GENERAL PLAN

MALMSTROM AIR FORCE BASE, MONTANA

The 341st Space Wing's vision is Professional team members building the world's most respected combat-ready mobility and ICBM forces.

This vision will be realized by implementing the 341st Space Wing Strategic Plan, which documents our mission, values, goals and key result areas, including ready deployable forces, quality mission support, a wholesome environment, and positive community relations.

This General Plan supports our strategic planning initiatives by guiding base development towards our vision. It summarizes information on environmental resources, infrastructure, land use, and capital improvements, and illustrates projects and improvements that support our goals and key result areas. Using the General Plan as a guide will ensure Malmstrom is a premier installation with facilities that support our vision of excellence.

J. GREGORY PAVLOVICH, Colonel, USAF
Commander

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Introduction

1.1 Introduction

The General Plan provides the 341st Space Wing commander and other key decision-makers a picture of Malmstrom Air Force Base's present and future capability to support its mission. It is a concise, stand-alone document, summarizing information from a variety of sources. Its illustrative format provides decision-makers with an understanding of the character and structure of the installation.

1.2 Description of the Planning Process

The Comprehensive Planning process enables a commander to logically analyze factors affecting the development of the base and evaluate alternative solutions to identified limitations. As stated in Air Force Instruction (AFI) 32-7062, *Air Force Comprehensive Planning*, "comprehensive planning incorporates Air Force Programs such as operational, environmental, urban planning, and others, to identify and assess development alternatives and ensure compliance with applicable federal, state and local laws, regulations and policies."

This General Plan was developed through a participatory process in which key personnel at the installation verified the base's mission, values, goals, and key result areas contained in the 341st Space Wing Strategic Plan. The General Plan integrates proposals that support the base's strategic planning initiatives, thus enabling component plans to complement one another. The result is a facilities-planning document that is parallel to and consistent with the vision for future development that key decision makers

341st Space Wing Headquarters

on the installation have established within the Strategic Plan.

1.3 The 341st Space Wing Strategic Plan

The 341st Space Wing Strategic Plan establishes the vision for Malmstrom AFB—

"Professional team members building the world's most respected combat-ready mobility and ICBM forces."

This vision is supported by the Wing's mission to keep America free and strong by providing combat-ready people and ICBM forces.

The Strategic Plan establishes key products and services that must be successfully addressed to meet requirements established by the base's customers.

Finally, the Strategic Plan establishes goals and objectives designed to move Malmstrom AFB closer to its vision. The goals of the Strategic Plan are to:

- Goal #1 Provide world class forces required for nuclear deterrence, mobility, and contingency operations by increasing readiness, surety, and timeliness of all Combat Ready Forces products and services;

- Goal #2 Sustain mission excellence by enhancing leadership and human development, personnel management, and quality of life to instill pride and professionalism; and

- Goal #3 Improve our corporate and individual citizenship by providing first class mutual aid, logistic support, search and rescue, and community education and service.

1.4 Comprehensive Planning Goals

The vision of Malmstrom AFB established in the Strategic Plan is supported by the Air Force's comprehensive planning process, which seeks to rationalize the process by which decisions concerning land use, infrastructure development, and project siting are made. Following

The Main Base Gate

The Base Heritage Center

are the goals of the installation comprehensive planning process:

- Direct and guide the long-range development of the base;
- Integrate interrelated functional programs derived from other component plans;
- Relate mission planning to policies, programs, and specific projects for installation facilities;
- Provide the basis for all decisions on siting of facilities and setting construction, repair, and renovation priorities; and
- Provide the basis for the preparation of the Five-Year Plan and other capital improvement programs, and long-range facility/infrastructure repair, renovation, and replacement.

1.5 General Plan Goals and Objectives

The overall goal of this planning effort is to provide a framework for programming, design and construction, and effective resource management, which will allow Malmstrom AFB to achieve its vision. If this goal is achieved, then facility development will enhance the operational efficiency of the base, while improving the overall environment in the interests of the health, safety, and welfare of those who live and work there.

The following is a list of objectives for this General Plan, indicating in parenthesis which of the 341st Space Wing Strategic Plan's goals each objective is intended to fulfill. These guidelines are subject to change and revision based on refinement by the Malmstrom AFB Facilities Board and Quality Council.

- Improve functional relationships by locating interrelated activities in proximity to one another, and separating incompatible activities from one another (Strategic Plan Goal #2: Sustain mission excellence).
- Improve morale, recruitment, and retention by providing an attractive built environment, both indoor and out, in work, living, and recreation areas (Strategic Plan Goal #2: Sustain mission excellence).
- Develop and operate the installation in cooperation and harmony with other services and the surrounding civilian community (Strategic Plan Goal #3: Improve citizenship).

- Improve and restore the on-base natural and cultural environment in a manner consonant with effective military training and adherence to environmental guidance and laws (Strategic Plan Goal #3: Improve citizenship).

- Ensure facilities and land uses are adaptable to and can expand to accommodate new missions, weapons systems, and training (Strategic Plan Goals #1 and #2: Provide world class forces and Sustain mission excellence).

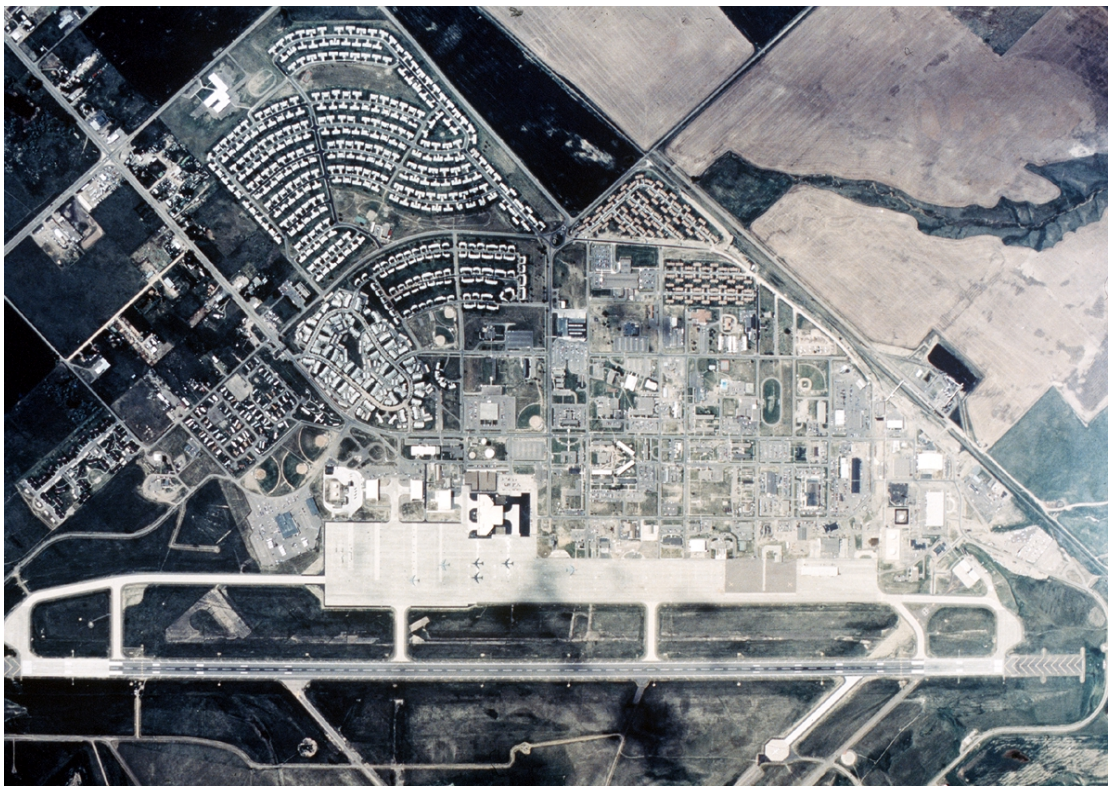
- Demolish inadequate structures and replace them with new facilities or renovate and relocate activities in existing facilities (Strategic Plan Goal #2: Sustain mission excellence).

1.6 Methodology

The General Plan has been formulated with consideration of information from three areas: mission, existing conditions, and current plans.

The current and projected missions of the units at Malmstrom AFB are described in Chapter 3. These missions are the standard for evaluating existing conditions, validating current plans, and implementing new plans. Existing conditions at the base and in the surrounding community are also described in general terms in Chapter 3. The six components of this General Plan (Composite Constraints and Opportunities, Infrastructure, Land Use, Capital Improvements Program, Facilities Excellence Plan, and Five-Year Plan) represent a compendium of current base plans

Aerial view of Malmstrom AFB



and are presented in narrative and graphic form in Section 4.

The process used to formulate the General Plan promotes informed, sound and coordinated decisions on future development of Malmstrom AFB.

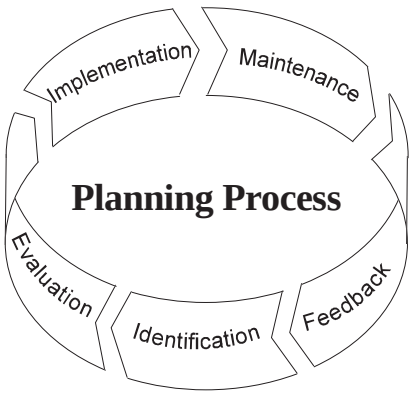
The five steps of this process are:

Identification of mission, goals, existing conditions and requirements. This step was initiated during the project kickoff meeting and continued through the following data collection phase leading up to the concept submittal.

Evaluation of constraints, opportunities and alternative solutions. This step followed preliminary data collection and involved review and analysis of subject matter by individual Air Force planning experts and by the project team.

Implementation of preferred alternatives. This step is accomplished incrementally as Malmstrom AFB development staff and decision makers proceed towards the vision for base development that the General Plan provides.

Maintenance of the General Plan. This step is accomplished on an annual basis during review and update of the plan.



As new missions or other impacts on development are defined, or as development is completed, the plan will be updated and remain current.

Feedback. This step is a continuous one in the comprehensive planning process. Feedback should be encouraged and received from all levels of the decision-making process, and subsequently be considered for reflection in the General Plan.

1.7 Roles and Responsibilities

AFI 32-7062, *Air Force Comprehensive Planning*, outlines responsibilities for developing, implementing, and maintaining the General Plan. Air Force Space Command provides a supplement to AFI 32-7062 that specifies additional responsibilities and requirements for the General Plan, Five-Year Plan and Facilities Excellence Program.

Command-level responsibilities related to these plans include policy formulation (Secretary of the Air Force), program oversight (Air Force Civil Engineer), and technical assistance (Air Force Center for Environmental Excellence and Air Force Civil Engineering Support Agency).

The Air Force Space Command Civil Engineer ensures Space Command installations establish and implement Comprehensive Planning and Facilities Excellence Programs, and develop and maintain the Five-Year Plan. In addition, AFSPC staff review plans for consistency and adequacy by coordinat-

ing on the 65 percent submittal of the installation General Plan.

The Wing Commander ensures all development actions are in accordance with the installation General Plan, and revalidates the General Plan annually through the installation Facilities Board.

The Base Civil Engineer and his staff provide day-to-day maintenance of the General Plan and ensure supporting plans and studies are accomplished as necessary.

1.8 Environmental Policy

In addition to establishing guidelines for growth on the installation, the comprehensive planning program furthers the goals and policies of the National Environmental Policy Act of 1969. To ensure this is accomplished, Malmstrom AFB:

- must follow the Environmental Impact Analysis Process whenever development is proposed on the installation, and

- remain in full compliance with local, state, and federal laws, regulations, and policies regarding protection of human health and the environment.

Section 2:

Plan Findings and Recommen-dations

Section 2:

Plan Findings and Recommendations

2.1 Vision

Through the 341st Space Wing Strategic Plan, Malmstrom AFB has established a vision of its future, which focuses on key areas for improvement and develops clear sets of goals, objectives, and plans to achieve its vision. To realize the 341st Space Wing vision, current capabilities must first be measured with full consideration of the complex built and natural environment. The General Plan provides an assessment revealing performance and capability gaps between the desired vision and existing conditions.

The General Plan, through its findings, recommendations, and four component plans, is the vehicle used to capture the Strategic Plan's vision for Malmstrom AFB. The General Plan will: provide continued guidance on future base development; assimilate the goals and status of the four component plans and their plan elements; and form a decision-making fabric for short- and long-range projects. The key environmental, infrastructure, and capital improvement initiatives for Malmstrom AFB are outlined in the following sections.

The base's host command, the 341st Space Wing, with its vision and mission shape the Strategic Plan framework. The 341st Space Wing's mission is to keep America free and strong by providing combat-ready people and ICBM forces.

The 341st Space Wing provides base and logistic support to 200 missile sites and 20 missile alert facilities at various locations in Montana. Malmstrom AFB's major tenants include the 819th RED HORSE Squadron, Air Force Office of Special Investigations, Civil

Air Patrol, and Defense Reutilization and Marketing Office.

The environment at Malmstrom AFB is both complex and diverse. Malmstrom AFB must support a wide range of customers, including U.S. Space Command, U.S. Strategic Command, and 341st Space Wing.

Malmstrom AFB has developed strong partnerships with its neighboring community, the City of Great Falls. The relationships fostered and resources shared between these communities will play an increasingly important role in the future development, vision, and mission attainment at Malmstrom AFB.

2.2 Findings and Recommendations

The findings and recommendations listed below summarize key issues affecting facility planning, future development and quality of life on Malmstrom AFB.

2.2.1 Composite Constraints and Opportunities

This component integrates the natural and cultural resources information, environmental quality issues, and airspace, operational, and safety requirements. Those factors, which have special development considerations or the potential to limit future development, are highlighted in the following sections and discussed in more detail in the appropriate Component Plan Overview.

2.2.1.1 Natural and Cultural Resources

The suitability of specific soils for construction is an important consideration at Malmstrom AFB. Since the base was built there have been numerous structural problems related to the movement of foundations and floor slabs. The planning stage of future construction projects should include geotechnical investigations of each building site.

Although no federally listed threatened or endangered species or potential habitats have been identified on Malmstrom AFB, it is a potential habitat for candidate and former candidate species. If these species—ferruginous hawk, loggerhead shrike and long-billed curlew—are eventually listed as threatened or endangered, consultation with the U.S. Fish and Wildlife Service will be required prior to initiating any construction project that may affect them.

Leadership Development Center

Approximately 36 acres of wetlands occur on Malmstrom AFB. While these areas are primarily contained within defined water bodies, future construction that could impact these areas will require a formal jurisdictional wetland delineation and U.S. Army Corps of Engineers permit.

Potential cultural resources exist on the base in the form of a segment of the Chicago, Milwaukee, St. Paul and Pacific Railroad, and several facilities. Alpha 1 and Alpha 6 Minuteman Missile facilities are recommended as currently eligible for listing in the National Register of Historic Places, while four others—Buildings 250, 300, 1700 and 1708—appear to warrant nomination. Potentially eligible buildings pending further research include Buildings 500, 769, 1460, 1464, 1705, and 1710. Development projects that consider alteration or demolition of these facilities should consider their historical significance with additional research.

2.2.1.2 Environmental Quality

Malmstrom AFB holds a Montana Pollution Discharge Eliminator System permit to discharge stormwater from industrial areas to the Missouri River. The base follows Best Management Practices in accordance with a Storm Water Pollution Prevention Plan to monitor the five permitted outfalls. Future development that lies within the associated drainage basins must consider additional stormwater contributions and effects on water quality.

Malmstrom AFB is a major potential source of pollutant emissions in accor-

Black Eagle Falls

dance with Title V of the Clean Air Act. While this is primarily due to the use of coal as a supplemental fuel at the Central Heat Plant, emission units associated with new construction must be assessed to determine if their operation would constitute a major modification to the installation's permit.

Twenty-five locations on Malmstrom AFB are designated as Installation Restoration Program sites; all are scheduled to be finished by the end of 2003. The base should continue to follow the Corrective Actions Program to implement appropriate corrective measures.

2.2.1.3 Operational and Safety Constraints

Operational and safety constraints at Malmstrom AFB are imposed primarily by the airfield and Weapons Storage Area.

Explosive safety quantity-distance zones associated with weapons storage and handling must be maintained when considering new development issues. Any change to the configuration of these areas conversely requires impact analysis on currently developed areas.

While Runway 03/21 is closed and not used for fixed-wing flying operations, there remains the potential for replacement of the flying mission and corresponding requirement to observe airfield safety criteria. Malmstrom AFB should therefore continue to protect against encroachment by off-base development, particularly in accident potential areas off the ends of the runway. Likewise, changes to existing land use patterns on base should consider compatibility with airfield operations activities assuming that the airfield will be open again at some point in the future.

Main entrance Flags

2.2.2 Infrastructure

The Infrastructure component of the General Plan examines all utility supply and delivery systems and provides a concise overview of their status and capacity to accommodate growth. Roadway and airfield pavements are also included in this component. Utility systems and pavement conditions, which have special development considerations or the potential to limit future development, are discussed in the following sections.

2.2.2.1 Utility Systems

All installation utility systems are adequate to meet current demands as well as supporting moderate growth. Capital investment requirements continue to be focused on reducing emergency maintenance requirements.

Elements of the water distribution, sanitary sewer collection, and natural gas distribution systems still require replacement of original construction materials

Electrical Substation

with polyvinyl chloride piping. Completing this effort will significantly reduce the potential for line breaks and, in the case of the sanitary sewerage, overloading the system with infiltration/inflow.

Transmission lines within the electrical distribution system are, for the most part, still located overhead on utility poles. Converting these aerial lines to buried lines will not only reduce emergency maintenance requirements, but also greatly improve the aesthetics of the installation.

Malmstrom AFB has been following a methodical, phased plan to replace distribution/collection piping, and to place electrical lines underground. Base decision makers and development personnel must continue to emphasize this portion of the Capital Improvements Program.

2.2.2.2 Pavements

Roadway pavements on Malmstrom AFB are in good to excellent condition. Emphasis should be placed on improving the condition of base parking lots, many of which are in poor condition. The base should also continue to construct sidewalks for pedestrian traffic, particularly in the core of the installation between unaccompanied housing, the community centers and industrial work areas.

While the condition of airfield pavements is not a concern relative to the current mission of Malmstrom AFB, the installation's ability to accommodate mission growth, specifically in terms of a flying or space mission, will in part focus on the runway, main parking apron and taxiways. Presently, the airfield pavements are in very good condition. Since funding is generally not available for maintenance of a closed runway, the base should make every effort to provide what limited maintenance it can to forestall deterioration.

2.2.3 Future Development

Future development embodies the functional relationships and planning factors that influence land use compatibility on base. Information from plan elements, planned projects, and installation growth patterns is synthesized and forms the basis for a land use plan that will guide future development at Malmstrom AFB. Future development findings and recommendations, comprised of potential development constraints and considerations, are discussed in the following sections.

2.2.3.1 Existing and Future Land Use

Current land use patterns on Malmstrom AFB reveal few incompatibilities between adjacent uses. Former aircraft operations and maintenance areas along

Base Housing Office

the flightline are now used for industrial activities, maintaining necessary separation from housing and community areas. Recommendations for improvement, based on current mission and population, focus on consolidation of a limited number of dispersed similar activities.

The future land use plan for Malmstrom AFB tailors existing land use patterns to provide consolidation of like activities and additional opportunities for development, and designates development areas for mission expansion. The Base Development office should ensure future facility sitings and development initiatives comply with this plan.

Development in off-base areas does not currently represent encroachment on the installation in either security or safety. As discussed in the Constraints and Opportunities component, the installation should continue to protect accident potential areas off the ends of the runway, particularly to the south. The principal concern of Malmstrom AFB regarding off-base land use is aesthetics of surrounding properties in unincorporated Cascade County, specifically to the west of the installation. Base decision-makers are considering an initiative to redesignate the north/commercial gate as the main base entrance to avoid blighted areas outside the south/main gate. A noteworthy concern regarding this proposal is that currently undeveloped properties near the north gate could likewise deteriorate.

2.2.3.2 Architecture and Landscape Architecture

A Facilities Excellence Plan has been prepared in conjunction with this General Plan (Appendix A) to provide guidance on exterior and interior architecture, and landscape architecture. The design standards provided in this plan should be implemented and applied to all base development activities.

2.2.3.3 Capital Improvements Program

The Malmstrom AFB Capital Improvements Program is designed to satisfy the facility requirements of current and projected missions. This component captures the short-term facility and infrastructure requirements of the base in the Five-Year Plan (Appendix B). This plan should be reviewed and updated as necessary to demonstrate the capital

The Commissary

investment strategy necessary to achieve the established 341 SW Vision.

2.3 Implementation Strategy

The 341st Space Wing Strategic Plan is the overarching document that establishes Malmstrom AFB's vision and sets its goals for the future. The General Plan supports the base's strategic vision in the area of facilities planning and development. It is therefore critical the General Plan be updated as the Strategic Plan is modified over time.

The Base Civil Engineer will implement the General Plan by following two primary strategies:

- Conveying the intent and importance of the General Plan to senior base leadership.
- Optimizing the existing processes for investing in construction, demolition and maintenance of real property.

Conveying the General Plan's importance and intent should begin within the 341st Civil Engineer Squadron, and then spread to other organizations within the 341st Space Wing, base tenants, and off-base organizations.

Preparation of the General Plan for Malmstrom AFB required the contributions of several people. Implementation of the General Plan requires support and resources from even more people. To that end, the installation's planners should:

- Solicit the Wing Commander's active support.
- Accompany distribution of the final General Plan report with formal or informal briefings by 341 CES personnel.
- As the General Plan and Commander's Summary are distributed, actively seek suggestions for improvement and incorporate these ideas into annual updates of the documents.

The existing processes for base development include normal CES mission activities and the functions of the Facilities Board. To optimize their effectiveness:

- Monitor the base's capital improvements program, coordinating the various funding sources and priorities, preparing budgets for new projects that advance the General Plan, and preparing phasing plans.
- Review construction, renovation, demolition, and maintenance projects to identify how they can advance long-range plans and enhance the environment. For example, as buildings are demolished, remove or close streets that are no longer needed.

Section 3:

Installation and Vicinity Profile

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3.1 Profile of Malmstrom AFB

Malmstrom AFB is located east of the City of Great Falls in west central Montana in a section of rolling hills and plains about 75 miles east of the Rocky Mountains. The 341st Space Wing is the host unit at Malmstrom AFB; major tenants include the 819th RED HORSE Squadron, Air Force Office of Special Investigations, Civil Air Patrol, and Defense Reutilization and Marketing Office. The 341st Space Wing also provides base and logistic support to 200 missile sites and 20 missile alert facilities at various locations throughout Montana.

3.2 341st Space Wing

The 341st Space Wing has both an operational and support mission. Wing responsibilities include missile and

Minuteman ICBM

helicopter maintenance and the day-to-day operation of Malmstrom AFB. The Wing is responsible for supporting nearly 5,000 Air Force personnel, both military and civilian, plus over 5,000 dependent family members.

To accomplish its mission, the 341st Space Wing is organized into four functional groups: operations, logistics, support, and medical. The men and women assigned to the 341st Space Wing combine talents to constantly enhance peacetime and wartime capabilities in Montana.

3.2.1 341st Operations Group

The 341st Operations Group is responsible for operating and securing 200 Minuteman III missiles on continuous alert at Malmstrom AFB. The Wing's four missile crew squadrons are: 10th Missile Squadron, 12 th Missile Squadron, 490th Missile Squadron and 564th Missile Squadron. The 341st Operations Support Squadron provides current operations, weapons and tactics, and weather flights for the 341st Space Wing's mission. These tasks encompass managing the airfield, training missile crews and support personnel for on-alert duties, and disseminating accurate weather products. The 40th Helicopter Flight performs priority security response for the missile field, aerial convoy surveillance and priority airlift support for missile maintenance and operations in the UH-1N Iroquois helicopter.

Home of the 341st Operations, Logistics, and Support Groups

UH-1N Iroquois

3.2.2 341st Logistics Group

The 341st Logistics Group provides the Wing with comprehensive support in the areas of maintenance of Minuteman ICBMs, supply, transportation, and contracting. These functions are tasked to four squadrons within the Group; they are: 341st Logistics Support Squadron, 341st Contracting Squadron, 341st Maintenance Squadron and 341st Transportation Squadron.

3.2.3 341st Support Group

The 341st Support Group is responsible for a variety of support functions imperative to daily operations at Malmstrom AFB. The group performs mission support, communications, security, civil engineering, recreation, food services, youth programs, and facility management. To conduct these many and diverse functions, the Group maintains five squadrons; they are the 341st Civil Engineer Squadron; the 341st Communications Squadron; the 341st Security Forces Squadron; the 341st Mission Support Squadron; and the 341st Services Squadron.

3.2.4 341st Medical Group

The 341st Medical Group contributes to the Wing mission by providing medical, dental, and aeromedical evacuation support. Air Force and contract physicians perform outpatient treatment and surgery covering a wide variety of specialties which include: Family Practice, General Surgery, Gynecology, Pediatrics, Orthopedics, Podiatry, Mental Health, Optometry, Physical Therapy, Pharmacy and Public Health to all personnel enrolled in Tricare Prime, and others on a space available basis. Special services that are not available through the base clinic may be offered through the Benefis Health Care System in Great Falls. The 341st Medical Group is composed of two squadrons: the 341st Medical Support Squadron and the 341st Medical Operations Squadron.

Dental Squadron activities

3.3 Installation Tenants

The 819th RED HORSE Squadron is designed to provide rapid construction of airfields and supporting environments in remote parts of the world. The squadron's 400 personnel are comprised of engineers, medical, food service, vehicle and equipment maintenance, logistics plans, and supply personnel. The squadron has the capability to deploy within 72 hours of notification.

Malmstrom's Air Force Office of Special Investigations provides specialized investigative support to all U.S. Air Force commanders at the base and in the surrounding area. Detachment 436 maintains liaison in all activities for the Air Force with all municipal, federal and international law enforcement agencies on matters which affect the Air Force. The unit's area of jurisdiction covers the entire state of Montana, as well as all of Alberta, Northwest Territories, and Yukon, Canada.

The Area Defense Counsel represents active duty military members in the

New Base Housing

areas of military justice and other adverse military personnel matters.

The Army and Air Force Exchange Service (AAFES) primary mission is to provide patrons with quality merchandise and services of necessity and convenience at consistently low prices. AAFES runs a Commissary, Base Exchange, Class Six, and Shoppette at Malmstrom.

3.4 Geographic Location

As shown in Figures 3.1 and 3.2, Malmstrom AFB is situated on approximately 4,120 acres within the boundaries of Cascade County, Montana. The base is located south of the Missouri River approximately 75 miles east of the Rocky Mountains and 2 miles east of the City of Great Falls. Malmstrom is 120 miles south of the Canadian border and 180 miles northwest of Billings, the largest city in Montana.

Malmstrom AFB is located at 47 degrees, 30 minutes north latitude and 111 degrees, 12 minutes west longitude. Major transportation links include Interstate 15 and U.S. Highways 87 and 89. In addition, rail lines provide rail freight transport through the Great Falls area via the Burlington Northern Railroad.

3.5 Base Population

There are 3,483 active duty military personnel assigned to Malmstrom AFB; of this number, 1,929, or 55 percent, reside on base while the remainder live off the installation. Family members and dependents of these military personnel total 4,692 people. Additionally, Malmstrom employs 1,266 civilian employees. The number of people associated with Malmstrom AFB exceeds 9,400 when all military personnel, civilian workers, and dependents are totaled.

Malmstrom Air Force Base, Montana

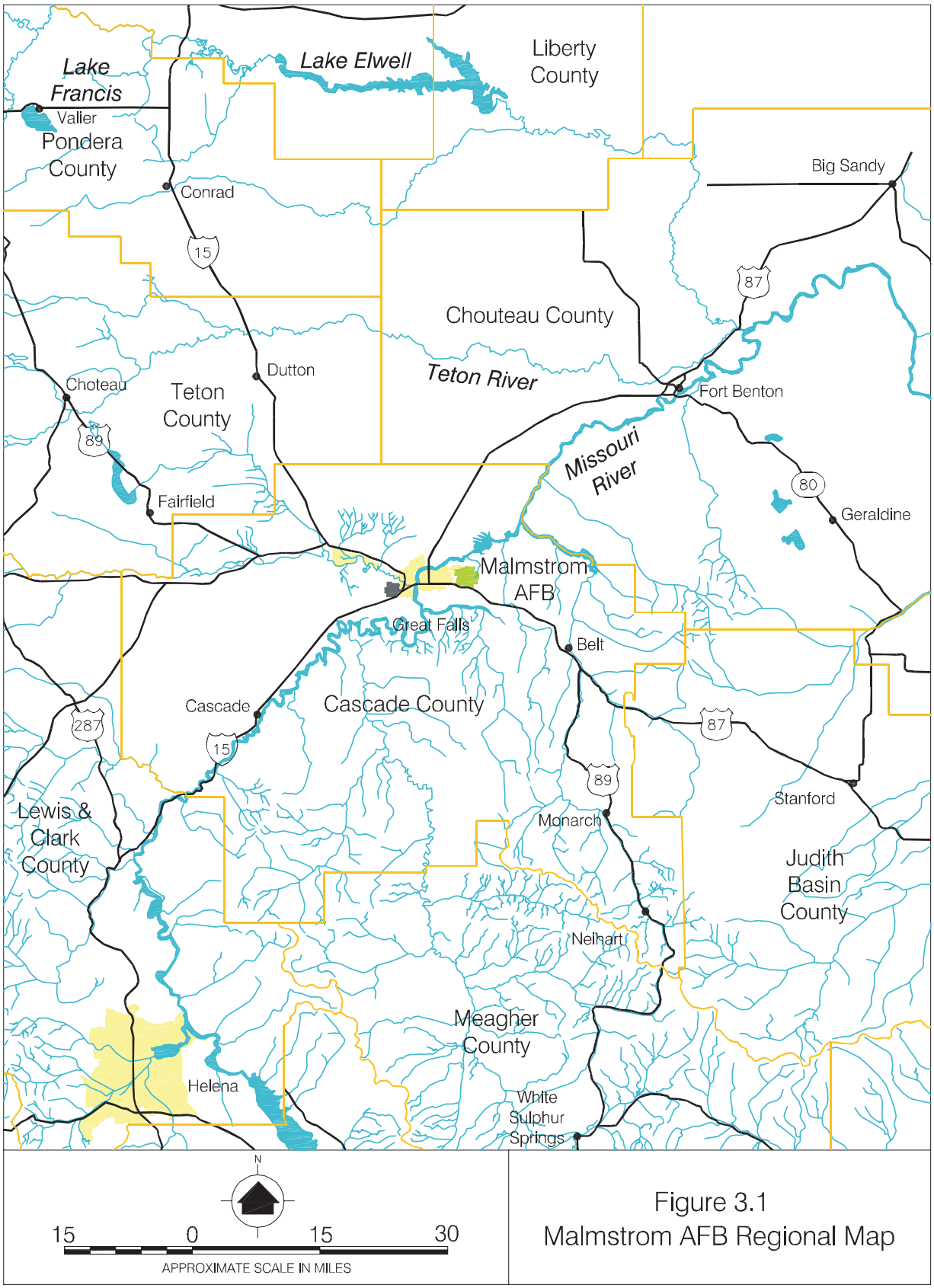


Figure 3.1
Malmstrom AFB Regional Map

Malmstrom Air Force Base, Montana

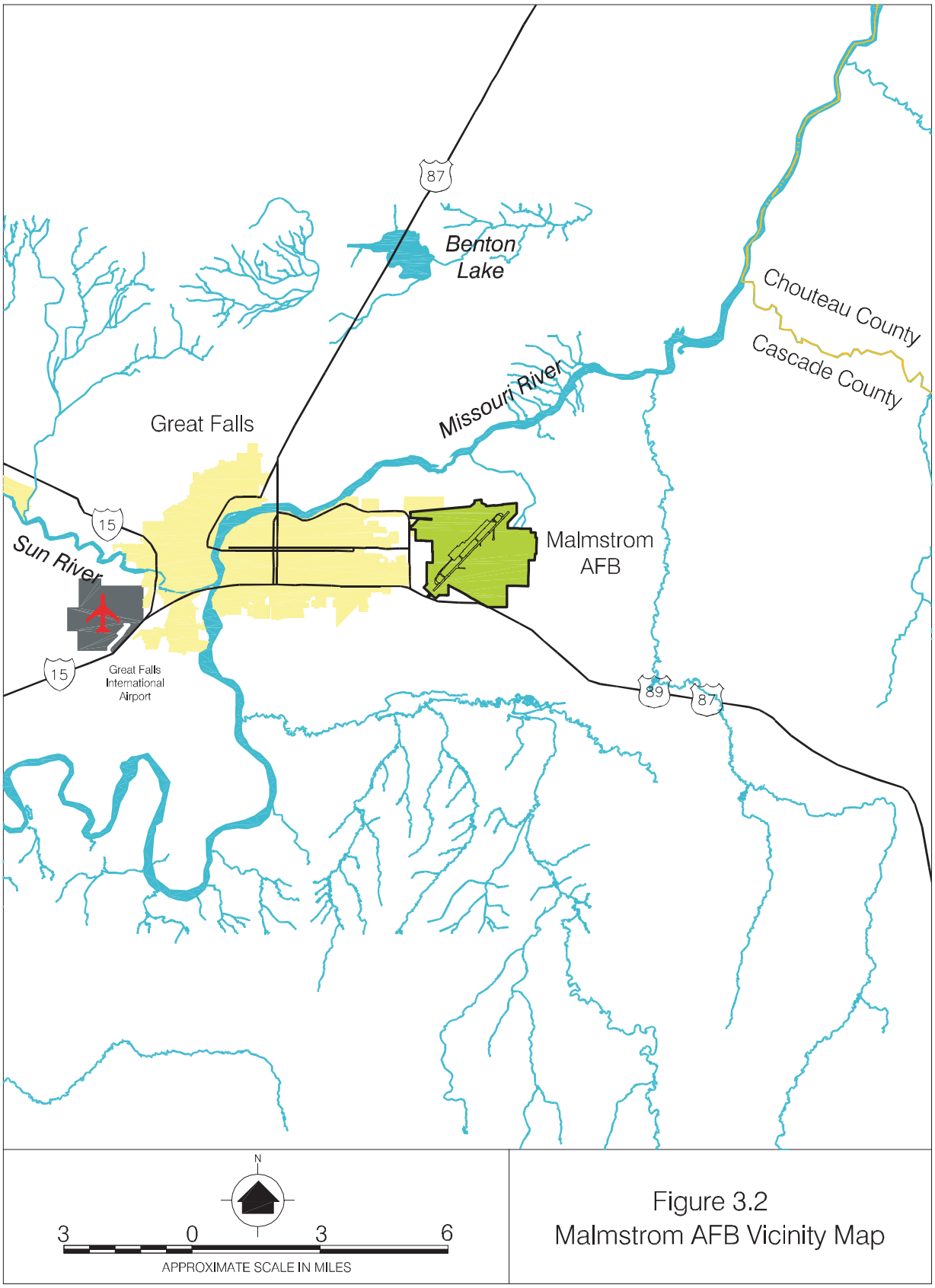


Figure 3.2
Malmstrom AFB Vicinity Map

3.6 Physical Assets

Facilities at the base encompass one runway, associated taxiways and parking aprons; unit headquarters; industrial facilities; dormitories and housing areas; recreational facilities and open space; and undeveloped land. Fixed wing flying operations were halted in January 1997 as a result of Base Realignment and Closure (BRAC) 95 decisions. Malmstrom's principal cantonment area is located in the western half of the base, while the eastern portion of the base is made up of the airfield runways, taxiways, and aprons along with operations and maintenance facilities and the Weapons Storage Area. In addition to assets located within the Malmstrom AFB boundary, the Air Force controls over 200 mission-related resources throughout the state of Montana.

3.7 Base and Local History

Malmstrom AFB's development began in 1940 with the Lend-Lease Act that supplied war materials to the Allies. The Army Air Force, specifically the 7th Ferrying Group of the Air Transport Command, shuttled aircraft and supplies to the Soviet Union through the Great Falls Airport. As the flow of material began to overwhelm the airport's inadequate facilities, plans for an Army Air Base to the east of Great Falls became reality. Construction began in the summer of 1942, and the "East Base" became active on 15 December 1942.

After the war, the Military Air Transport Service assumed command of the base and trained C-54 transport aircraft crews. Great Falls Army Base became Great

Historical Main Gate

Falls Air Force Base (AFB) in 1947. The Strategic Air Command took control of the base in February 1954 when it activated the 407th Strategic Fighter Wing (SFW).

The history of Great Falls AFB took new meaning on 21 August 1954, when a plane crash claimed the life of Colonel Einer Axel Malmstrom. In the short period of his tenure as Vice Wing Commander, Colonel Malmstrom endeared himself to the local community. Saddened by the loss, the people of Great Falls began a drive to rename the base after him.

The installation was officially dedicated Malmstrom AFB on June 1956 by the Department of the Air Force. The deactivation of the 407th SFW had occurred on 1 July 1954, and the 4061st Air Refueling Wing (ARW) became the host unit until its deactivation on 15 July 1961, the same day the 341st Strategic Missile Wing (SMW) was activated. Malmstrom officially entered the Inter-Continental Ballistic Missile (ICBM) age with the activation of the 341st.

In January 1988, Malmstrom gained its first flying wing since 1961, when the 301st ARW activated. The first KC-135R Stratotankers were tasked to refuel aircraft worldwide. Malmstrom entered another era in July 1989, when the 40th Air Division activated. The division called Malmstrom its home for two years before it deactivated in June 1991 as a result of Air Force-wide force structure reorganization. Under this reorganization, the refueling wing was redesignated the 43rd ARW and became the host unit. The missile wing became an associate unit and was renamed the 341st Missile Wing (MW).

Recreation in Great Falls, Montana

The 341st MW regained host unit responsibility at Malmstrom AFB on 1 July 1994. While at Malmstrom, the 43rd ARW was deactivated, transferring operations to MacDill AFB Florida on 30 September 1996. On 1 October 1997, at the direction of Air Force Space Command, the 341st Missile Wing was redesignated the 341st Space Wing. The redesignation reflects the logical progression of incorporating the entire spectrum of space operations as an integral element of air and space power.

3.8 Socioeconomic Conditions

Malmstrom AFB is located adjacent to the City of Great Falls, which encompasses approximately 17 square miles. The City of Great Falls is the county seat and second largest city in Montana with an estimated population of 56,000 persons.

In a predominantly rural area, Great Falls is largely dependent upon the fluctuations of the agricultural industry. Due to the area's natural terrain, Great Falls residents enjoy a high quality of life attributable to the numerous recreational opportunities and natural wildlife habitat in the area including: national and state parks, landmarks, historical sites, museums, galleries, libraries, and ski areas. Additionally, shopping malls, religious services, public and private schools, and higher education institutions serve the Great Falls community.

The operation of the base makes an important contribution to the economy of the region through both direct employment and purchases from local businesses. The presence of the base provides economic stability to the city and the region. Malmstrom's annual payroll obligates $129.2 million to military and civilian employees, and the Air Force contributes an estimated $98.2 million in construction and service contracts and other purchases from local businesses. Malmstrom AFB has a total economic impact of over $259 million per year on a 50-mile radius that includes the counties of Cascade, Judith Basin, Lewis and Clark, Teton, Pondera, and Choteau.

3.9 Local Government

The City of Great Falls system of government consists of an elected mayor and four elected council members. The City Commission members operate under overlapping four-year terms; while the Mayor of Great Falls is elected at-large for a term of two years. The

Local scenery

Mayor conducts the administrative and operational activities. The Commission is responsible for the executive, legislative and strategic policy making functions.

The City-County Planning Department manages development and growth plans for the City of Great Falls and Cascade County. A nine-member City-County Planning Board assists in the direction of planning issues. Additional committees addressing planning related issues are the County Zoning Commission, the Great Falls Housing Authority Board, Community Development Board, and the High Plains Development Authority.

3.10 Community Involvement

Base personnel foster a positive community image for Malmstrom AFB and the United States Air Force by participating in a variety of community activities and providing a number of community services. Guided tours are available for civilians and veterans alike and speakers are available for schools or other agencies desiring to host an Air Force speaker. Other community involvement activities include base tours, support for Scout camps, and a co-commander's committee where base senior staff have counterparts downtown. The local community reciprocates this friendly spirit by holding a Military Appreciation Picnic each summer for military members at Malmstrom to attend. This event is hosted by the community's principal military advocacy group, the Military Affairs Committee.

Section 4:

Component Plan Overview

Section 4:

Component Plan Overview

4.1 Introduction

This Section synthesizes the six components of the General Plan for Malmstrom AFB which include: Composite Constraints and Opportunities; Infrastructure; Land Use; Capital Improvements Program, Facilities Excellence Plan; and Five-year Plan. Collectively, these components provide the input that enables future development planning for Malmstrom AFB.

Each component captures summary information from various studies, reports, documents, and researches which have previously been prepared in each specific subject area. The purpose of this hierarchy of plans is to provide the appropriate scope of detailed, accurate information at each level. Decision-makers at the installation and command level can understand the development potential of the installation based on summary information in the General Plan, while the Base Civil Engineer uses the contributing elements to manage specific development programs.

4.2 Composite Constraints and Opportunities

This component addresses and summarizes all of the natural and man-made factors affecting development of Malmstrom AFB. Each of these factors falls into one of three categories: natural and cultural resources; environmental quality; and operational and safety constraints. Factors in these categories can greatly influence the potential use of Air Force real property. Generally, Air Force Policy Directive (AFPD) 32-70, *Environmental Quality* encourages the implementation of environmental programs throughout the Air Force; the goals of these programs include cleanup, compliance with

Base Beautification

environmental regulations, natural and cultural resources conservation and management, and pollution prevention.

Those factors, which present or may present impediments to future development are summarized in the following paragraphs. Figure 4.1 features summary data from subsequent figures and text Sections 4.2.1 and 4.2.2. This figure details information on natural, cultural, and environmental constraints and opportunities at Malmstrom AFB.

4.2.1 Natural and Cultural Resources

It is DoD policy to protect and conserve natural and cultural resources for which it is responsible; Malmstrom AFB provides planned and coordinated management for development, improvement, maintenance and conservation of the base's natural and cultural resources in keeping with the accomplishment of their assigned mission. This effort is to ensure conservation of natural and cultural resources and the military mission are not mutually exclusive. Therefore, all current and planned development activities, including master planning, construction and site approval requests, and training exercise plans, must consider the intent of DoD and base policies on the protection of natural and cultural resources.

The following summary will provide an assessment of these resources as they occur at the base. The assessment is the basis for evaluating potential effects to the environment and the extent to which future development at the installation may be constrained by natural and cultural resources.

4.2.1.1 Geology

Malmstrom AFB is located over the eastern flank of the Sweetgrass Arch. The Sweetgrass Arch is the dominant bedrock structural feature in north central Montana. It extends northwest between the Little Belt Mountains (24 miles/39 km south), past the base on the southwestern side, and into Alberta, Canada. Impervious glacial till is the predominant unconsolidated deposit over bedrock at Malmstrom AFB.

Throughout the geologic sequence, rock formations that are present elsewhere are either missing or noticeably thinner along the Arch. The surficial deposits on the northwestern third of the base are mostly Holicene dune sands and the sandy and silty subunit of the glacial-lake deposits. The contact between these two units is approximate. Both of these units are relatively thin; their combined thickness on the base is about 10 feet. These units overlie 50 to 200 feet of till.

4.2.1.2 Soils

The soil types corresponding to the glacial till parent material, as classified by the Soil Conservation Service, are within the No. 122 Lawther series, which is predominantly silty clay or clay. The predominant soil series is an alluvium consisting of silty clays and sandy loam, covering approximately 75 percent of the base. The majority of the remaining area is covered with a silty clay loam formed by glacial till and glaciolacustrine materials as shown in Figure 4.2.

The predominant soil type developed on the sands and silts over the northwest third of the base is the No. 53 Dooley series (Soil Conservation Service). This series includes sandy loam, sandy-clay loam, clay loam, and clay. Permeability ranges from 0.6 to 6.0 inches per hour, and available water capacity is moderate. Surface water runoff is slow due to the level nature of the surface.

There are a number of soil properties which can impose constraints to specific land uses. Soil erosion can occur in any area where conditions are conducive to it: steep slopes, disturbed soils, soils with insufficient ground cover, and the presence of a carrying force, like wind or water. The degree of erosion depends on the slope of the ground, the force of the carrying agent, the extent of ground cover, and the susceptibility of the particular soil type to erosion.

Most of the soils on Malmstrom AFB are not highly subject to wind or water erosion. Under natural vegetative conditions, these soil types and topography would not exhibit extensive erosion, but can become erodible under conditions associated with cultivation or development (e.g. grading, excavation). The dominant soil series on base, Lawther and Dooley, have only a moderate native erosion hazard due to wind and a slight hazard due to water. The Virgelle soil, which occupies a relatively small area in the

Wet Soil Lands

northwestern portion of the base, has the greatest potential for erosion from wind due to its fine sandy surface texture. The Hilton soil, present as a narrow strip in the east-central part of the base, has the greatest potential for erosion for water due to a combination of soil texture and slope. Any activities which have the potential to disturb vegetative cover of Virgelle and Hilton soils should include actions to reduce erosion.

The suitability of specific soils for construction is also an important consideration at Malmstrom AFB. Since the base was constructed, there have been numerous building problems related to the movement of foundations and floor slabs. Many of the soils on Malmstrom AFB contain shrinking and swelling clays and have limitations to building construction. These include Lawther, Gerber, Gerber-Lawther, Acel, McKenzie, and Lawther-Gerber soils. Most of these problems have occurred during and shortly after construction, and most have been considered to be due to expansive foundation materials. The shrinking and swelling of these clays in a soil can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A soil with a high shrink-swell potential indicates the need for special design considerations.

Added expense may be required if a soil will not tolerate large volume changes necessary to the planned use. The planning stage of future construction projects must, therefore, include geotechnical investigations to determine specific engineering properties and the development potential of each potential construction site. Results of such investigations may indicate mitigation measures (e.g. removing or bypassing poor soils, stabilizing existing soils, or modifying foundation design) are necessary if development is to proceed. The U.S. Army Corp of Engineers (USACE) recommended using a pier and grade beam foundation system to eliminate differential settling. Additionally, it was recommended all construction begin in late April or May when soil moisture conditions are high and the soil can be better stabilized.

4.2.1.3 Climate

The climate of the installation is typical for the semiarid, northern tier location. Humidity and precipitation are low and accompanied by large fluctuations in daily and seasonal temperatures. During the winter months, warm winds called Chinooks are common and prevent large accumulations of snow. July is the warmest month with a mean high temperature of 82 degrees Fahrenheit (F), while January is the coldest with a mean low temperature of 11 degrees F. Average annual precipitation is 15.24 inches, while the average annual snowfall is 58 inches.

Semiarid climate reflected in plant growth

Relatively Flat Terrain on Main Base

4.2.1.4 Topography

Malmstrom AFB is situated in a section of rolling plains about 75 miles east of the Rocky Mountains. Malmstrom AFB lies at an elevation of 3,525 feet above sea level on a plateau which slopes away from the Little Belt, southeast of the base. The topography is characterized by broad, gently sloping plains that have been moderately dissected by numerous streams. Stream valleys are interspersed throughout the area, but most of the year these valleys are dry. Any water runoff is directed into coulees or ditches which ultimately join one principle, but unnamed coulee, which discharges into the Missouri River. The greatest natural physical relief (40 to 50 feet) occurs in the northeast section of the base where runoff has carved a course through the glacial till. There are no major drainages within the Malmstrom AFB boundaries; however, nine surface water drainage basins have been identified.

The southwestern portion of Malmstrom AFB lies at an altitude of approximately 3,500 feet (1,067 m) above sea level, and is 100 feet (30.5 m) higher than the northeastern section. This gradual change occurs over 2.3 miles (3.7 km), resulting in an average slope of 0.5 degrees (0.9% grade) rising to the south-southwest. There are no topographic constraints to development on the installation, except the steep slopes at each end of the runway.

4.2.1.5 Vegetation

Little native vegetation currently exists on Malmstrom AFB. Over the years native vegetation on lands within the base boundaries has been altered or modified by developmental activities and the introduction of exotic grasses. Most of the open fields on the southeast portion of the base have been plowed and planted to such introduced grasses as crested wheatgrass (Agropyron cristatum), Kentucky bluegrass (Poa pratensis), and intermediate wheatgrass (Agropyron intermedium). Introduced weedy forbs, including bracteate verbena (Verbena bracteata) and summer cypress (Kochia scoparius), have invaded the area, although some native grass species have recolonized sites to a small degree

Mature Deciduous Shade Trees

(BioSystems Analysis, Inc. 1994). Three State of Montana Category 1 noxious weed species, Canada thistle (Cirsium arvense), field bindweed (Convolvolus arvensis), and spotted knapweed (Centaurea maculosa) have been found on base (BioSystems Analysis, Inc. 1994). A detailed survey of the base's flora has not yet been accomplished.

An inventory of threatened and endangered plant species was completed in 1994. The report recommended an ecological management strategy which would keep native plant communities intact and preserve features which are an integral part of wildlife habitats.

The ecological management strategy for Malmstrom AFB and the launch and control facilities should aim to keep native plant communities intact and to preserve key features which are an integral part of wildlife habitat. Native plant communities generally support a diversity and cover of plant species which have adapted to regional environmental conditions. Fragmentation of native communities resulting from activities such as road construction modifies the local ecological systems, particularly at habitat margins where newly exposed bare soil supports a different set of plant species, usually introduced weeds. Any activities which result in extensive topsoil disturbance also promotes colonization of bate ground by nonnative and often noxious weed species.

4.2.1.6 Wildlife

Wildlife in the area formerly included bison, Rocky Mountain elk (wapiti), pronghorn antelope, mule deer, white-tailed deer, black bear, and various small mammals. In 1994, an Endangered and Threatened Species inventory was completed for the base and its associated missile launch sites (BioSystems Analysis, Inc. 1994). No federally listed threatened or endangered species, or potential habitat for these species, was identified on base. No other sensitive species were found on base either. A query of the Montana Natural Heritage Program (MNHP) database yielded a list of species of concern within a 20-mile (32 km) radius of Malmstrom AFB. None of these species occur on base, nor does potential habitat for these species exist on base. However, threatened or endangered species (e.g. bald eagles) have been observed near the missile launch sites. The Malmstrom AFB Fish and Wildlife Management Plan contains a complete listing of birds, mammals, amphibians, reptiles, and fishes observed within a 50-mile radius of the installation.

Malmstrom AFB is a potential habitat for candidate (ferruginous hawk and loggerhead shrike) and former candidate (long-billed curlew) species. Although no specific protective measures are required, it is recommended consideration be given to preventing disruption of their habitat. In general, avoiding excessive vegetation disturbance in areas of suitable habitat is

recommended to avoid impacts to all of the avian species with the exception of the one raptor, the ferruginous hawk. Impacts to this species from Air Force activities are deemed unlikely. For sites which contain suitable habitat for Preble's shrew, a survey is recommended if a substantial amount of vegetation will be altered or removed. A biologist should be consulted if foraging areas for the spotted bat will be disturbed. The Endangered Species Biological Survey for Malmstrom AFB (BioSystems Analysis, Inc. 1994) provides additional site-specific management recommendations for these species.

If any of these species are eventually listed as threatened or endangered, consultation with the U.S. Fish and Wildlife Service (USFWS) will be required prior to initiating any project which may affect them.

Threatened or endangered species, thus, do not currently impose a constraint to development on Malmstrom AFB. Future verified sightings of threatened or endangered species on base might necessitate the preparation of a biological assessment by, or under the direction of, the USFWS.

4.2.1.7 Wetlands

Another natural resource constraint, or opportunity for resource conservation, is the presence of wetlands on base as shown in Figure 4.3. A National Wetlands Inventory was performed in 1994, and wetland areas were identified on the base. Wetlands are defined as lands where saturation with water is the dominant factor in determining the nature of soil and the types of plants and animals present.

Wetlands, comprising approximately 36 acres (14.5 ha), exist on-base in various

Wetlands

locations: in the westernmost part of the family housing area; adjacent to the northern base boundary; east of the airfield; in various locations in the vicinity of the Weapons Storage Area and Pow Wow Pond; and along a drainage ditch in the southern portion of the base. Species such as common cattail (Typha latifolia), spike rush (Eleocharis palustris), and hardstem bulrush (Scirpus acutus) commonly occur in these wetlands (BioSystems Analysis, Inc. 1994).

The wetlands on Malmstrom AFB have been classified according to a system developed by the USFWS to evaluate, inventory, and manage wetlands. The dominant systems found on Malmstrom AFB are "palustrine," which designates a shallow, standing water pond environment, and "riverine," which describes wetlands contained within a channel that may be continuously or only periodically flooded. Existing wetlands are primarily located in undeveloped portions of the base.

The USACE is responsible for the management of wetlands within the U.S.; a permit must be issued by the USACE before initiating any project which will alter a wetland area (33 CFR 330.1). The definition of development within wetlands is

very broad and includes erosion control projects and the construction of road crossings.

4.2.1.8 Flood Plain

Malmstrom AFB is located on a high plateau south of the Missouri River. Previous studies indicate that the base is approximately 100 feet (30.5 m) above the 100-year floodplain of the river. As such the floodplain poses no constraint to development.

4.2.1.9 Outdoor Recreation Areas

Malmstrom AFB has several outdoor recreation areas as shown in Figure 4.4. These include numerous athletic fields on the west side of the base; playgrounds scattered throughout family housing; and Pow Wow Park/Pond, horse riding stables and an archery range on the east side.

Since most of these areas are man-made and relocateable, they pose no constraint to development. However, if development is planned in current outdoor recreation areas, replacement facilities should be provided elsewhere.

4.2.1.10 Historic Buildings

Malmstrom AFB conducted a material culture inventory during the summer and fall of 1996 to identify extant Cold War resources important to the base, its history, and its Cold War mission. These resources represent the United States Air Force alert posture, weapons delivery potential, and deterrence capabilities during the Cold War era.

The draft Cold War report identified the following for documentation and evaluation: 214 non-housing buildings and structures, 2

One of Several Playground Areas

Capehart and 2 Wherry housing units, 8 Minuteman Missile facilities, as well as objects and records/documents. Recommendations for these resources range from stewardship to National Register of Historic Places of eligibility.

The report identifies two resources, Alpha-01 and Alpha-06 Minuteman Missile facilities, as currently eligible for listing on the National Register of Historic Places (NRHP) while four other resources (Buildings 250, 300, 1700 and 1708) are potentially eligible. Buildings 500, 769, 1460, 1464, 1705, and 1710 may warrant nomination for the NRHP pending the outcome of additional background research

Historical Rail Area

recommend by the report. Building 360 was determined eligible and mitigation was performed so the facility could be demolished. The locations of these facilities are shown in Figure 4.5.

Another area, a segment of the Chicago, Milwaukee, St. Paul and Pacific Railroad (now Burlington Northern), located along the northern perimeter of the installation, may be eligible based on its role in the Euro-American settlement of the region, although no determination has been made yet. The presence of these facilities poses no constraint to development.

4.2.1.11 Archaeological Sites

The 1994 Archaeological Survey Report indicates only one prehistoric archaeological site (small lithic scatter) located on the installation as shown in Figure 4.5. Near-surface sediments were apparently deposited prior to the arrival of human populations (approximately 12,000 years ago) and the area possesses little or no potential for deeply buried archaeological remains. Artifacts deposited on the surface could have been redeposited in or near surface contexts by processes such as frost action or tramping.

Stormwater Outfall

A national landmark covering 7,700 acres of noncontiguous lands has been established to recognize the portage route of the 1804 Lewis and Clark expedition. This route allegedly extends across the installation, however, no validating archaeological evidence has been discovered. Therefore, none of the base property has been recommended for addition to that landmark. Archeological sites pose no constraint to development on the installation.

4.2.2 Environmental Quality

Malmstrom AFB maintains a comprehensive set of policies and plans to ensure its mission does not adversely affect the surrounding natural environment. The Malmstrom AFB Environmental Protection Plan contains several programs developed to protect environmental quality on the installation. These programs respond to federal, state, and local regulations, Air Force directives, and the desire for good environmental stewardship by the base. Descriptions of these programs are provided in the following paragraphs.

4.2.2.1 Water Quality

Water quality programs at Malmstrom AFB protect both ground and surface water quality. Human activities, particularly urbanization, can alter natural drainage patterns and add pollutants to the rainwater and snow melt that run off of the earth's surface and enter into rivers, lakes, streams, and coastal waters.

Malmstrom AFB has both shallow and deep groundwater. The shallow groundwater is thought to be due to both geologic makeup and human activities (trenching and filling). Shallow groundwater can be found on base at depths ranging from 3 feet to

approximately 20 feet. This water has been adversely impacted at some of the Installation Restoration Program sites described in 4.2.2.4. Due to the limited supply of water, and the discontinuous nature of this shallow aquifer it is unlikely it will be used as a water source in the future. Deep groundwater sources on the base are the Kootenai aquifer (approximately 150 to 200 feet deep) and the Madison Swift aquifer (approximately 450 to 500 feet deep).

Surface water or storm water drainage from Malmstrom AFB flows through a system of underground pipes, ditches, swales, and natural drainages to reach the Missouri River, approximately 1.7 miles (2.7 km) north of the base boundary. Nine primary surface water drainage basins have been identified as shown on Figure 4.6. Six basins have point discharges and of these, five are monitored and sampled in compliance with a storm water permit issued by the State of Montana.

The base holds a Montana Pollution Discharge Eliminator System (MPDES) permit to discharge storm water from industrial areas into the Missouri River. Storm water discharges represent a potential pathway by which pollutants can enter surface waters, and the permit requires the base monitor the five outfalls that contribute significant runoff to surface waters. The permit further specifies storm water discharges covered under the permit must meet all water quality standards, including non-degradation, for the receiving water body.

The installation's Storm Water Pollution Prevention Plan (SWPPP), prepared in compliance with the MPDES permit, specifies Best Management Practices (BMPs) the base uses to minimize the discharge of pollutants into the storm water system (MAFB 1994b).

The State requires the permit be modified when changes in activities on the installation

Base Stormwater Discharges in to the Missouri River

have a significant effect on the potential for discharges of pollutants, or if the SWPPP is ineffective in protecting state waters.

4.2.2.2 Air Quality

The Clean Air Act establishes guidelines for obtaining, and standards for maintaining, air quality. Malmstrom AFB and Great Falls are included in the Great Falls Intrastate Air Quality Control Region No. 14 which is in attainment of the federally established air quality standards. An Air Emissions Inventory conducted in 1996 identified the Central Heat Plant (boiler operations) as the largest source of criteria pollutant emissions at Malmstrom AFB. Malmstrom AFB is a major source of criteria pollutant emissions and is therefore subject to Title V of the Clean Air Act.

While the Central Heat Plant is fueled primarily by natural gas, coal is used during the winter months as a supplement if temperatures drop to a point where it is more economical than using natural gas alone. When coal is used, a flue gas desulfurization (FGD) system is activated to control emissions. The Environmental Protection Agency and the State of Montana have issued permits to construct, operate, and emit from this plant.

Malmstrom AFB is also subject to the provisions of 40 CFR 52.21, "Prevention of Significant Deterioration (PSD)." The base is a PSD major source due to the potential emissions of Nitrous Oxides from the Central Heat Plant and is therefore required to assess all new emission units to determine if their operation at the installation would constitute a major modification.

Two other potential sources of air pollution are asbestos and radon. Although asbestos is still present in many facilities on the installation, it is managed in place. When damage occurs or renovation is planned that disturbs the asbestos, proper protection and disposal techniques prevent

Central Heat Plant

exposure. A radon survey was performed in September 1988. The results of that survey indicated Malmstrom AFB was categorized as "Low Probability." This signifies all structures sampled had a radon concentration level below four picocuries (4×10^{-12}) per liter. At this concentration, no further action is required.

4.2.2.3 Hazardous Materials and Wastes

Hazardous materials are used throughout the installation. Hazardous residues from these materials must be collected and controlled for proper management and disposal at facilities shown on Figure 4.7. This collection begins at a satellite accumulation point (SAP).

SAPs do not require a permit because they accumulate no more than 55 gallons of hazardous waste, or one quart of acutely hazardous waste. Wastes are then transferred from the SAP to the 90-Day Hazardous Waste Storage Area (adjacent to Bldg 411). Here materials are analyzed, identified, and prepared for shipment. Upon completion of this processing, the materials are moved to the Permitted Hazardous Waste Storage Facility (Bldg 1535) to await final disposition.

The arrangements for proper handling and shipping to treatment and disposal facilities are the responsibility of the Defense Reutilization and Marketing Office (DRMO). Since DRMO serves as a collection point for hazardous wastes generated at many different facilities on-base, the types and quantities of wastes stored at any point in time will vary.

DRMO contracts for hazardous waste management services. Depending on the waste type and its characteristics, the hazardous waste materials are sent to any of a number of permitted hazardous waste facilities around the nation. Since outside contractors are used for this service, adequate capacity for hazardous waste disposal is believed to exist. The off-site capacity for hazardous waste management is not a constraint to development at Malmstrom AFB.

A Waste Minimization Plan has been developed which identifies strategies which are in force, such as improved housekeeping and the Hazardous Materials Pharmacy project for inventory control. Other approaches include substitution of nonhazardous products for hazardous materials.

4.2.2.4 Potentially Contaminated Sites

Malmstrom AFB is included in the Air Force's Installation Restoration Program (IRP), which is tasked with the planning and executing of environmental restoration activities in response to releases of hazardous substances, pollutants, contaminants, or hazardous solid wastes. Malmstrom AFB is not on the National Priorities List and there is no Federal Facilities Agreement.

There are 25 locations on-base which have been designated as IRP sites (Figure 4.8 and following Table). These sites are in various stages of restoration, from investigation and characterization, to remediation and closure, to long-term monitoring. All sites are scheduled for closure by the end of FY03.

The investigation and closures/corrective actions at 18 sites are being performed under the provisions of the Resource Conservation and Recovery Act (RCRA).

Table 4-1: INSTALLATION RESTORATION PROGRAM SITES

Site Code	Site Description	Risk	Phase	NFRAP Date	Finished	Site Type
FT-01	Fire Training Area	L	Finished	27 May 98	Dec 97	Fire Train
ST-02	Yellowstone Pipeline	L	Finished	29 Sep 94	Sep 94	Stor Tank
ST-03	Military Gas Station	L	Finished	3 Aug 98	Apr 98	Stor Tank
ST-04	Pumphouses 2 & 3 and Hydrant Refueling System	L	LTM		FY2000	Stor Tank
ST-05	Bulk POL Storage and Fuel Supply & Return Lines	L	LTO		FY2001	Stor Tank
ST-06	ARRS Hangar	L	Finished	29 Sep 94	Sep 94	Stor Tank
OT-07	VOQ/Chapel	L	Finished	24 Sep 93	Sep 93	Spill Site
OT-08	Building 439 RFI Ovens	L	Finished	24 Sep 93	Sep 93	Spill Site
SS-09	Pole Yard Storage Area	L	Finished	24 Jul 97	Nov 96	Spill Site
SD-10	Open Storm Ditch	L	Finished	13 Jul 98	Apr 98	Drainage
SS-11	Launch Facility P-10	L	Closed	28 Jul 93	Jul 93	Spill Site
SS-12	Launch Control Facility S-0	L	Closed	14 Sep 93	Sep 93	Spill Site
SS-13	Kalispell AFS Housing Area Fuel Spill	L	Finished	29Sep 95	FY1999	Spill Site
SS-14	Acorn/Chestnut St. PCB Incident	L	Closed	28 Sep 92	28Sep 92	Spill Site
SS-15	Drum Disposal Site East of DRMO	L	Finished	24 Jul 97	Nov 96	Spill Site
OT-16	Conventional Munitions Disposal Site	H	Finished		Sep 99	Disposal Pit
SS-17	Drum Disposal Site South of WSA	L	Finished	24 Sep 94	Sep 94	Spill Site
LF-18	Flightline Landfill	L	Finished	29 Sep 95	29 Sep 95	Landfill
LF-19	Landfill NE of WSA	L	RA LTO/LTM	FY1999	FY2002	Landfill
RW-20	Radiological Disposal Site	L	Finished		Jun 99	Rad Waste
ST-21	Havre USTs	L	LTO/LTM		FY2001	Stor Tank
SS-22	Old Taxiway Landfarm	L	Finished	29 Sep 94	Sep 94	Spill Site
SS-23	Building 435 Aeration Slab	L	Finished	29 Sep 94	Sep 94	Spill Site
SS-24	Wherry Housing Pesticides	L	Finished	24 Jul 97	Nov 96	Spill Site
ST-25	USTs North of Building 370	L	Closed	29 Sep 95	29 Sep 95	Stor Tank
AOC26	Contamination North of Bldg 870	NE	Ph II RFA		FY1998	Spill Site?
SS-27	Contractor Storage Area	NE	RFI		Sep 99	Spill Site
AOC28	Perimeter Road Outfall Ditch	NE	RFA		Sep 99	Spill Site
SS-29	79th Street Petroleum Contamination	NE	RFI Work Plan		Dec 99	UST Site (Piping)

LTM - Long Term Monitoring
LTO - Long Term Operation
CMS - Corrective Measures Study
NE - Not Evaluated
L - Low Relative Risk
H - High Relative Risk
RA - Remedial Action
RFA - RCRA Facility Assessment
RFI - RCRA Facility Investigation

Hazardous Materials Pharmacy

A RCRA Facility Investigation (RFI) included a preliminary risk assessment to determine risk-based action levels. The action levels will provide the basis for any cleanup activities and have been determined assuming future land uses will be primarily for industrial and residential purposes.

Underground storage tanks (USTs) have historically been used for storing petroleum products and represent a source of potential contamination if not properly designed and monitored. Most of the existing USTs have been replaced with aboveground storage tanks (ASTs) or double-wall fiberglass underground tanks. These tanks have been brought into compliance with 1998 UST standards. According to the UST Management Plan (1994), there were 160 USTs that were in compliance, 50 USTs scheduled for removal, 47 for upgrade and 58 for replacement. All USTs, except those for heating oil, are registered with the Montana Department of Environmental Quality.

4.2.2.5 Pest Management

The affected area for Malmstrom AFB pest management activities encompasses a large area of Montana as a result of the 23,500 square mile missile complex.

There are 200 Minuteman missile launch sites which require bare ground herbiciding and 20 missile alert facilities which require a broad spectrum of pest control efforts. Herbicides are used to control noxious weeds (Field Bindweed, Canadian Thistle, and Leafy Spurge) and to eliminate vegetation where bare ground is required.

The high plains environment is home to pest rodents (ground squirrels, mice), birds (barn swallows), and insects (German cockroach, bedbug, ants, black widow

spider, aggressive house spider, hornet, wasp, and mosquito).

The large number of Richardson ground squirrels (Citellus richardsonii) on base creates a nuisance problem. The squirrels dig up new ornamental trees and burrow in semi-improved and improved grounds. They create severe safety hazards, ruin grounds equipment, and are an annoyance to housing occupants. They have also been implicated in the spread of insect pests and diseases, such as plague and Hantavirus. Nine counties surrounding the base have had cases of plague-infected animals, and one of three statewide reported Hantavirus fatalities occurred in Great Falls. Mice (Peromyscus sp.) are yet another wildlife pest problem. They often cause problems in aircrafts by damaging equipment. Deer mice (Peromyscus maniculatus) have also contributed to the spread of Hantavirus. Depending on their location and degree of infestation, rodent pests are controlled with either chemicals or traps.

Barn swallows commonly nest along the eaves of the buildings on the base. A permit has been received from the USFWS allowing removal of the swallow nests. Conditions of the permit require the nests be removed while they are inactive. The basis for removing the nests is to preserve sanitary conditions and minimize bird hazards. Poisons cannot be used to control the swallows because they are protected under the Migratory Bird Act. The use of plastic sheeting has provided a workable solution to combating the problems associated with the barn swallow migration. When the birds return, efforts are targeted to prevent them from establishing nests on other structures.

The Pest Management office and a local contractor provide support for all pest control programs at Malmstrom AFB. These programs consist of chemical and non-chemical control techniques used to correct existing pest problems and those which may occur in the future. All outdoor pesticides are approved by the installation Public Health Office. Pesticides must be the least toxic, least persistent chemicals that will be effective.

The Pest Management Plan summarizes the control methods used. There are currently no known environmentally sensitive areas or endangered species on Malmstrom AFB that restrict pest management activities.

4.2.2.6 Solid Wastes

Solid waste disposal services are provided to the base by a private waste collection and hauling company. Solid waste (trash) is accumulated on-base in dumpsters, and roll-off boxes are periodically emptied or retrieved. They are emptied into a commercial landfill operated by the waste collection and hauling contractor. The estimated operating life of the landfill is until CY 2036. The City of Great Falls also has property on which another landfill could be

Sun Plaza Park

constructed to provide additional disposal capacity.

Malmstrom AFB has initiated a recycling program to reduce the volume of solid waste requiring disposal. The program currently accommodates white, computer and mixed papers; newspaper; cardboard; clear and brown glass; aluminum; plastics; steel; and used petroleum products. There are active recycling programs in both the industrial and residential areas of the base. In the industrial sectors, there is a recycling point of contact for each squadron who coordinates delivery of recyclables to the Central Recycling Facility (Building 230). In addition, there is a weekly curbside pickup of recyclables in the housing areas, including newspaper, aluminum, clear glass, and cardboard. Cardboard products are bundled by the commissary and delivered to the Central Recycling Facility. Used oil is accumulated in one of twelve storage tanks throughout the base. Private contractors remove all recyclables from the base.

Malmstrom AFB has also initiated a mulch recycling program on base to reduce the amount of solid waste. The mulch is derived from scrap wood (that doesn't have a finish, etc.). The mulch is available to both on and off-base housing residents. In addition, the base offers a blade swap program, where base residents can exchange their standard lawn mower blades with a mulch blade.

There are no open landfills on Malmstrom AFB. Two closed landfills exist: one located off the northeast end of the runway east of Perimeter Road, and another northeast of the Weapons Storage Area (WSA). Both of these landfills have been designated as IRP sites. The flightline landfill, in operation from 1942 to 1950, was used to dispose of solid and industrial wastes as well as construction debris and fill dirt. The landfill encompasses approximately 22 acres. It has been closed for over 40 years; no operating permit or closure plan is required.

The landfill northeast of the WSA, in operation from 1950 to 1978, was used to dispose of domestic waste, as well as industrial wastes, munitions, waste oil, antifreeze, and battery acid. It covers approximately 34 acres. This landfill is classified by the State of Montana as a Class II landfill. A permit has been issued and the landfill is currently in an interim closure period.

There are no active disposal areas for hardfill on base. When buildings are demolished, the demolition contractor removes the rubble. In some cases, the footings may be buried in place.

4.2.2.7 Electromagnetic Radiation Sources

The only sources of electromagnetic radiation on-base fall into the radio frequency (RF) portion of the electromagnetic radiation spectrum and are shown in Figure 4.9. According to the base bioenvironmental engineer (Headen 1995), none of the stationary sources of RF radiation on-base represent a potential hazard to humans or animals. Stationary sources of RF radiation are found in Buildings 330, 360, 500, 1879, and 1881, and the runway. All of these emitters are categorized as either NH (no hazard levels generated in excess of the permissible exposure limit (PEL)); SH (hazard levels possible, but transmission time is too short for overexposure); IH (hazardous levels possible, but in normally inaccessible areas); or DL (transmitter

The Weapons Storage Area

dummy loaded). RF emitters are also found on helicopters, and security vehicles on-base.

The American Conference of Governmental Industrial Hygienists (ACGIH) has established threshold limit values (TLVs) for exposure to radio frequency/microwave radiation. Overexposure to RF radiation can cause hazards to personnel, flammable liquids, and electro-explosive devices. The primary effect on humans of overexposure to these frequencies is thermal stress, which can result in shock and burn hazards (Largent 1988). RF radiation can also cause combustion of flammable liquids and detonations of electro-explosive devices.

4.2.3 Operational and Safety Constraints

Existing and future development of Malmstrom AFB must be compatible with airfield operations and other future mission-related activities. Factors influencing development decisions include clear zones and other imaginary surfaces requiring safeguarding against aircraft accidents, aircraft noise generation, and explosive safety restrictions. These areas, discussed in the following paragraphs, are shown in Figure 4.10.

Current safety constraints at Malmstrom AFB result from airfield safety siting criteria and explosives safety siting criteria. Applicable airfield safety clearance criteria are defined in Air Force Manual (AFMAN) 32-2311, *Airfield and Heliport Planning and Design Criteria*. AFMAN 32-2311 outlines detailed planning and design criteria and standards for airfields; these criteria and standards include dimensions, clearances, and grades for airfield operational areas described above. Although the runway at Malmstrom AFB is not opera-

Radio Frequency Transmitters at Building 500

tional, the installation should continue to observe the constraints imposed by these criteria to protect the airfield and surrounding areas for mission expansion. It is also important to retain compatible land uses within the areas identified in the latest Air Installation Compatible Use Zone Study by working with the City of Great Falls and Cascade County to prevent encroachment of the airfield.

The remaining safety considerations at the installation revolve around designated areas constrained by explosive safety-quantity distance (Q/D) zones. These clear zones include the area within a safety arc surrounding an explosives storage facility.

An Explosives Site Plan (ESP) is required whenever explosives will be introduced into an area not previously approved for explosives, or the risks within an inhabited building distance clear zone are increased. The ESP, which originates at the installation level, undergoes an Air Force Safety Center endorsement review before presentation to the Department of Defense Explosives Safety Board (DDESB) for approval. Explosive safety criteria, site planning procedures, and exemptions and waivers to these requirements are established and implemented through AFMAN 91-201, *Explosives Safety Standards*.

The Q/D zones at Malmstrom AFB encompass the following areas: a suspect vehicle parking areas, hot cargo and holding pads, explosives storage facilities, and a bombing simulation area. Most of these areas focus on the Weapons Storage Area (WSA) on the east side of the runway away from the main cantonment area. Malmstrom AFB Q/D zones and aforementioned sites are depicted in Figure 4.10.

The Q/D zones' arcs range in size from a 268- to 1,440- foot radius surrounding the individual sites; variations in an arc's radius depend upon the type and quantity of explosives.

The Q/D zones cover a significant portion of the airfield and adjacent lands; existing land uses in the arcs are mission necessary functions generally consisting of industrial operations. Malmstrom AFB should continue to employ safety measures and practice sound land use planning to avoid unnecessary facility siting and the heavy concentration of personnel within the Q/D zones.

4.3 Infrastructure Component

The following is a general synopsis of the existing infrastructure and utility systems at Malmstrom AFB, rather than a detailed system analysis. Each of these systems should provide adequate facilities to support the mission and existing and future

development while protecting the natural and human environment.

4.3.1 Water Distribution System

The base water distribution system must be capable of providing adequate supply and storage to meet duration, flow rate and pressure requirements of domestic consumption and fire protection. Elements of the system at Malmstrom AFB are shown in Figure 4.11.

Water is supplied to the installation by the City of Great Falls. Malmstrom AFB has a contract with Great Falls for 1.26 million gallons per day (MGD) and 460 million gallons per year. One 12-inch supply main

Emergency Response

runs parallel to Third Avenue South and supplies the Malmstrom Dr., Lincoln Dr., and Vista Village areas with city water pressure. This line, along with the 12-inch main that runs parallel to 2nd Avenue North, both supply the base through two ground-level storage tanks which have capacities, respectively, of 600,000 and 1,100,000 gallons.

Water is pumped into the distribution system and elevated storage tanks from a pump station located in Building 152. The pump station consists of three electrically-driven pumps: two primary pumps rated at 1,400 gallons per minute (gpm) and a third backup pump rated at 2,000 gpm.

The distribution system consists of 44 miles of 8 to 12-inch cast iron, asbestos cement, and polyvinyl chloride (PVC) looped mains. While few remaining segments of the mains are cast iron, these are the most susceptible to line breaks due to the corrosive soils. A program is underway to replace these mains as well as others that are not PVC.

In addition to the tanks listed above there are three elevated storage tanks on the installation. The first tank (1515) is located east of the pump station and holds 500,000 gallons. The second tank (8000) is located south of the Central Heat Plant and has a 250,000-gallon capacity. The altitude shutoff valve is defective, causing the water level to vary in conjunction with levels in Tank 1515 and the tank to overflow without the inflow shutting off. The third tank (9000) is located near the WSA and holds 200,000 gallons. This tank primarily supplies the deluge fire protection system in Building 1840, but also supplies fire protection to other facilities in the WSA.

The Malmstrom AFB water supply and distribution system is adequate to meet current demands as well as supporting moderate growth. During peak demand periods (FY 97 data) there is still approximately 38 percent excess capacity in the

supply. Tank 8000 can be repaired if necessary to maintain system pressure with increased demand due to growth of the installation. When the main replacement program is complete, all lines will be PVC, with increased durability and decreased maintenance requirements.

4.3.2 Sanitary Sewer System

The base sanitary sewer system must provide adequate collection and treatment facilities for wastewater generated at Malmstrom AFB. Major components of this system are shown in Figure 4.12.

The original wastewater collection system at Malmstrom AFB was constructed in the 1940s and expanded in the 1950s and 1960s to accommodate family housing areas. Under the provisions of a utility contract with the City of Great Falls, Malmstrom AFB transfers all wastewater to the City's treatment plant via a 10-inch force main. The Great Falls treatment plant is an activated sludge facility operated by service contract with a private sewage treatment management firm. Base effluent is tested for solids content and biochemical oxygen demand and the installation pays additional charges for overstrengths in either.

Industrial Area Drainage

Water Storage Facilities

The base has a single 1.5 MGD lift station which pumps wastewater through this main. These two components of the sanitary sewer system were upgraded in 1982 and remain in good to excellent condition.

Other elements of the collection system were originally constructed of vitrified clay or concrete pipe. New construction and replacement projects have been steadily replacing these lines with PVC. These efforts should help stem a recurring problem with infiltration and inflow, in which surface drainage from storm events penetrates the system and provides the potential for overload.

The Malmstrom AFB sanitary sewer system is adequate to meet current demands as well as supporting moderate growth. Peak sewage generation periods from FY97 indicate an excess capacity of 46 percent; this is based on a peak of 808,000 gpd and a lift station capacity of 1.5 MGD. Annualized daily generation

over the same period (672,000 gpd) indicates an excess capacity of 55 percent.

The growth capacity of the system on base is supported by the growth capacity of the treatment system. Sanitary sewage from the installation currently comprises only about 10 percent of the inflow to the City of Great Falls treatment plant. Additionally, the treatment plant is operating at approximately 50 percent of available capacity.

4.3.3 Storm Drainage System

The storm drainage system must be capable of adequately collecting surface water from storm events and conveying it away from the installation. The Malmstrom AFB storm drainage system is shown in Figure 4.13.

The Malmstrom AFB storm drainage system is comprised predominantly of open drainage ditches, swales, constructed culverts and buried pipe. As shown in Figure 4.6, there are nine surface drainage basins that feed this system.

The primary concern surrounding this system has been the open drainage ditches which exist along main transportation routes (e.g. Goddard Avenue). These ditches are aesthetically unappealing, and have eroded significantly over the years. A major effort is currently underway to place buried storm drain lines in these areas. In addition to providing better storm water conveyance, burying these lines has allowed the installation to provide much-needed pedestrian walkways and landscaping.

The Malmstrom AFB storm drainage system is capable of supporting current development as well as moderate growth. Replacing the open drainage ditches with buried storm water mains has provided the capacity to accommodate a 10- to 15-year storm event. Since new facility development will likely increase the amount of impermeable surface on the installation, the impact on specific drainage basins should be addressed.

4.3.4 Central Heating System

The central heating system must be capable of providing adequate supply and distribution of high temperature hot water to meet the heating requirements of serviced facilities. Components of the Malmstrom AFB central heating system are shown in Figure 4.14.

High temperature hot water (HTHW) is generated at the Central Heat Plant, Building 82110. Constructed in 1986, the Central Heat Plant is capable of producing 240 million British Thermal Units (BTU). The plant is comprised of three boilers, two of which routinely burn natural gas. The Central Heat Plant burns coal as a backup and during peak demand periods. The burner assemblies in each of the boilers have also been upgraded to permit co-firing

Open Storm Drainage

of natural gas and coal to maximize efficiency and control air emissions. A backup control system is installed in the Central Heat Plant to ensure continuous delivery of HTHW in the case of main system failure.

HTHW is delivered to base facilities through the distribution system at 400 degrees Fahrenheit. As shown in Figure 4.14, there are two main branches to the system with supply and return lines running parallel. Approximately 95 percent of the distribution lines are contained in buried concrete trenches. Anticorrosive and antifreeze chemicals are added to the HTHW to protect the distribution lines. Service lines to individual facilities are direct buried and insulated.

The Malmstrom AFB central heating system is capable of supporting additional growth if individual new facilities were added to the distribution system. It is likely new facilities would have individual natural gas boilers, as the natural gas supply system has an excess capacity of nearly 35 percent (see section 4.3.6). However, whole development areas could be added to the system through construction of additional main distribution branches. The Central Heat Plant has the capacity, through the boiler ability to alternately or co-fire natural gas or coal, to approximately double current system loads. Moreover, the Central Heat Plant was designed with the capacity for expansion and addition of two more HTHW boilers.

4.3.5 Electrical Distribution System

The specific objective of the electrical system is to provide adequate supply and distribution to meet the electrical energy needs of existing and future facilities.

Heat Plant Coal piles

Components of the Malmstrom AFB electrical distribution system are shown in Figure 4.15.

Malmstrom AFB receives its electrical power from the Montana Power Company. A 100 kilovolt (kV) transmission line feeds the base electrical substation, building 81120, located in the industrial area on the north end of the main base. A limited capacity backup line is available in case of catastrophic substation failure. This 15-megavolt-amperes (MVA) substation consists of two 7.5-megawatt (MW) distribution transformers. The substation components and transmission lines were replaced in 1990 and are in excellent condition. Forced-air cooling has also been added to the transformers, providing increased capacity.

Most of the electrical distribution system is comprised of overhead lines, with portions along Goddard Avenue having been converted to underground lines (see Figure 4.15). All overhead distribution lines will ultimately be placed underground, except in industrial areas.

Five primary service feeders supply base facilities and have cross-connect/back-feed

Central Heat Plant

capability. Critical facilities are also equipped with backup generators. The feeder to the Weapons Storage Area (WSA) is an ongoing source of concern, as peak demands from WSA facilities overload the feeder.

The Malmstrom AFB electrical supply and distribution system is capable of meeting current requirements and supporting moderate growth. Based on FY 97 peak demand figures, the system has an excess capacity of 57 percent.

4.3.6 Natural Gas

The specific objective of the natural gas supply and distribution system is to provide a sufficient supply of natural gas to those base facilities connected to the system to meet their heating requirements. Major components of the Malmstrom AFB natural gas system are shown in Figure 4.16.

Malmstrom AFB is supplied with natural gas by the Energy West via a 12-inch steel pipeline that enters the base near the south gate. This line was installed in 1953 and remains in excellent condition.

The remainder of the distribution system was also originally installed as steel piping. More than half has since been replaced with PVC lines with the rest programmed for replacement. The remaining steel lines are protected from corrosion by a cathodic protection system.

The Malmstrom AFB natural gas supply and distribution system is capable of supporting significant growth. The capacity of the current distribution network is 117.4 million cubic feet (MCF) per month. Peak consumption from FY 97 was 78 MCF, yielding excess capacity of 34 percent.

4.3.7 Communications Systems

The communications system must provide adequate supply and effective distribution of communication capabilities at Malmstrom AFB. The system is considered adequate if it meets the various communication system needs of existing and future facilities at the installation. Components of the communication system are detailed in Figures 4.17 and 4.18. Figure 4.17 outlines

Electrical Substation

Malmstrom's fiber optic cable system, and the base telephone transport architecture system is featured in Figure 4.18.

The 341st Communications Squadron is the principal organization handling the communications system at Malmstrom. The communications system consists of twisted pair copper cable and fiber optic cable, which is mostly underground with some aerial and direct buried cable.

In order to enhance its communications systems, Malmstrom AFB has adopted and is implementing a C4I Systems Blueprint. The C4I Blueprint's objectives are to document existing system architecture and infrastructure, develop a target for that system based on mission requirements, and provide an implementation strategy and transition plan, which includes budgetary information.

The C4I Blueprint has identified primary components of the base communications infrastructure; they are information transfer architecture; voice switching systems; the Network Control Center; long haul communications; and video systems.

The issues at the forefront of the Malmstrom AFB communications system are the evolution of the fiber optic cable, secure networking, and the Information Transfer System (ITS). There are also problem areas in the communications system and C4I Blueprint environment; the most prominent obstacle is the lack of a comprehensive fiber optic system.

Malmstrom's communications system is adequate to meet the immediate needs of the base; however, the existing, limited fiber connectivity is incomplete and the backbone components and technology currently used are dated. The need to consolidate servers and ease the server administration burden also demands attention. Building an integrated secure network is among the top priorities.

In order to achieve mission accomplishment in the future, the base must continue to promote and implement communications systems, which will leverage the capabilities of Malmstrom's personnel. The C4I Blueprint should be continually modified and amended to best represent the condition of the communications system while addressing its changing needs.

4.3.8 Roadway Pavements

The Malmstrom AFB roadway system should safely handle and distribute vehicular movements with a minimum amount of congestion and delay. This includes traffic movements on to and off of the base as well as movements within the base. Pavement condition should not inhibit these movements.

Roadway pavements on Malmstrom AFB are primarily constructed of asphalt concrete pavement and the majority are in good or excellent condition.

341st Communications Squadron Headquarters

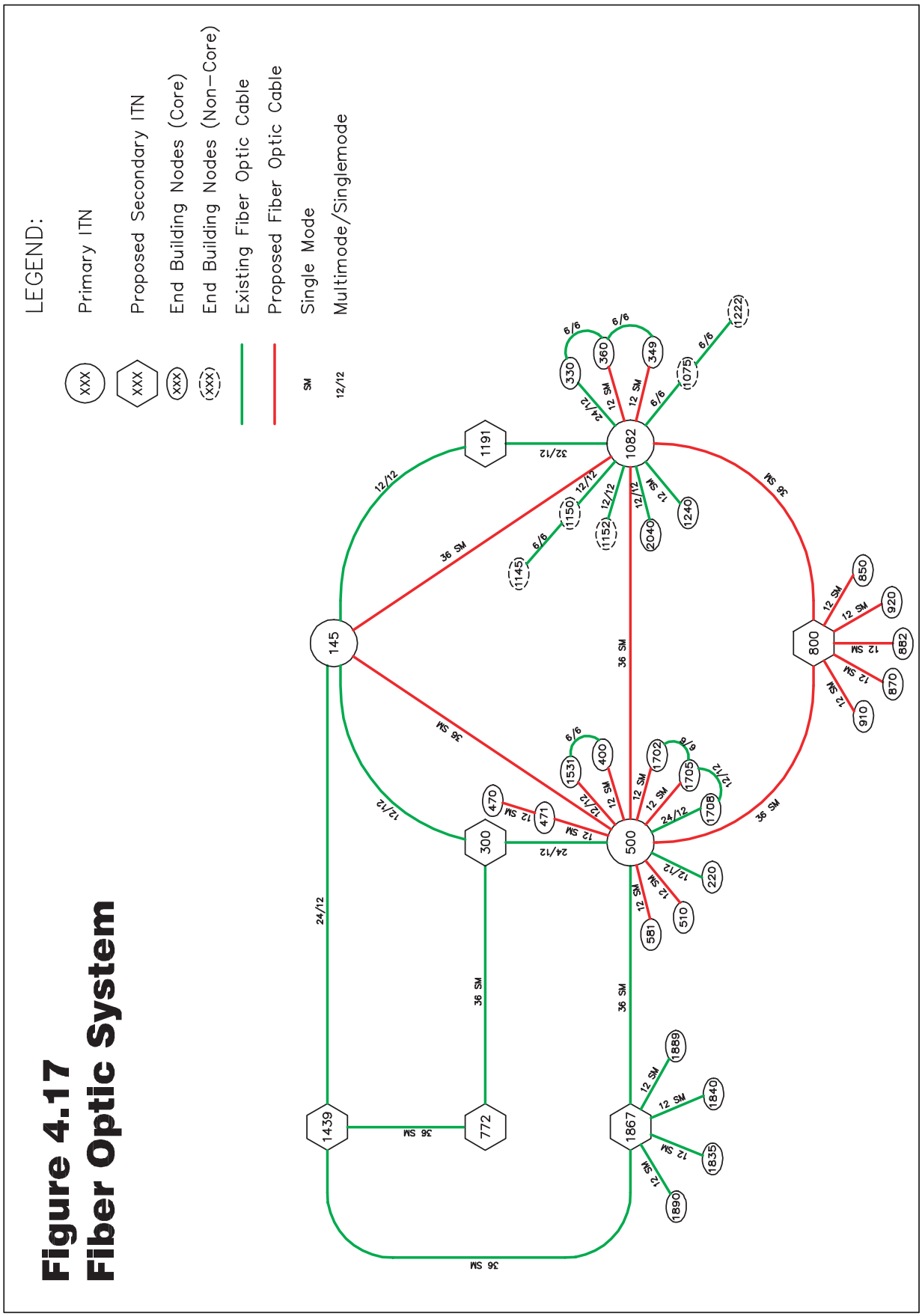


Figure 4.17
Fiber Optic System

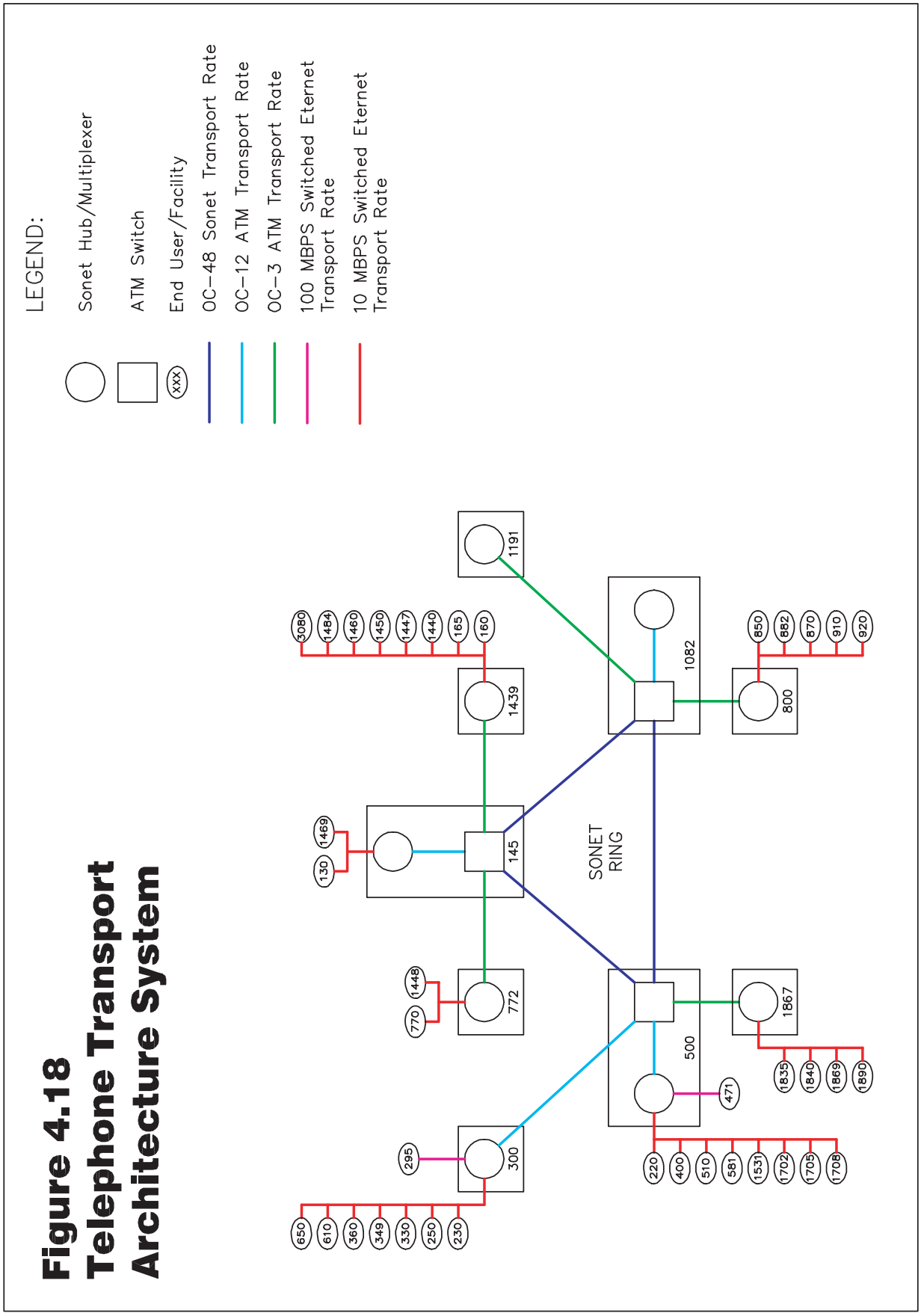


Figure 4.18
Telephone Transport Architecture System

The condition of parking lots is the area of principal concern regarding roadway pavements. Many need resurfacing, with a few identified for full-depth repair.

4.3.9 Airfield Pavements

The specific objective of the airfield pavement system is to provide safe operating areas for the ground movement and parking of aircraft. While there is currently no fixed-wing flying mission assigned to Malmstrom AFB, the condition of airfield pavements affect the ability of the installation to accept a new flying mission.

The overall condition of the Runway 03/21 pavement is very good to excellent. Joint seal deterioration is evident in Portland Cement Concrete (PCC) sections with asphalt concrete sections suffering some cracking due to weather fluctuations. The runway overruns both suffer from cracking.

Taxiways are generally in excellent condition. The parallel taxiway is in very good condition with some minor cracking evident.

The parking aprons are likewise in excellent condition overall. This includes the helicopter parking apron which is still in use at the north end of the airfield.

Pedestrian Walkway- Goddard Avenue

While the airfield pavements will not receive any maintenance priority without the base having a flying mission, every effort should be made to continue to provide some degree of preventative maintenance. The current condition of the pavements indicates the capability of Malmstrom AFB to support growth in this area.

4.4 Land Use

A land use plan for an Air Force Base provides direction for siting future construction and improvements. Collocating similar facilities and separating incompatible land uses improves the appearance, quality of life, and functional efficiency of the installation. To avoid conflicts, the base land use plan should also be consistent with the land use planning and goals of the surrounding community.

The purpose of the land use plan component of the General Plan is to guide the future development and land use decisions at Malmstrom. To provide this guidance, the plan identifies and analyzes the functional relationships of the units and activities assigned to the base. It assesses the compatibility of these relationships and determines the manner in which they affect land use compatibility. The plan also supports both the existing and future mission requirements by allocating or reserving the land necessary to support ongoing and proposed operations.

4.4.1 Existing Land Use

Malmstrom's developed areas lie primarily in the northwestern third of the installation,

bordered by the City of Great Falls to the west. The airfield is the dominant land use feature, with light industrial and aircraft operations and maintenance immediately flanking it. Open space dominates the eastern side of the base along with the Weapons Storage Area (WSA). Other land uses in the cantonment area are generally located to the west of the airfield.

As illustrated in Figure 4.19, Malmstrom AFB's main development consists of two distinct land use areas. Accompanied housing consumes a large area in the northwestern vicinities, while the remainder of the cantonment is characterized by a heterogeneous land use pattern. Immediately west of the airfield, aircraft operations and maintenance and industrial land uses are the dominant activities. Base outdoor recreation facilities are scattered throughout the base in areas adjacent to Family Housing and also south of the WSA on the east side of the base.

The current land use pattern suggests land use planning has played a significant role in decisions regarding base development. The existing layout exhibits relatively few land use incompatibilities, and provides expansion capability for on-base future construction and facility improvements.

In order to realize the Malmstrom AFB vision, the land use pattern should be a well-designed system providing for maximum aesthetic quality, functional efficiency and utility, minimized impacts on the environment, while reserving available land for mission and installation growth.

4.4.2 Future Land Use

The Future Land Use plan for Malmstrom AFB is displayed in Figure 4.20 and discussed in the following paragraphs.

As illustrated in Figure 4.20, there are marked differences between the future land use plan and the existing layout. An initial change has been the consolidation of similar land use pockets to create larger areas offering alternate development possibilities to accommodate future growth.

The review of base development plans has played a principal role in the future land use plan. Land use areas have been shaped to accommodate proposed projects necessary to the Malmstrom AFB current mission and the potential X-33 mission. The future land use plan accounts for facility expansion and new construction, building demolition, airfield enhancements, and roadway and infrastructure improvements.

Preparation of the Future Land Use Plan involved consideration of three alternative growth scenarios:

Industrial Land Use

Table 4.2 Land Use Definitions

Land Use	*Map Color*	*Typical Facilities and F*
Administrative	Orange	Personnel, headquarters, legal
Aircraft Operations	Blue	Aircraft maintenance hangars a flight training facilities, and Mai buildings
Airfield	Brown/White	Runways, taxiways, aircraft par clearance and safety zones
Community	Red/Magenta	Commissary, base exchange, s lodging facilities, clubs, chapels
Housing	Ocher/Yellow	Unaccompanied quarters; Fam
Industrial	Gray	Utility systems, building mainte supply warehouse
Medical	Purple	Medical centers, hospitals and
Open Space	Lt Green	Buffer areas, out lease areas
Outdoor Recreation	Green	Swimming pools, tennis courts, recreation facilities

Source: *Air Force Center for Environmental Excellence*

- Mission Sustainment
- Flying Mission Restoration
- Space Mission Addition

Mission Sustainment at Malmstrom AFB limits the flying mission to that of the 40th Helicopter Flight, maintaining the status quo. This scenario could provide a significant opportunity to redevelop the airfield portion of the installation. However, with no additional facility requirements, actual redevelopment would likely be limited to outdoor recreation or training facilities. Flightline facilities designed for Aircraft Operations and Maintenance that are currently being used on a temporary basis for other functions could be converted to permanent use.

Flying Mission Restoration is a positive growth scenario. This scenario would primarily call for reclamation of Aircraft Operations and Maintenance facilities for their intended use. This in turn would require relocation of organizations such as RED HORSE from those facilities. New development areas would likely be required for at least some associated new construction. Airfield facilities would be returned to use for regular flying operations and land use impacted by the reestablishment of AICUZ and other operational safety criteria.

Space Mission Addition is also a positive growth scenario but one with less impact on existing land use. This scenario involves selection of Malmstrom AFB as a primary location for the Venture Star and X-33 program. This scenario is outlined in a proposal prepared by the City of Great Falls. According to the scenario contained in this proposal, there would be limited impacts on the main cantonment area of Malmstrom AFB, with new facilities located to the east of the base. Airfield facilities would be reused as part of this scenario.

The Malmstrom AFB Future Land Use Plan discussed below represents an amalgamation of these scenarios and provides maximum flexibility to accommodate varying levels of growth. Flightline facilities are maintained through adaptive reuse while reserved for potential flying mission reuse. The airfield is reserved for active flying reuse and safety criteria observed. Expansion opportunities, though limited, are provided in the main cantonment area.

Land use changes throughout the base involved reshaping existing land use areas to remove incompatibilities and yield a sustainable design. This measure will clarify future site planning decisions and support projects proposed in area development plans.

Administrative areas near the primary administrative cluster along Goddard Avenue will be expanded to join other administrative areas, thereby consolidating similar activities. Another expansion of administrative areas is to the southwest of the Wing Headquarters, Building 500. This area is currently industrial.

The Future Land Use Plan provides two areas of industrial expansion. One is the joining of two industrial areas at the southwest end of the runway. This includes the removal of an administrative area. Expansion of the WSA industrial area is the second and is depicted on the Future Land Use figure.

In accordance with the Malmstrom AFB Housing Community Plan (HCP), housing areas at the northwest corner of the base should be expanded to join with existing Family Housing areas north and south of 10th Avenue North and westward to the 57th Street Bypass. This will create a more cohesive housing area.

Slight land use changes have occurred to accommodate and expand community service land uses which frame the unaccompanied housing areas. Other expansion of land uses includes recreation areas on the east side of the runway, the extension of the runway to the north along with the corresponding easement, and the relocation of the FamCamp to the site of the old Malmstrom Drive housing area.

A significant issue affecting future land use is development of the 10th Avenue North corridor and base entry gate (new North Gate). Corridor development will be accomplished in accordance with the Malmstrom AFB HCP and provide the opportunity for redesignation of the Commercial (north) Gate as the primary base entrance. This measure could provide a more appropriate Distinguished Visitor (DV) approach to the installation, as the current Main Gate approach (off-base) is aesthetically unappealing. In accordance with a Gate Evaluation and Traffic Analysis prepared by an Air Force Center for Environmental Excellence Planning Assistance Team, short and long term recommendations are provided for both the Main (south) Gate and the new North Gate.

Short-term recommendations are minimal. For the Main Gate, they include minor traffic realignments and signage changes. For the new North Gate, they include measures to clarify the traffic flow through the gate and interior roundabout. Long-term recommendations involve significant changes to the Commercial Gate entry. The base entry would be relocated to the crest of 10th Avenue North and designated the new North Gate. The interior roundabout would also be replaced with a direct-route, four-way intersection with turning lanes to

move traffic from 10th Avenue North to 72nd Street.

The Future Land Use Plan is compatible with these recommendations for both entry gates. A key consideration in maintaining this compatibility is the potential for official designation of the new North Gate as the "main" gate, with this entrance used as the DV route access point. While this action will principally affect urban design elements along the exterior and interior corridor, land use must remain compatible by providing appropriate buffering and limited impact on the increased traffic flow.

Malmstrom's future land use plan seeks to eliminate land use incompatibilities at the installation. The framework provides for optimal facility siting and maximizes the amount of developable land; the future land use plan enables key decision-makers to readily identify areas suitable for various development types as well as enhance functional relationships. All future land use plans include a review in accordance with the Enivronmental Impact Analysis Process as well.

4.4.3 Off-Base Land Use

Malmstrom AFB is in Cascade County and to the east of the City of Great Falls. The land surrounding the base is all privately owned and not specifically zoned. Farmland surrounds the base to the north, east, and south. Mixed commercial, residential, and open land uses occupy the landscape to the west of the base.

Loy School, a public land use, is on the east side of 57th Street Bypass and adjacent to Malmstrom AFB housing areas. Also, residential land uses characterize a majority of the area west of the base; additionally, a

Coming into Great Falls

low-intensity commercial district can be found immediately adjacent to the base's Main Gate in association with the base's western border. This commercial strip along 2nd Avenue North, which is the primary access route to the base, is not within Great Falls city limits and cannot be annexed unless requested by the property owners. Since this is an eyesore and a blighted area, base personnel are considering moving the Main Gate either back away from this area to 70th Street North or relocating it altogether to the Commercial Gate at the northwest corner of the installation (see 4.4.2).

There are no current incompatibilities concerning neighboring city and county land uses since the densely populated areas of the city and county occur west of the base, appropriately separated. Other surrounding land uses include rural, agriculture, and industrial activities. One base concern is an Ethanol plant which may be constructed north of the new Military Family Housing area northwest of the base. Obtrusive fumes from the plant could adversely affect residents of the housing area if the prevailing southwesterly winds change direction.

Another potential concern in off-base land use is the advent of the South Arterial. The South Arterial is recognized as an alternative corridor to alleviate traffic congestion on 10th Avenue South that is generated by local motorists. It will also link Interstate 15 with U.S. Highways 87/89 southeast of Great Falls at the intersection of 10th Avenue South and the 57th Street Bypass. Potential for commercial and/or residential development on the east side of the arterial would be incompatible with the proximate Clear Zone and Accident Potential Zones in the base AICUZ program. The arterial would have a positive impact on base operations by expediting troop deployments from the base to Great Falls International Airport.

Malmstrom AFB should coordinate with City of Great Falls officials to stay informed of planned future developments, which may affect the installation and its respective mission. Base personnel should also obtain a current copy of Cascade County and the City of Great Falls land use plans and corresponding maps. These efforts will further enhance the sound relationship between Malmstrom AFB and its host while providing insight to Great Falls' long range goals.

Great Falls Bungalow

4.5 Capital Improvements Program

The Capital Improvements Program uses the findings and recommendations from the other component plans to define and describe programs, projects and siting proposals that will guide the future physical development of the installation. Principal elements of this component plan provide an overview of facility development and urban design.

4.5.1 Facility Development

As part of preparing the facility development portion of the Capital Improvements Program, Malmstrom AFB Base Development personnel use a continual process of: evaluating existing facilities, identifying needs, developing and evaluating alternatives, and preparing future development plans. A key input to this process is facility utilization. Base Development staff monitor space allocations and allowances and seek opportunities to address deficiencies and overages through the facility development process. Outsourcing and privatization initiatives can have an impact on facility utilization. Depending on the terms of these contracts, the installation may be obligated to provide facilities in support of these additional requirements.

As future development plans are formulated that require investment in new or renovated facilities, base development staff document these requirements and program their design and construction. Different investment programs are available based on a project's type, scope and using organization. Together these programs form the

Malmstrom AFB Five-Year Plan (Appendix B).

4.5.2 Urban Design

Urban design is the component of the General Plan that addresses physical development of the installation. It is primarily concerned with the urban fabric, the layout, and the texture of the installation. The urban design of Malmstrom AFB is guided by a Facilities Excellence Plan (Appendix A, Facilities Excellence Plan). Primary components of the Facilities Excellence Plan address architectural compatibility and landscape architecture.

Architectural compatibility is expressed on two distinct levels. In the broad sense, architectural compatibility addresses the homogenous integration of the overall built environment into its natural surroundings. Closer scrutiny interprets the interrelationship among existing structures. Compatibility is established by orienting comprehensive design solutions to the physical properties and climatic forces of Malmstrom AFB. Specific building designs establish unanimity by creating a uniform architectural aesthetic that emphasizes recurring design excellence. Successful development of compatible architectural relationships contributes to enhanced working environments, an improved public relations profile, and more efficient staff performance in executing base missions.

Appropriate design, planting, and maintenance of landscaping has a profound impact on the visual environment and orderly appearance of Malmstrom AFB. The base maintains landscape development guidelines as part of the aforementioned Facilities Excellence Plan; these guidelines are the guiding principles for Malmstrom's landscape design and maintenance programs.

Malmstrom AFB should employ architecture and landscape architecture standards to increase environmental quality and energy conservation, enhance aesthetics of buildings and grounds, and reduce visual and physical impacts of land use incompatibilities. Prior to future landscape endeavors, proponents should consult the Facilities Excellence Plan for a complete listing of recommended landscape materials, planting guidelines, and proper siting and design criteria for maximum utility and reduced maintenance.

4.6 Facilities Excellence Plan

The guidelines contained in the Malmstrom AFB Facilities Excellence Plan (Appendix A) are intended to be the linkage between the broad planning policies of the General Plan and the specific design of installation facilities. As Wing leadership executes the General Plan, the Facilities Excellence Plan is intended for use throughout the facility delivery process from initial programming through construction, and even operations and maintenance. Implementing these guidelines will help the base achieve minimum facility life-cycle costs while retaining an appropriate and enjoyable environment for people to live and work.

4.7 Five Year Plan

The Malmstrom AFB Five Year Plan (Appendix B) aligns planning, programming, budgeting and execution of facility requirements with the long-range goals and objectives of the General Plan. It is designed to

satisfy the facility requirements of current and projected missions, and contains construction, renovation and demolition projects.

Gazebo and Park Landscaping

Section 5:

General Plan Maintenance and Revision

Section 5:

General Plan Maintenance and Revision

5.1 Installation and Command Review Process

The proponent of this General Plan for Malmstrom AFB is the Base Civil Engineer. The civil engineering staff promotes and oversees the review effort. The base planning and programming staff must give attention to the review of the General Plan, as this is an important tool used in base development. This document affects the installation's development activities, and consideration must be given to its distribution among major units. In addition, the General Plan is available on the base World Wide Web Internet site for review.

The Space Command, Directorate of Civil Engineering reviews this document for technical content and consistency with HQ AFSPC goals and objectives and other planning documents. Legal, public affairs, and other key staff at headquarters can provide reviews. Finally, it is approved by the Wing Commander as an action of the Facilities Board.

The US Air Force Center for Environmental Excellence (AFCEE) and HQ AFSPC/CECP provide technical guidance on comprehensive planning issues.

5.2 Contacts for Recommendations and Changes

Corrections, changes, additional information, or other data pertinent to this General Plan will be directed to:

Mr. Larry Antonich
341 CES/CECP
39 78th Street North
Malmstrom AFB, MT 59402-7536
(406) 731-6158

Informational copies will be furnished to:

Ms. Vicki Williams
HQ AFSPC/CECP
150 Vandenberg Street, Suite 1105
Peterson AFB, CO 80914-4150
(719) 554-5034

5.3 Updating and Production

The Base Development Element of the 341st Civil Engineer Squadron is responsible for the annual update of the General Plan. Those pages requiring changes will be developed, reproduced, and inserted into the General Plan notebook. Base Development will keep a log of General Plan recipients to facilitate updating.

A consulting firm prepared the original General Plan in 1998. The format of the report was developed so base staff using personal computer software and hardware can perform updates.

Software packages used in the development of the General Plan were Microsoft Word, Version 7.0 for Windows 95/NT and AutoCAD Release 14.

For final reproduction, the report text was merged with map-based graphics (CAD files) and digitized photography using standard digital publishing software for the PC, including Microsoft Word, Version 7.0; and Adobe PageMaker, Version 6.5. Adobe Photoshop LE was used for manipulation of digital photography, but is not required for updating this report.

For most efficient production of final report, various duplication methods were used:

- Color photo/text pages were color laser output, based on the PageMaker layout.
- Text-only pages and tables were printed on a black and white digital copier on preprinted sheets.
- Map-based graphics were printed offset on a digital color press- CAD files were saved as encapsulated postscript (eps) and output through a PageMaker layout.
- Tab dividers and preprinted pages were printed on a traditional offset press.

The report was printed on one side of the paper only, making it easier to update single pages, and bound within a three-ring notebook. Updated map-based graphics (CAD files) can be digitally produced and printed on a color ink jet plotter, then duplicated on a color copier.

All material used in the original production of the report was provided with the final submittal to Malmstrom AFB. This included PageMaker layouts, Microsoft Word text files, digital photography, AutoCAD files, and printer's negatives.

Appendices

Appendix A:

FACILITIES EXCELLENCE PLAN

Contents

Table of Figures

Section 1:

Introduction

1.1 Purpose

Achieving facilities excellence requires careful planning and articulation of standards. The purpose of the Facilities Excellence Plan is to establish and document installation-specific standards and provide a tool to assure these standards are consistently applied. This Facilities Excellence Plan strives to recognize the cultural, environmental, climatic, and existing facility conditions distinctive to Malmstrom AFB and define the appropriate styles, finishes, and materials to be used to achieve the best facility life-cycle costs while retaining the appropriate environment for people to achieve their highest productivity.

The Facilities Excellence Plan is an element of the Capital Improvements Plan. The Capital Improvements Plan is a component plan to the Malmstrom AFB General Plan.

1.2 Use

The Facilities Excellence Plan is a tool to chart a course towards installation excellence and provides a means to assess the installation's progress in achieving that end. The Facilities Excellence Plan is intended to be used at all stages of the facility delivery process from initial programming through construction, and even operations and maintenance. It is essential that the Facilities Excellence Plan be provided to the design agent early in the process to assure that the entire design team understands the applicable design standards and objectives for the project.

New dormitory construction at Malmstrom AFB.

1.3 Implementation

A single person at Malmstrom AFB should be designated as the Facilities Excellence Plan Coordinator to ensure the Facilities Excellence Plan is followed as projects are conceived, designed, and constructed. The Coordinator will review all projects which affect the appearance of Malmstrom AFB for conformance with the Facilities Excellence Plan. The Coordinator will also annually update the Facilities Excellence Plan to ensure that it reflects the most current design objectives and standards for Malmstrom AFB. The Facilities Excellence Plan presents a simplified description of facility design concepts and provides specific information to guide routine facility maintenance and renovation.

Additional sources of information regarding the use and implementation of the Facilities Excellence Plan include the Air Force Architectural Compatibility Design Guide, Space Command's Facilities Excellence Guide 2000, the Facilities Excellence Program and Standards Handbook (AFSPCH32-1004), and AFI 31-210, The Air Force Antiterrorism/ Force Protection Program Standards.

1.4 Organization

The Facilities Excellence Plan has been organized to promote ease of use and facilitate routine updates and revisions. The following sections describe the organization and primary components of the plan.

Chapter 2 Visual District Standards describes the existing character, assets, and liabilities of each visual district identified at Malmstrom AFB. This chapter includes a future development section listing the design objectives and standards with regard to theme, scale, form, articulation, materials, color, fenestration, and detailing for each visual district.

Chapter 3 Building Interior Standards describes general observations of existing building interiors and provides future recommendations. These general recommendations include space planning

Main entrance landscape planting at Malmstrom AFB.

criteria, furnishing standards, finish standards, and interior signing standards.

Chapter 4 Landscape Standards identifies installation landscape standards for street trees, landscape buffers, open space plantings, xeriscaping, irrigation, and landscape details. Landscape treatments for parking lots, building entrances, lawn areas, and pedestrian areas are also examined. The section concludes with a plant palette specifically tailored to Malmstrom AFB.

Chapter 5 Hardscape Standards lists installation hardscape standards with regard to roadways, parking lots, sidewalks, pathways, fencing and screening, exterior signing, site furnishings, lighting, and utilities.

Chapter 6 Systems Furniture Specifications provides a standard interior systems furniture specification for Malmstrom AFB.

Aerial view of main cantonment at Malmstrom AFB.

1.5 Installation Description

1.5.1 General Description

Malmstrom AFB is located east of the City of Great Falls in west central Montana among rolling hills and plains approximately 75 miles east of the Rocky Mountains. The 341st Space Wing is the host unit at Malmstrom AFB. Major tenants include the 819th RED HORSE Squadron, Air Force Office of Special Investigations, American Red Cross, Civil Air Patrol, and Defense Reutilization and Marketing Office. The 341st Space Wing also provides base and logistic support to 200 missile sites and 20 missile alert facilities at various locations throughout Montana.

Geographically, Malmstrom AFB is situated on approximately 4,120 acres within the boundaries of Cascade County, Montana. The base is located south of the Missouri River approximately 50 miles east of the Continental Divide and two miles east of the City of Great Falls. Malmstrom is 120 miles south of the Canadian border and 180 miles northwest of Billings, the largest city in Montana.

Facilities at the base include one runway, taxiways and parking aprons, administrative facilities, industrial facilities, dormitories and housing areas, recreational facilities, and open space. Malmstrom's principal cantonment area is located in the western half of the base, while the eastern portion of the base is comprised of the airfield, operations and mainte-

nance facilities and the Weapons Storage Area.

1.5.2 Climate

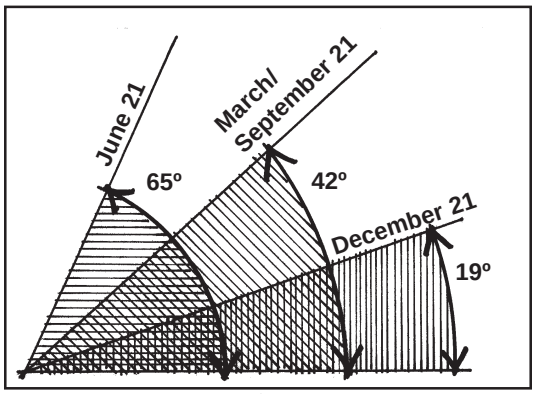
The climate of the installation is typical for its semiarid, northern tier location. Humidity and precipitation are low and accompanied by large fluctuations in daily and seasonal temperatures. Warm winds called Chinooks are common during the winter months and prevent large accumulations of snow. The installation is located within USDA hardiness zone three. The following paragraphs provide a brief description of the various factors which effect the climate at Malmstrom AFB.

1.5.2.a. Temperature

Temperatures in the vicinity of Malmstrom AFB are relatively mild. Uncomfortable extremes occur in summer and winter, but are usually short in duration. January is the coldest month, with an average monthly temperature of 21.2 degrees F. July is the warmest month, with an average monthly temperature of 68.2 degrees F.

1.5.2.b. Sun

Malmstrom AFB and the surrounding region have a climate which is generally partly cloudy to cloudy with annually 79.1 days identified as clear, 106.4 identified as partly cloudy, and 179.5 days identified as cloudy. Protection from heat gain is desirable during summer months, while solar heat gain is always desirable during the winter. Shade structures and plantings should be utilized to control solar gain during the summer. Cooling systems are desirable



Great Falls, Montana Sun Angles.

in most buildings to moderate the occasional hot summer temperatures.

1.5.2.c. Wind

Malmstrom AFB is located within the open high plains of west central Montana. The land surrounding the installation is open and has very little protection from existing vegetation. This open exposure, combined with the normally arid conditions, creates a very dry climate which has a significant impact on the design of buildings and the use of landscape plant material. The prevailing wind direction is from the southwest, with mean monthly wind speeds of 10.2 miles per hour in August and 15.6 miles per hour in December. The warm Chinook winds commonly occur during the winter and prevent large accumulations of snow.

1.5.2.d. Precipitation

Annual precipitation at Malmstrom AFB is a sparse 15.24 inches. Approximately 75 percent of the annual precipitation falls between April and September, usually during spring and summer thunderstorms. The average annual snowfall is 58 inches per year, with the heaviest snowfall occurring in January and March.

1.5.2.e. Humidity

The relative humidity within the region is relatively low. The humidity is typically lowest during daylight hours and highest during the night, with the annual relative humidity averaging 45 percent during the day and 67 percent at night.

1.5.2.f. Summary

Many of the existing buildings at Malmstrom AFB have been designed with little regard for the existing climate. Shade structures have been attached to several buildings to reduce solar gain. These structures appear as afterthoughts rather than a unified element of the building facade. Roof overhangs provide shade during the summer months and should be used whenever possible. The design and location of many building entrances promote the channelling of winds, creating problems which have required extensive post construction modifications to correct. The climate, combined with the need for low maintenance requirements, has strongly influenced the selection of plant material choices, resulting in a very narrow landscape palette. An expanded plant palette with hardy native materials should be utilized whenever possible.

1.5.3 Topography

The topography of Malmstrom AFB is comprised of broad, gently sloping plains which are dissected by numerous streams. The southwestern section of the base lies at an altitude of approximately 3,500 feet above sea level, 100 feet higher than the northeast section. This gradual change occurs over a 2.3 mile area, a .9 percent average rise to the south-southwest. There are no topographic constraints to development on the installation.

1.5.4 Soils

The predominant soil series is an alluvium consisting of silty clays and sandy loam which covers approximately 75 percent of the base. The majority of the remaining base is covered with a silty clay loam formed by glacial till and glaciolacustrine materials. The soils on the installation are primarily alkaline and create a slight hindrance to plant growth, as most trees prefer slightly acidic soils.

Native plant materials within the Great Falls area.

1.5.5 Natural Plant Communities

Malmstrom AFB is located in an area known as the Shortgrass Prairie. This area, which is also known as the Great Plains or High Plains, is the most arid of the mid-continental grasslands. Typical grasses characteristic of the shortgrass prairie include Buffalo Grass, Blue Grama, and Western Wheatgrass. Over the years, native vegetation within the installation has been significantly altered by development and the introduction of

exotic grasses. Typical exotic grasses include Kentucky Bluegrass and Intermediate Wheatgrass. Several introduced weedy forbs have also invaded the base, although some native grasses have recolonized several sites.

1.5.6. Urban Context

Malmstrom AFB is located adjacent to the City of Great Falls which covers approximately 17 square miles. As the second largest city in Montana, Great Falls has an estimated population of 56,000 persons and is the Cascade County seat. The architectural character of the Great Falls area contains considerable variety. This variety directly reflects the historical development of the city since 1888. While Great Falls has a considerable number of architectural landmarks, no distinct architectural style is prevalent in the city. However, design elements such as pitched roofs, large roof overhangs, and brick masonry are common in Great Falls and can be applied to the buildings at Malmstrom AFB.

Section 2:

Visual District Standards

2.1 Overview and Comprehensive Map

For the purpose of describing architectural compatibility with respect to the Facilities Excellence Plan, Malmstrom AFB has been organized into six unique visual districts. These visual districts have been designated based on the installation's existing land use pattern, and other factors such as geographic and circulation patterns. Figure A.1 Visual District Map shows the arrangement of these visual districts at Malmstrom AFB.

2.2 South Gate Visual District

2.2.1 Description

The South Gate Visual District includes the main entrance into Malmstrom AFB, a portion of Goddard Drive from the main gate to the intersection of 69th Street North, and the area occupied by the Malmstrom Heritage Center. This visual district also includes a small parcel of land along Goddard Drive bounded by 69th Street North and 1st Avenue North.

2.2.2 Existing Conditions

2.2.2.a Character

This visual district is Malmstrom AFB's front door to those who arrive at the

installation. It is comprised of a Visitor Center, Main Gate, and a "boulevard" of flags which creates a very formal character. The Malmstrom Heritage Center provides an interesting selection of vintage Air Force static display pieces. Directly across from the static displays is a recently completed landscaped screen wall that forms the northern edge of the visual district and provides a buffer for the adjacent family housing area. Together these elements give the installation a strong and formal sense of arrival.

South Gate, Malmstrom AFB.

2.2.2.b Assets and Liabilities

The visual assets and liabilities of the South Gate Visual District have been identified in this section of the Facilities Excellence Plan. Observations regarding building design elements, site design elements, and landscape design elements have been made and recorded below. Figure A.2, South Gate Visual District Assets and Liabilities Key Map, indicates the location of these elements within the visual district.

2.2.2.b.1 Buildings

1. ASSET - South Gate Visitor Center is an excellent building in terms of massing, with an interesting roof form.

South Gate Visitor Center.

2. LIABILITY - The Malmstrom Heritage Center Building has received upgrades to match installation standards, but still lacks visual interest, especially for a customer oriented facility.

2.2.2.b.2 Landscape

3. ASSET - The site around the entry sign and Visitors Center have been properly landscaped including the use of appropriate stone mulch material. This helps project a positive "main gate" image.

Landscape bed around main sign.

4. LIABILITY - Plant material installed along the base of the brick screen wall is small and not proportional to the height of the wall. Taller plant material should be used.

5. LIABILITY - The center median leading up to the South Gate has been planted but is not well maintained, presenting a poor first impression of the installation.

Center median leading to the South Gate.

6. LIABILITY - This triangular space currently appears as the "left over" space where Goddard Drive and 1st Ave. N meet. It could be designed to visually terminate the arrival sequence within this visual district.

"Left over" triangular space at the intersection of Goddard Drive and 1st Ave. N.

2.2.2.b.3 Site Elements

7. ASSET - The screen wall and associated landscaping provide an effective buffer between the housing area and the main entry. This screen wall helps reduce the traffic impact on the adjacent housing area while enhancing the entry drive.

8. ASSET - The "procession" of flags adds formality to the arrival sequence and is appropriate for an entry boulevard on a military installation.

Procession of flags along Goddard Drive at south gate entrance.

9. ASSET - Static display pieces add visual interest along the entry drive. These displays help inform visitors of the history of Malmstrom AFB and its role in the US Air Force.

10. LIABILITY - The wood fence used to screen the housing area from the entry drive is showing signs of wear and needs to be replaced with either a wall similar to the one across Goddard Drive, a dense landscape screen, or a combination of both.

Wood fence which screens family housing area from Malmstrom Heritage Center.

2.2.3 Future Development

2.2.3.a Objectives

The South Gate Visual District is the formal entry into Malmstrom AFB. As such, this area should present an image which projects a positive, high quality first impression. In order to accomplish this goal, the following objectives should be considered when planning any aesthetic improvements within the visual district.

- Continue to present a positive "front door" image which reflects the quality of Malmstrom AFB, and instills a sense of pride in the installation.

- Improve the quality of the arrival sequence. This arrival sequence begins along 2nd Avenue North outside of the installation boundary and continues to the open space triangle at Goddard Drive and 1st Avenue North. Improvements to the arrival sequence should include the development of well maintained, visually pleasing, landscape treatments.

- Improve the Malmstrom Heritage Center and associated building, particularly as it is viewed along the arrival sequence. Since this facility is the destination of many visitors to Malmstrom AFB, it should serve as a visual landmark along Goddard Drive.

- Improve the visual quality of areas inside, outside, and adjacent to the Malmstrom AFB entrance.

2.2.3.b Desired Patterns

A highly desired pattern within the South Gate Visual District is the development of exterior building enhancements and landscape treatments which directly reflect the goal of a high quality formal entrance.

2.2.3.c Exterior Design Objectives

Exterior design theme for the South Gate Visual District should follow the Visitor Center, Building 192.

2.2.3.c.1 Theme

- The exterior design theme for all new buildings and building renovations should follow the style established by the Visitors Center, Building 192. This style is characterized by the use of

brick exterior and sloped, standing seam metal roofing. The use of angular and circular architectural forms should also be considered as part of this theme.

2.2.3.c.2 Scale

- Any proposed buildings should be of a scale which is compatible with the overall mass of other buildings within the visual district. Since the South Gate Visual District contains only a few small scale buildings, any new buildings should also be small in scale.

- Buildings with a gross square foot area between 200 and 5000 should be considered small scale buildings and are suitable for this visual district.

- Buildings with a gross square foot area between 5001 and 25,000 should be considered medium scale buildings and are not suitable for this visual district.

- Buildings with a gross square foot area larger than 25,000 should be considered large scale buildings and are not suitable for this visual district.

- Avoid designs that include one rectangular mass for buildings within the South Gate Visual District.

2.2.3.c.2.a Height

- Building height should be limited to a maximum of two stories above grade, or a total height of 30 feet.

2.2.3.c.2.b Massing

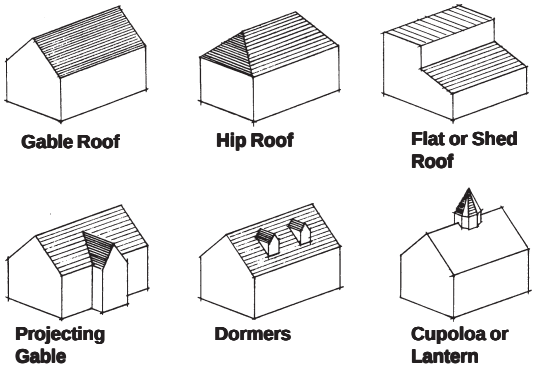
- Buildings should be broken into smaller submasses to reduce the visual impact of the building and provide added visual interest.

- The massing of forms which compose a building will influence its character. A symmetrical composition with a central entrance form will result in a formal appearance appropriate to administration buildings and visitor information buildings. An asymmetrical composition with an off-center entrance is applicable for most other buildings on the installation. The composition of building massing within the South Gate Visual District may be either formal or informal based on the functional activities of the building. Buildings with high levels of visitor activity should have massing which is more formal and directs the unfamiliar user toward the entrance.

2.2.3.c.3 Form

2.2.3.c.3.a Roof Configuration

- Sloped roof forms are elements of the building form which are vital to the overall visual experience. Climatic conditions in Montana dictate using sloped roofs with overhangs to provide positive roof drainage and shade on the facade. Primary roof forms may be gables, hips, or sheds. Secondary roof forms may include projecting gables or dormers. Flat roofs should not be used in the South Gate Visual District.



Typical roof types.

- Typical roof overhangs for this visual district should be a minimum of 18 inches.

- All roof mounted building appurtenances such as HVAC equipment should be screened from view with the same roof materials used elsewhere on the building. All roof mounted equipment should be painted an appropriate color to allow the equipment to be visually inconspicuous.

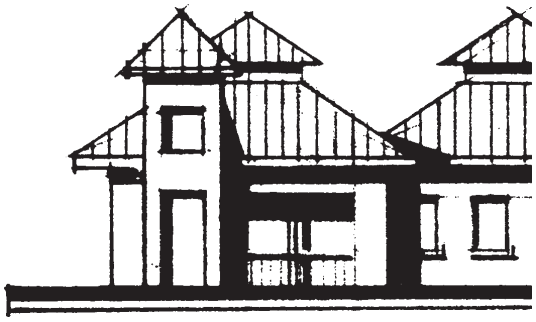
- Parapets or edge type roof treatments should be used to conceal structural roof elements. The size of these edge treatments should be in visual proportion with the building elevation.

- For sloped roofs, the typical roof pitch for new or overbuilt roofs should be 3:12.

2.2.3.c.3.b Exterior Elevation Elements

2.2.3.c.3.b.1 Entrances

- Building entrances should be made more identifiable to create a hierarchy with wall plane changes, vertical elements, or a similar facade variation. This can also include changes in exterior surface material. The main entry element should be projected for emphasis on buildings in the South Gate Visual District.

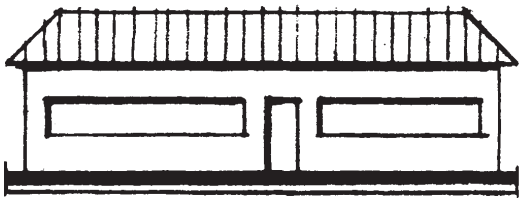


Projected building entry.

- Destination buildings such as visitor centers should consist of complex forms to create focal structures which are more easily identifiable.

2.2.3.c.3.b.2 Windows

•Projections, recesses, and window openings should be used to reduce the visual length of long uninterrupted building walls.



Undesirable

Desirable

Projections and windows should be used to break up long uninterrupted building walls.

- Use a consistent shape of windows to create a unified architectural theme. More than two window patterns per building should not be permitted.

- Minimize glass area to improve energy conservation, especially in locations where excessive solar gain is an issue. However, the required levels of natural light and ventilation should be maintained.

- For buildings within the South Gate Visual District, individual or grouped (maximum of three) windows should be used. Glass curtain walls may be used at entry vestibules and lobbies.

2.2.3.c.3.c Plan Geometry

- Building footprint and profile should be representative of the building function and present an identifiable building hierarchy.

- Building entrances facing in directions that collect or channel wind should be constructed with dual door vestibules. The first door within the vestibule should be controlled in such a manner so that it closes before the second door opens to provide protection from the strong local winds.

- Locate primary building entrances to relate to adjacent building entrances and major pedestrian circulation routes.

- Angular or orthogonal plan geometries should be permitted if used sparingly for the specific purpose of providing building hierarchy at locations such as entrances.

2.2.3.c.4 Articulation

2.2.3.c.4.a Materials

2.2.3.c.4.a.1 Roof Material

- Roof material should consist of either standing seam metal or shingles. For color and finish, see Architectural Materials and Color Palette, page A2-43.

- Standing seam metal roofs should include continuous snow stops with thermostatically controlled heat cables.

2.2.3.c.4.a.2 Wall Material

- For all buildings within the South Gate Visual District, exterior wall material should be brick. For color and finish, see Architectural Materials and Color Palette, page A2-43.

2.2.3.c.4.a.3 Trim Material

- Trim material within the South Gate Visual District can include brick, metal, or exterior concrete. For color and finish, see Architectural Materials and Color Palette, page A2-43.

2.2.3.c.4.b Color

- The use of exterior wall paint should be avoided whenever possible to reduce exterior building maintenance. When exterior paint is necessary, use exterior paint colors as specified in the Architectural Materials and Color Palette, page A2-43.

2.2.3.c.4.c Fenestration

2.2.3.c.4.c.1 Windows

- Use dark bronze anodized aluminum with thermal barrier and factory seal dual glazing from the interior for all windows within the South Gate Visual District (Federal Standard Color No. 37056).

2.2.3.c.4.c.2 Doors

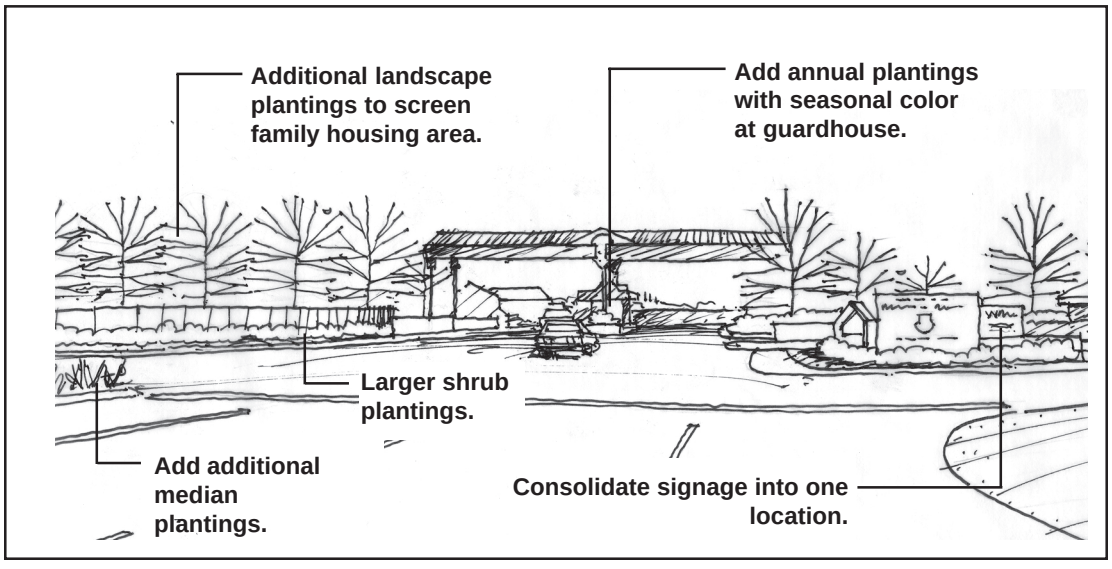
- Provide steel doors and frames , painted to match Sherwin-Williams No. SW37056.

2.2.3.c.5 Landscape Objectives

Because the South Gate Visual District contains few buildings, the landscape objectives for this area play an important role in establishing the character and quality of this visual district. These include:

- Continue the high level of landscape maintenance around the South Gate and Visitors Center.
- Provide high quality landscape maintenance in the medians along 2nd Avenue North equal to that in the vicinty of the gate and Visitors Center.
- Include brightly colored annual plantings at key locations: the South Gate, Visitors Center, and 2nd Avenue North medians.
- Provide additional landscape plantings at the South Gate screen wall including larger shade trees behind the wall to screen family housing and larger shrub plantings at the base of the wall.

Potential landscape improvements at the South Gate entrance.



2.3 Administration Visual District

2.3.1 Description

The Administration Visual District is located in the center of the installation and is adjacent to the Operational/Industrial, and Dormitory/Quarters Visual Districts. Several portions of the Community Visual District are also adjacent to the Administration Visual District.

2.3.2 Existing Conditions

2.3.2.a Character

This visual district consists of a mixture of buildings varying in size and scale. The majority of these buildings are one to two stories in height, with building 500 (341st Space Wing HQ) being the exception at four stories. The majority of the parking for this area is located in smaller parking lots associated with nearby buildings. Larger shared parking lots also exist within this visual district. Landscape treatment varies from buildings having substantial treatment at entrances to buildings with no landscape treatment.

Building 1191, typical of the Administration Visual District.

2.3.2.b Assets and Liabilities

The visual assets and liabilities of the Administration Visual District have been identified in this section of the Facilities Excellence Plan. Observations regarding building design elements, site design elements, and landscape design elements have been made and recorded below. Figure A.3, Administration Visual District Assets and Liabilities Key Map, indicates the location of these elements within the visual district.

2.3.2.b.1 Buildings

1. ASSET - Building 1191 has a strong visual presence primarily because of the prominent Minuteman missile static display in front of the building. Building 1191 meets the installation architectural standards.

2. ASSET - Building 500 (341st Space Wing HQ) has a strong visual presence due to its large size. The checkerboard facade treatment is unique and is compatible with the surrounding buildings.

Building 500.

3. ASSET - Building 220 (Self Help) is an excellent example of using a contemporary window treatment and roof form to add

visual interest to a simple building in addition to distinguishing the entrance.

Building 220.

4. LIABILITY - Building 770 is currently under renovation and is receiving exterior architectural upgrades. This building is in a visually prominent site along Goddard Drive, a primary traffic thoroughfare.

Building 770.

5. LIABILITY - Building 769 has not received any exterior architectural upgrades and is not consistent with the exterior architectural standards for the installation with respect to window treatments and roof pitch.

Building 769.

2.3.2.b.2 Landscape

6. ASSET - Building 610 has a well developed landscape with extensive parking lot plantings and screened service areas.

7. LIABILITY - Plant material installed within parking lot islands should be increased and maintained to provide additional screening and shade for the parking lots.

Additional plant material would provide better screening in parking lot.

8. LIABILITY - The parking lot across 77th Street North from Building 500 is very long, with few opportunities for landscaping. This is especially detrimental because the parking lot is orientated with its longest

side directly facing the rear facade of Building 510.

9. LIABILITY - The parking lot across 72nd Street North from Building 770 is very large, with absolutely no landscape treatment. Since this parking lot fronts onto Goddard Drive, it is very visible to the high volumes of vehicular traffic which occur along this road.

2.3.2.b.3 Site Elements

10. ASSET - The RED HORSE Squadron Statue in front of Building 160 (Nutter Hall) is visually prominent due to its location along Goddard Drive.

RED HORSE Squadron statue.

11. LIABILITY - The parking lot serving Building 470 has a bay of parking which fronts directly onto 78th Street North, with no visual or functional separation of parking and roadway.

No functional separation of parking and roadway.

12. LIABILITY - Service equipment adjacent to Building 500 is not screened adequately. Not only is the service equipment seen by approaching vehicles, but visitors on foot have views of this equipment as they use the sidewalk leading from the parking lot to the main building entry.

Service equipment needs additional screening.

2.3.3 Future Development

2.3.3.a Objectives

The Administration Visual District is widely dispersed, with a concentration of buildings focused around Building 500 (341st Space Wing HQ). Goddard Drive passes though portions of this district and the roadway's

visual qualities have a strong impact on the visual perception of this district. The objectives for this district focus on visual unification and include:

- Enhance the visual qualities of the open space defined by Buildings 1191 and 770. The visual quality of this open space could be improved with architectural updates to the exterior of Building 770, and landscape treatments to the open space fronting this building.

- Complete an exterior renovation to Building 769. With a flat roof and large expanses of windows with silver aluminum mullions, this building is not visually consistent with other buildings in the Administration Visual District.

- Improve the landscape plantings within the parking lots. Many of these parking lots are large and contain very little landscaping.

- Provide adequate equipment screening for service equipment near buildings within this visual district. (This is especially important near Building 500, 341st Space Wing HQ).

2.3.3.b Desired Patterns

An important visual pattern to establish within the Administration Visual District is well landscaped parking lots. Currently, many of the larger lots contain very little landscape treatment to provide any degree of visual screening.

A second pattern which is desired within the Administration Visual District is to establish a pattern of visually consistent buildings. To achieve this goal, buildings should utilize elements from the exterior design objectives to establish a unified visual appearance.

2.3.3.c Exterior Design Objectives

2.3.3.c.1 Theme

The exterior design theme for all new buildings and building renovations should follow a style to develop a consistent theme throughout the installation. This style is characterized by a contemporary use of brick, concrete block, concrete, and sloped, standing seam metal roofing. Elements which distinguish buildings within this visual district from those of other districts include: the use of concrete and brick as an exterior wall material, visually subdued building signage, and buildings appropriately scaled for administrative functions.

Exterior design theme for the Administration Visual District includes the use of concrete and brick.

2.3.3.c.1 Scale

Visually prominent administrative facilities shall have a scale which is somewhat monumental. The main entrance feature shall be centrally located and project vertically from the roof and horizontally

from the facade, making it clearly visible from a distance.

- Buildings with a gross square foot area between 200 and 5000 shall be considered small scale buildings and may be suitable for this visual district, but smaller buildings are not encouraged within this visual district.

- Buildings with a gross square foot area between 5001 and 25,000 shall be considered medium scale buildings and are suitable for this visual district.

- Buildings with a gross square foot area larger than 25,000 shall be considered large scale buildings and are not suitable for this visual district, unless the building functions as a central administration building for the entire installation.

2.3.3.c.2.a Height

- Building height shall be limited to a maximum of three stories above grade, or a total height of 40 feet.

2.3.3.c.2.b Massing

- Buildings shall be broken into smaller submasses to reduce the visual impact and provide added visual interest.

- The massing of forms which compose a building will influence its character. A symmetrical composition with a central entrance form will result in a formal appearance appropriate for certain types of administration facilities, such as headquarters buildings. An asymmetrical composition with an off-center entrance is applicable for most other administrative buildings within the visual district. The composition of the massing of buildings within the Administration Visual District may be either formal or informal based on the functional activities of the building.

- New buildings within the Administration Visual District should avoid designs using one rectangular mass.

- Smaller secondary administration type buildings shall use small porches to help identify entrances where possible.

2.3.2.c.3 Form

2.3.3.c.3.a Roof Configuration

- Sloped roof forms are elements of the building form which are vital to the overall visual experience. Climatic conditions in Montana dictate using sloped roofs with overhangs to provide positive roof drainage and shade on the facade. Primary roof forms may be gables, hips, or sheds. Secondary roof forms may include projecting gables or dormers. Flat roofs shall not be used on buildings within the Administration Visual District.

- Typical roof overhangs for this visual district shall be a minimum of 18 inches. Deep roof overhangs shall be used at all building entrances to provide protection from the weather.

An example of an adequate roof overhang.

- All roof-mounted building appurtenances such as HVAC equipment shall be screened from view with the same roof materials used elsewhere on the building. All roof mounted equipment shall be painted an appropriate color to allow the equipment to be visually inconspicuous.

- Parapets or edge type roof treatments shall be used to conceal structural roof elements. The size of these edge treatments shall be in visual proportion with the building elevation.

- For sloped roofs, the typical roof pitch for new or overbuilt roofs shall be 3:12.

2.3.3.c.3.b Exterior Elevation Elements

2.3.3.c.3.b.1 Entrances

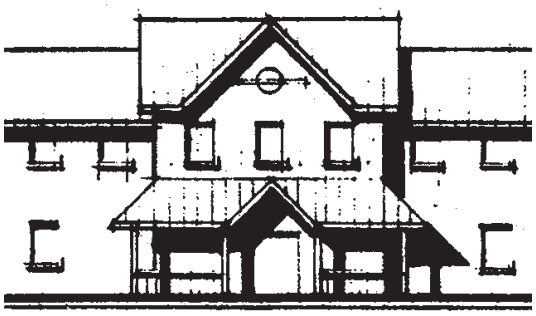
- Building entrances shall be made more identifiable, creating a hierarchy with the use of wall plane changes, vertical elements, or some other similar facade variation. This can also include changes in exterior surface material. The main entry element shall be projected to emphasize the entrance on buildings in the Administration Visual District.

- Destination buildings such as headquarters, shall consist of more complex forms to create focal structures which are more easily identifiable.

2.3.3.c.3.b.2 Windows

- Projections, recesses, and window openings shall be used to reduce the visual length of long uninterrupted building walls.

- Use a consistent shape of windows to create a unified architectural theme. More than two window patterns per building shall not be permitted.



Consistent window shape helps create a unified architectural theme.

- Minimize glass area where possible for energy conservation, but maintain required natural light and ventilation.

- For buildings within the Administration Visual District, individual or grouped (maximum three windows per opening) shall be used. Glass curtain walls may be used at entry vestibules and lobbies.

- Windows shall be residential in scale, while doors should have a more monumental scale. Smaller secondary administrative buildings shall have comfortably

proportioned and spaced window openings.

2.3.3.c.3.c Plan Geometry

- Building footprint and profile shall be representative of the building function and present an identifiable building hierarchy.

- Building entrances facing in directions that collect or channel wind shall be constructed with dual door vestibules. The first door within the vestibule shall be controlled in such a manner so that it closes before the second door opens to provide protection from the strong local winds.

- Locate primary building entrances to relate to adjacent building entrances and major pedestrian circulation routes.

- Angular or orthogonal plan geometries shall be permitted if used sparingly for the specific purpose of providing building hierarchy at locations such as entrances.

2.3.3.c.4 Articulation

2.3.3.c.4.a Materials

2.3.3.c.4.a.1 Roof Material

- Roof material shall consist of either standing seam metal or shingles. On many large or irregular shaped roofs, standing seam material will be selected on a case by case basis. For color and finish, see Architectural Materials and Color Palette, page A2-43.

- Standing seam metal roofs shall include continuous snow stops with thermostatically controlled heat cables.

2.3.3.c.4.a.2 Wall Material

- For all buildings within the Administration Visual District, exterior wall material shall be either brick, metal, or exterior concrete. See Architectural Materials and Color Palette, page A2-43.

2.3.3.c.4.a.3 Trim Material

- Trim material within the Administration Visual District can include metal or exterior concrete. See Architectural Materials and Color Palette, page A2-43.

2.3.3.c.4.b Color

- The use of exterior wall paint should be avoided whenever possible to reduce exterior building maintenance. When exterior paint is necessary, use exterior paint colors as specified in the Architectural Materials and Color Palette, page A2-43.

2.3.3.c.4.c Fenestration

2.3.3.c.4.c.1 Windows

- Use dark bronze anodized aluminum thermal barrier and factory seal dual glazing from the interior (Federal Standard Color No. 37056).

2.3.3.c.4.c.2 Doors

- Provide steel doors and frames painted to match Sherwin-Williams No. SW37056.

2.3.3.c.4.d Details

- Avoid the use of supergraphics and stripes which create features at odds with their natural or built-up context.

- Large building signing indicating function and/or activities should be avoided within this visual district.

- Where possible, roof gutter and downspouts shall be integrated into the exterior design of the building facade. Where downspouts meet sidewalks or pedestrian areas at the ground, they should run below the pavement to prevent freezing hazards on walkways during winter months.

2.3.3.c.5 Landscape Objectives

Landscape objectives for this visual district should focus on unifying the various elements of the district, using a comprehensive set of installation wide landscape standards. Specifically:

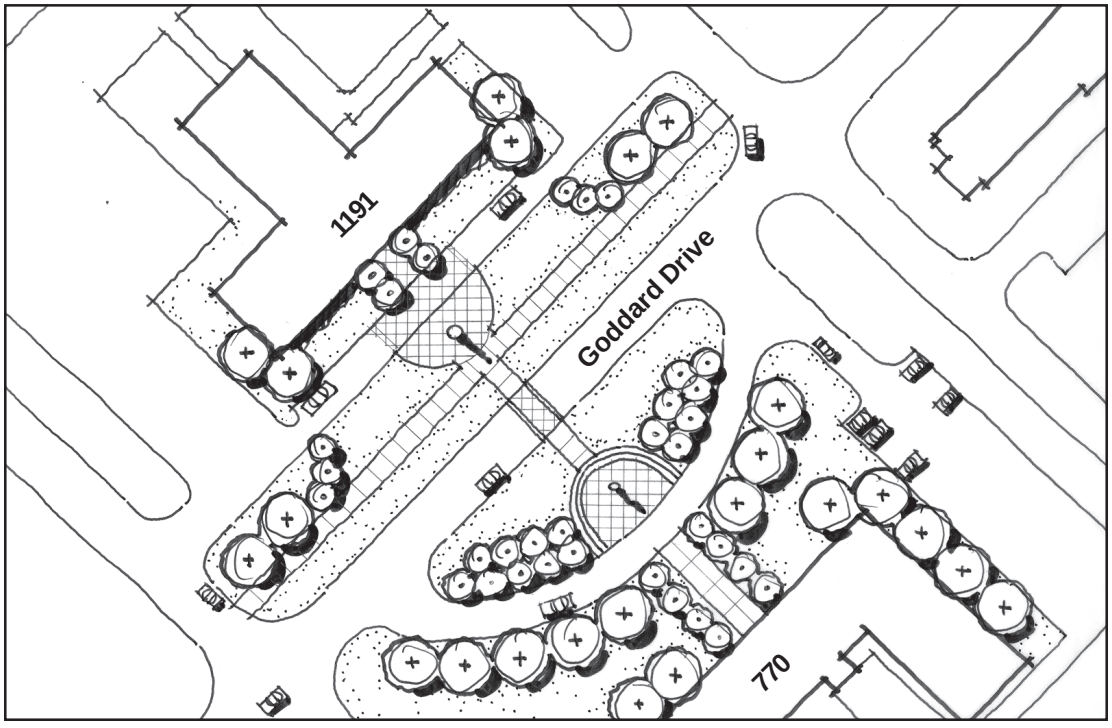
- Develop and enhance the open space character in front of Building 770 and 1191 with the goal of enhancing the travel sequence along Goddard Drive. This can be accomplished with the development of formal landscape plantings.

- Provide a comprehensive and cohesive treatment of all parking lots within this visual district.

- Include key accent plantings at building entrances. These plantings may include brightly colored annuals and ornamental grasses.

- Provide additional landscape plantings to enhance the streetscape along Goddard Drive. Streetscape plantings are currently being installed at various locations and additional plantings should be installed to continue this treatment.

Potential planting improvements which enhance the open space in front of Buildings 770 and 1191.



2.4 Community Visual District

2.4.1 Description

The Community Visual District is located in the center of the installation and is adjacent to the Operational/Industrial Visual District, Dormitory/Quarters Visual District, and the Family Housing Visual District. This section of the installation serves as the "town center," and includes religious, dining, shopping, medical, library and recreational facilities.

2.4.2 Existing Conditions

2.4.2.a Character

The Community Visual District consists of a mixture of buildings varying significantly in size and scale, from a large Commissary to a small Post Office. The majority of the buildings within this visual district are one to two stories in height. The buildings typically have sloping roofs constructed of standing seam metal. Many of the older buildings have received exterior upgrades including facade improvements. Parking is usually accommodated in larger parking lots associated with nearby buildings. Some smaller parking areas also exist within the district. Landscape treatment within this visual district varies from substantial treatment to areas with no landscape development. Also of note, many of the buildings within this visual district have facility names placed directly on facades.

Building 1320, Commissary, has a substantial aesthetic impact on the Community Visual District.

2.4.2.b Assets and Liabilities

The visual assets and liabilities of the Community Visual District are identified in this section of the Facilities Excellence Plan. Observations regarding building design elements, site design elements, and landscape design elements have been made and recorded below. Figure A.4, Community Visual District Assets and Liabilities Key Map, indicates the location of these items within the visual district.

2.4.2.b.1 Buildings

1. ASSET - Building 2040 (Medical Clinic) is a strong visual asset due to its unique massing and roof forms. The building form and materials contribute to a cohesive appearance and provides a positive example of applying the current exterior architectural standards creatively.

Building 2040, Medical Clinic.

2. ASSET - Building 1320 (Commissary) is, by the nature of its size, a visual anchor for the Community Visual District. This building is a good example of using varying roof forms to provide visual interest. By utilizing a variety of appropriate materials on the facades of the building, large expanses of wall have a more "human" scale.

Building 1320, Commissary.

3. ASSET - The steeple on Building 1199 (Chapel) acts as a vertical element providing a visual landmark in the Community Visual District.

4. ASSET - The Library is an excellent example of applying the base exterior standards to upgrade an existing building. The detailing of the building entry allows users to readily identify the entrance.

Building 1152, Library.

5. ASSET - The recently completed Car Wash is an excellent example of implementing the installation's exterior standards for a utilitarian building. Using split face block in a variety of ways visually enhances this structure.

6. LIABILITY - White brick used on Building 1150 is inconsistent with base exterior standards.

7. LIABILITY - The Sports and Fitness Center has a very poorly defined main entry. The upper gym windows are inconsistent with installation standards and require replacement.

Entrance to Sports and Fitness Center.

8. LIABILITY - The Post Office does not match the installation standards with regard to roof pitch and window treatment. This building also has a vending machine located near the front door which is visually distracting.

Building 1084, Post Office.

9. LIABILITY - The buildings which comprise the temporary lodging facility have inconsistently applied siding. Some siding seams run horizontally while others run vertically. These buildings are scheduled to be demolished.

Siding applied vertically and horizontally.

2.4.2.b.2 Landscape

10. ASSET - This open space provides a nice transition between the Community Visual District and the adjacent housing areas.

11. ASSET - The Medical Clinic parking lot is well landscaped and adequately screens vehicles. The lot itself is also screened well from Perimeter Road.

Medical Clinic parking lot landscaping helps screen views of vehicles.

12. ASSET - Club Malmstrom is well landscaped, although the split rail fence is not consistent with the installation theme.

13. LIABILITY - Very large parking lot with no landscape planting.

14. LIABILITY - This area lacks landscape treatment and requires additional plantings to provide shade and screening of building service areas.

The area behind Buildings 1145, 1150, 1154, and 1156 lacks landscape treatment to help define and create positive outdoor space.

2.4.2.b.3 Site Elements

15. ASSET - New play equipment and associated items add visual interest to this area.

16. ASSET - This is a nice community picnic area with mature landscaping and appropriately designed pavilions.

Picnic shelter located within Sun Plaza Park.

17. ASSET - Medal of Honor Park is a positive visual addition to this portion of the Community Visual District, with proper use of landscape material and rock mulch. The gazebos and other miscellaneous site furnishings do not match the installation's exterior site furnishings standards.

Medal of Honor Park.

18. LIABILITY - FamCamp needs an enclosure to buffer it from other portions of the base. Utilities for this area should be relocated underground to reduce their visual impact.

19. LIABILITY - Electrical control boxes and transformers should be screened. Other furnishings such as fencing and trash receptacles should match the installation standards.

2.4.3 Future Development

2.4.3.a Objectives

The Community Visual District serves as the focal point both visually and functionally for the Malmstrom community. As such, this area should be visually distinctive and reflect the communal aspect of the activities which take place within the buildings. Goddard Drive passes though the district and the visual qualities of this roadway have a strong impact on the perception of the visual district. The design objectives should focus on unifying the visual district, while providing visual clues that this area is the

"center" of the installation. These objectives include:

- Complete exterior renovations for the buildings which are not consistent with the exterior guidelines for this district.
- Develop visual enhancements which help identify the visual district as the social focus for the Malmstrom AFB community.
- Encourage further development of the "Community Center" within the Community Visual District. This "Community Center" should have a pedestrian emphasis that includes linkages to adjacent portions of the district.
- As part of the development of a 'Community Center", the space currently formed by buildings 1145, 1150, 1156, and 1154 should receive hardscape and landscape treatments in order to create a positive outdoor space to compliment the other community oriented facilities.

2.4.3.b Desired Patterns

Within the Community Visual District, an important pattern to establish is a pedestrian oriented Community Center. To begin to establish this visual pattern, streetscape elements such as benches, planters, trash receptacles, and pedestrian scaled light fixtures should be incorporated into building entry areas, pedestrian nodes, and other appropriate areas.

Parking lots should be developed with adequate provisions for reducing the visual impact of vehicles, providing shade, and serving as wind breaks.

Develop appropriate signing for community buildings to provide adequate information without becoming an eyesore.

Community buildings should include signage attached directly to building facades to improve wayfinding.

2.4.3.c Exterior Design Objectives

2.4.3.c.1 Theme

The exterior design theme for all new buildings and any buildings requiring exterior renovation or expansion should follow a style which is characterized by the contemporary use of brick, glazed-faced masonry units, precast concrete, stucco, and sloped standing seamed metal roofing. This style should include the use of signage attached directly to the building facade.

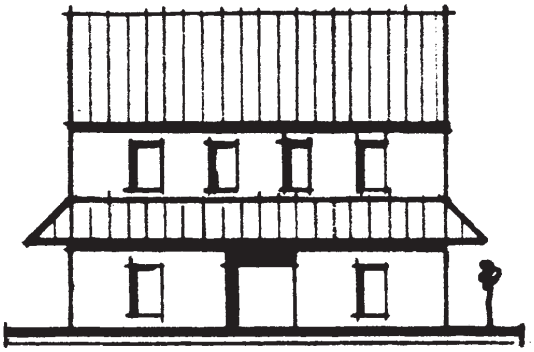
2.4.3.c.2 Scale

- Because a wide variety of functions occur within the Community Visual District, the scale of the buildings within this area will also vary. Buildings with a gross square foot area between 200 and 5000 shall be considered small scale buildings and are suitable for this visual district.
- Buildings with a gross square foot area between 5001 and 25,000 shall be

considered medium scale buildings and may be suitable for this visual district.

- Buildings with a gross square foot area larger than 25,000 shall be considered large scale buildings and may be suitable for this visual district under very limited circumstances. Examples of larger buildings which currently exist within this visual district include the Commissary and Base Exchange.

- New building construction within the Community Visual District should always avoid designs using one rectangular mass. This is especially important for larger buildings which require a sense of human scale at the street level.



Horizontal expression helps create human scale at street level.

2.4.3.c.2.a Height

- Building height shall be limited to a maximum of two stories above grade, or a total height of 30 feet.

- Roofs and covered porches shall be used to bring larger buildings "down" to a more human scale.

2.4.3.c.2.b Massing

- Larger buildings within the Community Visual District shall be broken into smaller submasses to reduce the visual impact and provide visual interest. The massing of larger buildings shall be informal in order to create a more relaxed human scale.

2.4.3.c.3 Form

2.4.3.c.3.a Roof Configuration

- Sloped roofs are required within this visual district to respond better to the prevailing climatic conditions for this portion of Montana. Sloped roofs with deep overhangs provide positive roof drainage and shade the facade. Primary roof forms may include gables, hips, or sheds. Secondary roof forms may include projecting gables or dormers where appropriate. Flat roofs should be avoided where possible.

- Typical roof overhangs for this visual district shall be a minimum of 18 inches. Deep roof overhangs shall be provided at all building entrances to provide protection from the weather.

- All roof mounted building appurtenances such as HVAC equipment shall be screened from view with the same roof materials used elsewhere on the building. All roof mounted equipment shall be painted an appropriate color to allow the equipment to be visually inconspicuous.

All roof mounted equipment shall be screened with roof materials used elsewhere on the building.

- Parapets or edge type roof treatments shall be used to conceal structural roof elements. The size of these edge treatments shall be in visual proportion with the building elevation.

- For sloped roofs, the typical roof pitch for new or overbuilt roofs shall be 3:12.

2.4.3.c.3.b Exterior Elevation Elements

2.4.3.c.3.b.1 Entrances

- Building entrances shall be made more identifiable, creating a hierarchy with the use of wall plane changes, vertical elements, or some other similar facade variation. This can also include changes in exterior surface material. For this visual district, the main entry element shall be emphasized to make major building entrances more recognizable.

Overhead canopy helps emphasize Dining Hall entrance.

- Destination buildings such as Commissaries, Base Exchanges, and Medical Clinics shall consist of complex forms which create focal structures that are more easily identifiable.

- Vending machines shall not be placed on the exterior of buildings. If vending machines are required near building entrances, they should be located within entrance vestibule areas.

2.4.3.c.3.b.2 Windows

- Projections, recesses, and window openings shall be used to reduce the visual length of long uninterrupted building walls.

- Use a consistent shape of windows for buildings to create a unified architectural theme. More than two window patterns per building shall not be permitted.

- Minimize glass area where possible for energy conservation, but maintain required natural light and ventilation.

- For buildings within the Community Visual District, individual or grouped windows shall be used. If appropriate, glass

curtain walls may be used at entry vestibules and lobbies.

- Windows for recreational community facilities such as day-care centers, bowling alleys, theaters, and NCO clubs shall be residential in scale, while doors should have a more monumental scale. Smaller community type buildings shall have comfortably proportioned and spaced window openings.

Smaller community type buildings shall have comfortably proportioned and spaced window openings.

2.4.3.c.3.c Plan Geometry

- Building footprint and profile shall be representative of the buildings function and present an identifiable building hierarchy.

- Building entrances facing in directions that collect or channel wind shall be constructed with dual door vestibules. The first door within the vestibule shall be controlled so that it closes before the second door opens to provide protection from the strong local winds.

- Locate primary building entrances to relate to adjacent building entrances and major pedestrian circulation routes.

- Angular or orthogonal plan geometries shall be permitted if used sparingly for the specific purpose of providing building hierarchy at locations such as entrances.

2.4.3.c.4 Articulation

2.4.3.c.4.a Materials

2.4.3.c.4.a.1 Roof Material

- Roof material shall consist of either standing seam metal or shingles. For color and finish, see Architectural Materials and Color Palette, page A2-43.

- Standing seam metal roofs shall include continuous snow stops with thermostatically controlled heat cables.

2.3.3.c.4.a.2 Wall Material

- For all buildings within the Community Visual District, exterior wall material shall be brick similar to that manufactured by Denver Brick (Desert Tan) or equal. See Architectural Materials and Color Palette, page A2-43 for colors and specifications.

2.3.3.c.4.a.3 Trim Material

- Trim materials within the Community Visual District can include metal or exterior concrete. See Architectural Materials and Color Palette, page A2-43 for colors and specifications.

2.3.3.c.4.b Color

- The use of exterior wall paint should be avoided whenever possible to reduce

exterior building maintenance. When exterior paint is necessary, use exterior paint colors as specified in the Architectural Materials and Color Palette, page A2-43.

2.4.3.c.4.c Fenestration

2.4.3.c.4.c.1 Windows

- Use dark bronze anodized aluminum thermal barrier and factory seal dual glazing from the interior (Federal Standard Color No. 37056) for all windows within the Community Visual District.

2.4.3.c.4.c.2 Doors

- Provide steel doors and frames, painted to match Sherwin-Williams No. SW37056.

2.4.3.c.4.d Details

- Avoid the use of supergraphics and stripes which "create" features at odds with their natural or built-up context.

- Large building signing indicating function and/or activities should be used to promote better legibility throughout the visual district. Signing related to building function or activity should not be attached to adjacent utility screen walls.

Signing related to building function or activity should not be attached to adjacent or nearby utility screen walls.

- Where possible, roof gutter and downspouts shall be integrated into the exterior design of the building facade. Where downspouts meet sidewalks or pedestrian areas at the ground, they should run below the pavement to prevent freezing hazards on walkways during winter months.

2.4.3.c.5 Landscape Objectives

Currently within the Community Visual District, very little design effort has been made to create an environment more conducive to pedestrian activities. Landscape objectives within this visual district should be designed to create more people-friendly space. This includes not only articulating pedestrian spaces with planting, but also developing a pedestrian circulation system which is reinforced with a clear method of landscaping. Specifically:

- Develop pedestrian scale spaces within the area bounded by Buildings 1145, 1150, 1152, 1154, and 1156 with planting materials. Develop planting schemes which create plant massings to define space for pedestrian areas.

- Provide a comprehensive and cohesive treatment of all parking lots within this visual district. Landscape plantings should screen parking lots from adjacent roads and also reinforce safe pedestrian circulation routes within parking areas.

- Include key accent plantings at building entrances. These plantings may include brightly colored annuals and ornamental grasses which are more in character with community type facilities.

- Provide additional streetscape landscape plantings to continue to develop a pedestrian oriented streetscape along Goddard Drive.

2.5 Dormitory/Quarters Visual District

2.5.1 Description

The Dormitory/Quarters Visual District is adjacent to the Administration Visual District and Community Visual District and includes the Visiting Officers Quarters (VOQ) located on the northwest portion of the installation. This portion of the installation serves as the primary unaccompanied personnel housing area on the installation.

2.5.2 Existing Conditions

2.5.2.a Character

This visual district consists of buildings which tend to be larger in mass and taller than surrounding buildings. Because the majority of these building can be seen from Goddard Drive, they have a significant visual impact on the installation. Parking typically occurs in larger parking lots adjacent to dormitory groupings. Landscape treatment within this visual district typically includes treatment at entrances and interior courtyard spaces. Several buildings have no landscape development.

Dormitory/Quarters Visual District.

2.5.2.b Assets and Liabilities

The visual assets and liabilities of the Dormitory/Quarters Visual District are identified in this section of the Facilities Excellence Plan. Observations regarding building design elements, site design elements, and landscape design elements have been made and recorded below. Figure A.5, Dormitory/Quarters Visual District Assets and Liabilities Key Map, indicates the location of these elements within the visual district.

2.5.2.b.1 Buildings

1. ASSET - The new dorms are excellent examples of utilizing the current exterior architectural standards to provide interesting building massing and roof forms.

2. LIABILITY - Buildings 737 and 740 are flat roof dorms which have not received any exterior upgrades. These structures have very little facade articulation and do not convey a residential character.

3. LIABILITY - The front entrance brick and leaded glass windows on the Malmstrom Inn are not consistent with installation exterior standards. Regional wooden characters add to the visual chaos at this building.

The Malmstrom Inn is not consistent with installation exterior standards.

2.5.2.b.2 Landscape

4. ASSET - The landscape treatment along Building 768 includes trees which provide some visual relief along the building facade. New turf helps create a residential character.

5. ASSET - The landscape bed adjacent to the parking area is well planted and maintained, which is appropriate given its location at Billeting.

6. ASSET - A well-planted landscape bed along Building 1620 gives a good first impression to visitors at Billeting.

Landscape bed along Building 1620.

7. LIABILITY - Additional landscape planting is needed here to provide summer shade for dormitory structures.

Additional planting is needed to provide summer shade for dormitories.

2.5.2.b.3 Site Elements

8. ASSET - The courtyard is well developed with an interesting paving pattern.

Plaza area located within dormitory grouping.

9. LIABILITY - Dumpsters need to be screened better, or possibly moved to an

alternative location due to their proximity to the courtyard.

Dumpsters need better screening or relocation.

10. LIABILITY - Parking lot is very open and needs plantings to visually reduce the amount of pavement. Planting islands should be incorporated by removing the existing pavement in the end islands. Light standard finishes are not consistent with installation standards.

Parking lot needs planting to visually reduce paving.

2.5.3 Future Development

2.5.3.a Objectives

The Dormitory/Quarters Visual District is primarily concentrated within two areas of the installation. Because the buildings within this visual district are taller and located along Goddard Drive, they have a strong visual impact on the entire installation. When considered with the Visiting Officers Quarters (VOQ), this district has a substantial visual impact on the installation. The objectives for this visual district focus on presenting a unified visual image for all buildings, site elements, and landscape elements, and include the following:

- Complete exterior renovations for buildings which do not meet current exterior guidelines.
- Provide landscape plantings to help create human scale spaces and improve microclimatic conditions associated with large scale dormitory buildings and adjacent pedestrian spaces.
- Improve the landscape plantings and berming for parking lots within this visual district. Many of these parking lots are large, clearly visible from adjacent roadways, and in need of screening.

2.5.3.b Desired Patterns

The pattern of grouped, consistently styled, dormitory buildings surrounded by well landscaped pedestrian oriented open space is the primary pattern desired for the Dormitory/Quarters Visual District.

The development of parking lots with adequate provisions for reducing the visual impact of vehicles, providing shade, and functioning as wind breaks, is strongly encouraged within this visual district.

2.5.3.c Exterior Design Objectives

2.5.3.c.1 Theme

Exterior design theme for the Dormitory/ Quarters Visual District should follow Building 655.

The exterior design theme for all new buildings and building renovations should follow a style to develop a consistent theme throughout the installation. This style is characterized by a contemporary use of brick, concrete block, concrete, and sloped, standing seam metal roofing. Elements which distinguish buildings within this visual district from those of other districts include: 1) the use of concrete and concrete block as an exterior wall material 2) visually subdued building signage, and 3) building elements which are residential in character and style.

2.5.3.c.2 Scale

Dormitories and visitor quarters are generally large buildings which are visually prominent. In order to efficiently house the required number of personnel, buildings of this type are usually of a larger scale.

- Buildings with a gross square foot area between 200 and 5000 shall be considered small scale buildings and shall not be considered suitable for this visual district.

- Buildings with a gross square foot area between 5001 and 25,000 shall be considered medium scale buildings and are not considered suitable for this visual district.

- Buildings with a gross square foot area larger than 25,000 shall be considered large scale buildings and are suitable for this visual district.

2.5.3.c.2.a Height

- Building height shall be limited to a range of between two and four stories above grade, or a total height of 45 feet.

- Roofs, covered porches, and other elements with “residential” character shall be used to bring larger buildings “down” to a more human scale.

2.5.3.c.2.b Massing

- Because of functional requirements, dormitories are typically structures with substantial bulk. This bulk should be reduced by breaking buildings into smaller submasses which will reduce the visual impact and provide additional visual interest.

New dormitory currently under construction reduces the bulk of the building into smaller submasses.

2.5.3.c.3 Form

2.5.3.c.3.a Roof Configuration

- Sloped roof forms are elements of the building form which are vital to the overall visual experience of a building. Climatic conditions in Montana dictate using sloped roofs with overhangs to provide positive roof drainage and some amount of shade on the facade. Primary roof forms may include gables, hips, or sheds. Secondary roof forms may include projecting gables or preferably dormers. Flat roofs shall not be used for any buildings within the Dormitory/Quarters Visual District.

- Typical roof overhangs for this visual district shall be a minimum of 18 inches. Deep roof overhangs shall be provided at all building entrances to provide protection from the weather.

- All roof mounted building appurtenances such as HVAC equipment shall be screened from view with the same roof materials used elsewhere on the building. All roof mounted equipment shall be painted an appropriate color to allow the equipment to be visually inconspicuous.

- Parapets or edge type roof treatments shall be used to conceal structural roof elements. The size of these edge treatments shall be in visual proportion with the building elevation.

- For sloped roofs, the typical roof pitch for new or overbuilt roofs shall be 3:12.

2.5.3.c.3.a Exterior Elevation Elements

2.5.3.c.3.b.1 Entrances

- Building entrances shall be made more identifiable, creating a hierarchy with the use of wall plane changes, vertical elements, or some other similar facade variation. This can also include changes in exterior surface material. For this visual district, the main entry element shall be emphasized in order to make major building entrances more recognizable.

- Entrance roofs and covered porches with a residential character should be utilized for this visual district.

2.5.3.c.3.b.2 Windows

- Projections, recesses, and window openings shall be used to reduce the visual length of long uninterrupted building walls.

- Use a consistent shape of windows for buildings to create a unified architectural theme. More than two window patterns per building shall not be permitted.

- Minimize glass area where possible for energy conservation, but maintain required natural light and ventilation.

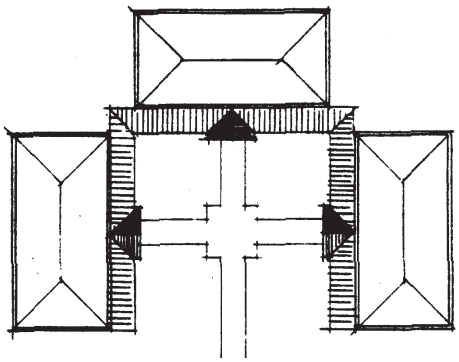
- For buildings within the Dormitory/ Quarters Visual District, individual or grouped windows shall be used. Glass curtain walls may be used at entry vestibules and lobbies.

2.5.3.c.3.c Plan Geometry

- Building footprint and profile shall be representative of the building's function and present an identifiable building hierarchy.

- Building entrances facing in directions that collect or channel wind shall be constructed with dual door vestibules. The first door within the vestibule shall be controlled so that it closes before the second door opens to provide protection from the strong local winds.

- Locate primary building entrances to relate to adjacent building entrances and major pedestrian circulation routes.



Relate building entrances to major circulation routes.

- Angular or orthogonal plan geometries shall be permitted if used sparingly for the specific purpose of providing building hierarchy at locations such as entrances.

2.5.3.c.4 Articulation

2.5.3.c.4.a Materials

2.5.3.c.4.a.1 Roof Materials

- Roof material shall consist of either standing seam metal or shingle. For color and finish, see Architectural Materials and Color Palette, page A2-43.

- Standing seam metal roofs shall include continuous snow stops with thermostatically controlled heat cables.

2.5.3.c.4.b.1 Wall Materials

- For all buildings within the Dormitory/ Quarters Visual District, exterior wall material shall be split-faced block, an exterior insulated wall system such as Dryvit or equal, and/or exterior concrete. See Architectural Materials and Color Palette, page A2-43, for colors and specifications.

2.5.3.c.4.c.1 Trim Materials

- Trim materials within the Dormitory/ Quarters Visual District can include either brick or metal. See Architectural Materials and Color Palette, page A2-43, for colors and specifications.

2.5.3.c.4.b Color

- The use of exterior wall paint should be avoided whenever possible to reduce exterior building maintenance. When exterior paint is necessary, use exterior paint colors as specified in the Architectural Materials and Color Palette, page A2-43.

2.5.3.c.4.c Fenestration

2.5.3.c.4.c.1 Windows

- Use dark bronze anodized aluminum with thermal barrier and factory seal dual glazing from the interior (Federal Standard Color No. 37056) for all windows within the Dormitory/Quarters Visual District.

2.5.3.c.4.d Doors

- Provide steel doors and frames, painted to match Sherwin-Williams No. SW37056.

2.5.3.c.4.d Details

- Avoid the use of supergraphics and stripes which "create" features at odds with their natural or built-up context.

- Large building signing indicating function and/or activities should not be used throughout this visual district.

2.5.3.c.5 Landscape Objectives

Landscape objectives for this visual district focus on unifying the various elements of the visual district by using a comprehensive set of installation wide landscape standards. Specifically these objectives include:

•Continue to provide additional foundation landscape plantings to soften the effects of larger building masses meeting the ground plane.

Foundation plantings along dormitory buildings help soften the effects of larger building masses meeting the ground plane.

- Develop and enhance the open space character that exists between the dormitory buildings within the visual district. This can be accomplished through the development of either formal or informal landscape plantings.

- Provide a comprehensive and cohesive landscape treatment of all parking lots within this visual district.

- Include key accent plantings at building entrances. These plantings may include brightly colored annuals and ornamental grasses.

2.6 Operations/Industrial Visual District

2.6.1 Description

The Operations/Industrial Visual District is located along the southwest and northeast edges of the installation, adjacent to the flightline and runways. This district accommodates the operational, utility, and warehouse functions of the installation.

2.6.2 Existing Conditions

2.6.2.a Character

This visual district consists of industrial buildings which tend to be larger in mass and scale than buildings in surrounding visual districts. Since this area also contains buildings directly associated with the installation utility systems, a large amount of above grade utility equipment is present. Parking within this visual district occurs in lots of various sizes and configurations. Landscape treatment is typically sparse due to the utilitarian nature of this visual district.

2.6.b Assets and Liabilities

The visual assets and liabilities of the Operations/Industrial Visual District are identified in this section of the Facilities Excellence Plan. Observations regarding building design elements, site design elements, and landscape design elements have been made and recorded below. Figure A.6, Operations/Industrial Visual District Assets and Liabilities Key Map, indicates the location of these items within the visual district.

2.6.2.b.1 Buildings

1. ASSET - Building 82110 (Central Heat Plant) has received a consistent exterior treatment suitable for the Industrial/Operations visual district. The beige/tan exterior color contributes to a cohesive appearance which blends into background views of the surrounding high plains.

Building 82110, Heat Plant.

2. ASSET - Building 407 is an excellent example of a large warehouse consistent with the installation exterior design standards for the visual district.

3. ASSET - As the largest building on the installation, Building 1440 dominates a significant portion of the Operations/Industrial Visual District. This building's large mass is visually reduced by the stair-step articulation of the facade. This treatment is consistent with the image of the surrounding area and presents an orderly appearance.

4. ASSET - Building 1439 is an excellent example of using varying facade material to provide visual interest. However, the roof color of this building appears inconsistent with other roof colors on the installation.

Building 1438.

5. LIABILITY - Building 349 (Fire Protection) needs exterior renovations which are currently underway.

6. LIABILITY - Buildings 219 and 230 are visually prominent due to their location adjacent to the flightline. The exterior facades are painted one color and could benefit from additional facade articulation.

Buildings 219 and 230.

7. LIABILITY - Water storage tanks are a visual liability. Painting and landscape screen planting would reduce their negative visual impact.

Water Storage Tank.

8. LIABILITY - The Supply Warehouse has a large flat roof which is inconsistent with the exterior design standards for this visual district.

9. LIABILITY - JP-8 Fuel Storage Tanks visually terminate the view down Flightline Drive. The area surrounding these tanks appears cluttered and should be screened.

Fuel Storage Tanks visually terminate Flightline Drive.

10. LIABILITY - Building 800 is inconsistent with the exterior architectural standards for this visual district. The gray color of this building and flat roof are the two principal visual liabilities.

Building 800.

2.6.2.b.2 Landscape

11. LIABILITY - Tree plantings adjacent to the Central Heat Plant are arranged with coniferous and deciduous trees in a linear and alternating pattern which appears unnatural.

Tree planting adjacent to Heat Plant.

12. LIABILITY - The landscape plantings around Building 1702 appear scattered and have a chaotic visual effect.

13. LIABILITY - The landscaping in front of Building 300 is arranged in a linear manner which appears unnatural.

2.6.2.b.3 Site Elements

14. ASSET - Central Heat Plant equipment along Flightline Drive has been adequately screened from the roadway.

15. LIABILITY - Utility poles along Flightline Drive have a strong visual presence within this visual district.

Utility poles along Flightline Drive.

16. LIABILITY - This large parking lot and storage yard with no landscape planting is a visual eyesore. Portions of this storage area are gravel which also has a negative visual impact.

17. LIABILITY - This is a very large parking lot with no landscape treatment. This lot fronts directly onto Perimeter Road with no visual or functional separation of parking and roadway. The large size of the parking lot emphasizes this problem.

Parking lot which fronts directly onto Perimeter Road.

2.6.3 Future Development

2.6.3.a Objectives

The Operations/Industrial Visual District accommodates the operational, utility, and storage functions of the installation. The objectives for this visual district focus on the use of consistent exterior building materials and/or treatments while allowing each facility to function adequately. Specifically:

- Reduce the visual impacts of the various utility systems.
- Improve vehicular circulation within parking lots and vehicle service areas. This objective also includes reducing the potential for pedestrian/vehicular conflicts.
- Improve the landscape plantings within the parking lots of the district. Several parking lots are large and contain very little landscaping to reduce their visual impact on the surrounding environment.
- Provide adequate screening for service equipment near buildings within this visual district.

2.6.3.b Desired Patterns

A highly desired pattern is the continued use of a consistent palette of exterior design elements to create a sense of visual order.

A second visual pattern to be established within the Operations/Industrial Visual District is well landscaped parking lots. These parking lots should not only provide shade during the warmer summer months, but also visually reduce the impact of large expanses of paved parking and service areas.

2.6.3.c Exterior Design Objectives

2.6.3.c.1 Theme

The exterior design theme for all new buildings, building renovations, and building expansions should follow a style characterized by the use of concrete block, split faced concrete block, concrete, metal siding, and standing seam metal roofing.

2.6.3.c.2 Scale

Since most of the buildings within this visual district are quite large, the scale between adjacent structures should be carefully considered. This is especially critical in areas where other visual districts abut the Operations/Industrial Visual District.

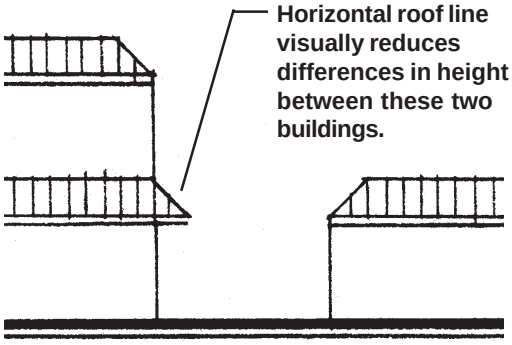
- Buildings with a gross square foot area between 200 and 5000 shall be considered small scale buildings and are suitable for this visual district.
- Buildings with a gross square foot area between 5001 and 25,000 shall be considered medium scale buildings and are suitable for this visual district.

• Buildings with a gross square foot area larger than 25,000 shall be considered large scale buildings and are suitable for this visual district.

Since buildings of various scales are allowed within this visual district, the scale relationship between buildings is of utmost importance and should always be evaluated. Avoid locating buildings with drastic size differences directly adjacent to one another.

2.6.3.c.2.a Height

- Building height shall not be limited to a maximum, due to the highly specialized nature of this visual district. The relationship of buildings with great differences in height should be carefully studied prior to final building siting.



The relationship of buildings with great differences in height should be carefully studied prior to final building siting.

2.6.3.c.2.b Massing

- Larger buildings within the Operations/Industrial Visual District shall be broken into smaller submasses wherever functionally possible to reduce the visual impact of the building and provide added visual interest. The massing of larger buildings shall be informal in order to help create a more relaxed human scale.

- New building construction within the Operations/Industrial Visual District should avoid designs using one rectangular mass.

- Smaller secondary type operations or industrial buildings shall use small porches or extended roof overhangs to help identify entrances where possible.

2.6.3.c.3 Form

2.6.3.c.3.a Roof Configuration

- Sloped roofs are required within this visual district to better respond to the climatic conditions of this portion of Montana. Sloped roofs with deep overhangs provide positive roof drainage and shade the facade. Primary roof forms may include gables, hips, or sheds. Secondary roof forms may include projecting gables or dormers where appropriate. Flat roofs should be avoided if possible.

- Typical roof overhangs for this visual district shall be a minimum of 18 inches. Deep roof overhangs shall be provided at all building entrances to provide protection from the weather.

- All roof mounted building appurtenances such as HVAC equipment shall be screened from view with the same roof materials used elsewhere on the building. All roof mounted equipment shall be painted an appropriate color to allow the equipment to be visually inconspicuous.

- Parapets or edge type roof treatments shall be used to conceal structural roof elements. The size of these edge treatments shall be in visual proportion with the building elevation.

- For sloped roofs, the typical roof pitch for new or overbuilt roofs shall be 3:12.

2.6.3.c.3.a Exterior Elevation Elements

2.6.3.c.3.b.1 Entrances

- Building entrances shall be made more identifiable, creating a hierarchy with the use of wall plane changes, vertical elements, or some other similar facade variation. This can also include changes in exterior surface material. For this visual district, the main entry element shall be emphasized to make major building entrances more recognizable.

- Operations and /or industrial buildings shall consist of simpler forms. Focal points should be created at portions of the structure where visual emphasis is appropriate such as major pedestrian entrances.

An example of an industrial building in which the visual emphasis has been placed on the service entrances.

2.6.3.c.3.b.2 Windows

- Projections, recesses, and window openings shall be used to reduce the visual length of long uninterrupted building walls.

- Use a consistent shape of windows for buildings to create a unified architectural theme. More than two window patterns per building shall not be permitted.

- Minimize glass area where possible for energy conservation, but maintain required natural light and ventilation.

- Windows shall be residential in scale, while doors should have a more monumental scale.

2.6.3.c.3.c Plan Geometry

- Building footprint and profile shall be representative of the building's function and present an identifiable building hierarchy.

- Building entrances facing in directions that collect or channel wind shall be constructed with dual door vestibules. The first door within the vestibule shall be controlled so that it closes before the second door opens to provide protection from the strong local winds.

- Locate primary building entrances to relate to adjacent building entrances and major pedestrian circulation routes.

- Angular or orthogonal plan geometries shall be permitted if used sparingly for the specific purpose of providing building hierarchy at locations such as entrances.

2.6.3.c.4 Articulation

2.6.3.c.4.a Materials

2.6.3.c.4.a.1 Roof Materials

- Roof material shall consist of standing seam metal. See Architectural Materials and Color Palette, page A2-43 for colors and specifications. Flat roofs may be allowed in this visual district and designs will be review on a case by case basis.

- Standing seam metal roofs shall include continuous snow stops with thermostatically controlled heat cables.

2.6.3.c.4.b.1 Wall Materials

- For all buildings within the Industrial/ Operations Visual District, exterior wall material shall be split-faced block, metal, or exterior concrete. See Architectural Materials and Color Palette, page A2-43 for colors and specifications.

2.6.3.c.4.c.1 Trim Materials

- Trim materials within the Operations/ Industrial Visual District can include either brick or metal. See Architectural Materials and Color Palette, page A2-43 for colors and specifications.

2.6.3.c.4.b Color

- The use of exterior wall paint should be avoided whenever possible to reduce exterior building maintenance. When exterior paint is necessary, use exterior paint colors as specified in the Architectural Materials and Color Palette, page A2-43.

2.6.3.c.4.c Fenestration

2.6.3.c.4.c.1 Windows

- Use dark bronze anodized aluminum with thermal barrier and factory seal dual glazing from the interior (Federal Standard No. Color 37056) for all windows within the Operations/Industrial Visual District.

2.6.3.c.4.d Doors

- Provide steel doors and frames, painted to match Sherwin-Williams No. SW37056.

2.6.3.c.4.d Details

- Avoid the use of supergraphics and stripes which “create” features at odds with their natural or built-up context.

- Large building signage indicating function, and/or activities should be avoided within this visual district.

- Where possible, roof gutter and downspouts shall be integrated into the exterior design of the building facade. Where downspouts meet sidewalks or pedestrian areas at the ground, they should run below the pavement to prevent freezing hazards on walkways during winter months.

2.6.3.c.5 Landscape Objectives

Landscape objectives for this visual district focus on unifying the various elements of the visual district by using a comprehensive set of installation wide landscape standards. Specifically these objectives include:

- Develop planting schemes which create plant massings to define positive outdoor spaces.

- Provide a comprehensive and cohesive treatment of all parking lots within this visual district.

- Include key accent plantings at building entrances. These plantings may include brightly colored annuals and ornamental grasses.

- Provide additional landscape plantings to develop the streetscape along Flightline Drive.

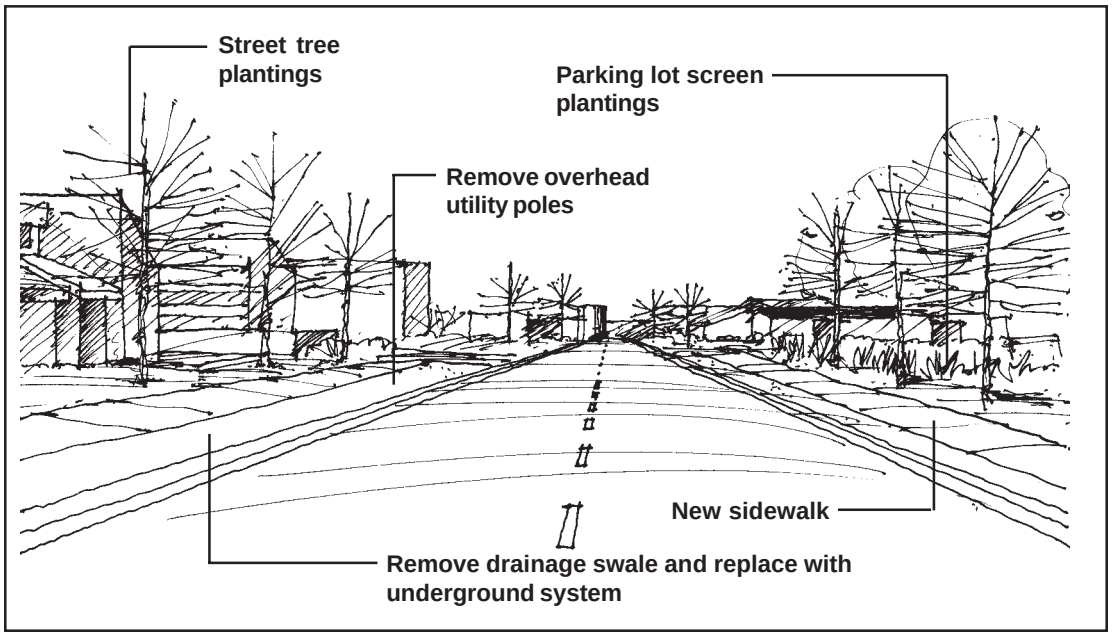
2.7 Family Housing Visual District

2.7.1 Description

The Family Housing Visual District is located primarily in the northeast corner of the installation and is adjacent to the Community Visual District. A second portion of the Family Housing Visual District is located south of the South Gate Visual District. Figure A.1, Visual District Map, shows the arrangement of this visual district at Malmstrom AFB.

There are several types of family housing units within this visual district at Malmstrom AFB including single family, duplex, four-, six-, and eight-plex, modular construction, and mobile homes.

Potential streetscape improvements to Flightline Drive.



A Housing Community Plan (HCP) has recently been prepared for Malmstrom AFB and will contains the visual district standards for the Family Housing areas.

Typical six-plex housing unit at Malmstrom AFB.

Section 3:

Building Interior Standards

3.1 Overview

Housing Office Exterior.

Exterior architecture creates the first impression for visitors and those living and working on the base. However, the interior architecture and design impacts how the people feel and function when using the building. Most people spend the majority of their time inside buildings working, eating, sleeping and relaxing. For this reason special attention should be paid to the interior design of the base facilities. There are many elements that affect the quality and design of interior space: color, maintenance and durability of finishes, functional layout and space plan, work tools and accessories, ergonomics, lighting, daylighting, air quality, temperature control, noise control, electrical and communications access. Each of these items must be carefully addressed and planned to create a successful interior project as each directly effects the productivity and safety of those using the building.

While design is a complicated process which requires both education and experience, these Interior Design Guidelines provide direction for both the novice and professional.

The sections that follow address the observations made by the Facilities Excellence Audit Team followed by recommendations

for improving existing conditions and planning future projects. There are space planning criteria, furniture standards, finish and color standards, product specifications and signage standards for future project planning.

3.2 General Observations

3.2.1 Image and Function

For the newer buildings on the base, the function of the building is reflected in both the exterior and interior design. The heavy use of industrial/operational buildings require more utilitarian and durable finishes while the administrative/office functions are constructed of more comfortable, "human" materials with refined details. Some buildings are no longer being used as they were originally intended. Points of entry are not distinguished and the interior flow is confusing.

Glass & low panels for visibility.

In the interior, the finishes and furniture reflect the image as well as the work performed. Temporary furniture such as folding tables or furniture made of press-board covered in plastic coated paper have been utilized. These are not appropriate for a permanent application due to a limited life expectancy and lack of ergonomic design. The image projected is not one of quality or professionalism.

Exposed wires are unsightly and present a hazard.

The finishes and furniture of the dormitory buildings are softer, more relaxed, but some are not as durable as needed to take the abuse of young people in their living environment. Typically, vinyl or ceramic tile is used in vending and wet areas, however carpet has also been used in such areas and becomes a maintenance issue.

Common area in dormitory.

Walk-off mats are used throughout the base. In the newer buildings, recessed floor mats are provided in vestibules. A service is provided for the other buildings to replace the removable mats periodically.

Accessibility is crucial. All building types should address the ADA (Americans with Disabilities Act) requirements. Not all older buildings are totally accessible and this should be addressed in future renovations.

3.2.2 Lighting

Lighting types and levels vary according to type and age of buildings. Most administrative and dormitory buildings utilize fluorescent fixtures. Both the appearance of the fixture housing and the lamp type should be consistent within a space and preferably within a building. Inconsistent lamping causes an undesirable multi-color light into a space.

Lights parallel to a long, narrow corridor.

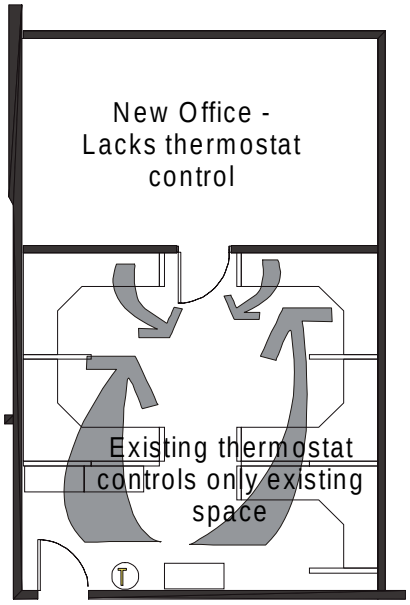
In corridor situations, the fluorescent fixtures are often running parallel with the direction of a corridor which creates the perception of elongating the corridor. Many areas of high computer usage employ fluorescent lighting with prismatic lenses that glow and can cause glare on computer screens. Newer buildings utilize parabolic lenses that reduce this glare. The addition of task lighting at the work surface is typical. The task lighting can be adjusted appropriately for each unique task.

Glare on screens from prismatic lenses.

Daylight within a space is important and has a direct effect on those working in an office. Many offices are void of natural lighting sometimes resulting in a cave-like feeling. Window treatments at exterior windows help control the heat and amount of light that enters a room, however they are visible to the exterior. Using different types of window treatments within a single facility causes an inconsistency on the exterior of the building.

3.2.3 Air Quality and Temperature

Air quality and temperature affect people and their productivity as well. Mechanical systems are designed to provide comfort for the activity in a space as efficiently as possible. Changes in the number of people, window and door openings, amount of equipment, and height of partitions can affect the loads on the mechanical system or airflow. Outdated thermostats that control renovated areas are no longer efficient due to changes in plan layout and use.



Outdated thermostat.

Ceiling fans are often used in office areas throughout the base. A well designed mechanical system should not require the addition of fans. These are better suited for the residential areas.

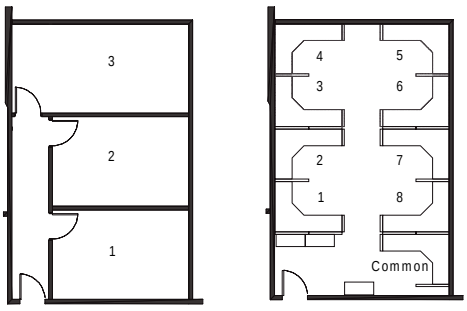
Residential fan unnecessary if mechanical system is well designed.

3.2.4 Acoustics

The job function, finishes and equipment within a space impact the acoustics. Some functions demand more acoustic privacy than others. Walls to create private offices and office areas and acoustical fabric panels are used to increase the acoustical privacy. Mechanical systems provide a certain amount of "white noise" which helps decrease acoustical disruptions. Acoustics in industrial/operational buildings, are much harder to control and vary with the activity performed.

3.2.5 Space Planning & Work Tools

In much of the base, smaller work areas have been created which decreases the efficiency of the space and increases the cost of the mechanical systems. Although necessary for privacy in some cases, it inhibits proper departmental and interdepartmental workflow.



Private office vs. workstations.

Several applications demonstrated open planning concepts utilizing workstations with panels resulting in open communication and better workflow.

Bullpen layout enhances communication.

Some workstations are designed to distribute electrical and communication wires in an efficient manner, however, in other installations the wires were visible which is unsightly and can be hazardous.

Transaction counter identifies reception.

3.2.6 Accessories

Accessories help to add a human element to the interior space and allow people to personalize their own work environment. Personal accessories, however, are not always confined to a person's workspace. Placement of objects on low partitions or shelves, creates clutter in the room. Personal objects placed on window sills are visible to areas outside the work area which creates clutter outside the office area.

Avoid painting graphics directly on walls.

In some buildings the artwork and/or message boards in corridors are coordinated with the interior design and provided a pleasant appearance. Improperly placed and planned accessories look unprofessional.

Artwork, trophy cases and awards displayed near the entrance or in public areas reflect the pride of the personnel within a building and of the base. Where permanent cases are not provided, movable cabinets are provided. Lighting is not always appropriate to highlight the display and should be addressed.

Trophy case in public reception area.

Signage systems that are easily changed and maintained add to the professional look of all facilities. Several buildings do not utilize this type of signage, resulting in temporary

signage applied over outdated signage or mis-matched signage. The newer buildings employ consistent framing that adds a professional look.

Flexible signage.

3.2.7 Ancillary Spaces

Support spaces are often overlooked in the planning of a work environment. This includes coat and outerwear storage, reception and waiting areas, supply storage and filing, equipment areas, and conference and break rooms.

Reception and waiting area.

Reception and waiting are not provided in many buildings resulting in some confusion for visitors. The successful buildings had a clearly defined waiting and reception area usually adjacent to the entrance.

Where coat and outerwear storage is not provided, the result is a cluttered appearance within the workstations where coats are placed.

Provide coat storage near building entrance.

Many buildings lack sufficient and clearly defined file and equipment areas. Workstations and work areas become inefficient when used to accommodate storage, filing and equipment needs.

Remove coffee areas from workspace.

Coffee areas are often overlooked and not planned. Although some buildings incorporated break rooms with coffee, refrigerators and microwaves, many had coffee and microwaves with the workspace creating distractions in the work area and maintenance problems since the finishes and

materials are not appropriate for such an area.

Centrally located coffee area.

Conference rooms were dispersed throughout buildings and were not clearly marked as such. There is no efficient way of locating, reserving or identifying when they are in use.

3.2.8 Dormitory

Most existing dormitories have been or are being renovated to bring them up to current Air Force standards. More durable finishes are being used to take the abuse received in this environment.

Ceramic tile floor in laundry room.

Metal ceiling treatments in corridors do not allow for proper acoustics and are easily damaged. Mail areas in some buildings were not centrally located and easily accessed. Ceramic tile or vinyl flooring was used in laundry areas and some vending areas. Because of their durability, it presented a much cleaner looking environment.

3.2.9 Fire Protection Systems

Pursuant to applicable building codes and the local Fire Marshall, all buildings are required to contain fire extinguishers, alarms and pull stations. Most extinguishers were mounted directly to walls and not in cabinets. This results in a less attractive appearance to the overall space and hazards when protruding into corridors or work space. While provisions for these items must be made, options are available to help coordinate with the interior design.

3.2.10 Craftsmanship & Installation

Quality installation and craftsmanship is important to maintain the professionalism of the base facilities.

In some cases poor materials and craftsmanship used for renovations will not withstand normal wear and abuse as required in a professional work environment. Use of unskilled craftsman also results in detailing not consistent with quality level desired and required. This disparity diminishes the professional appearance. Although, pride can be instilled in the units when they complete the work for themselves, these projects many times reflect the "do-it-yourself" approach. The materials and craftsmanship do not meet the quality standards set for the base.

3.3 General Recommendations

3.3.1 Image and Function

Operations/Industrial Building.

The image and function of the building should be reflected in both the exterior and interior design of the building. Buildings which house administrative functions should have a more human scale, which is not intimidating, while a building accommodating industrial/operational functions should be recognizable at a distance. The materials and forms chosen for these designs should reflect both the function and image in an appropriate manner. Entries should always be clearly marked and identifiable.

Durable finishes in operational building Interior furnishings reflect the image and the work being performed. All furniture should be of a commercial quality and constructed using durable materials to reflect the professional image of the office or the residential quality of the dormitory.

Library reception desk.

Finishes are affected by functional use. Flooring in break rooms or vending areas should be vinyl or ceramic tile which is easily maintained and less likely to be stained from spills. Flooring immediately inside an entrance should be appropriate to handle the wear and tear of the weather and elements, such as walk-off mats or quarry tile.

Ceramic tile in restroom.

Recessed walk off mats should also be utilized where ever possible. A service to change the temporary mats is recommended so that soiled mats are changed periodically.

Walk off mat at entry.

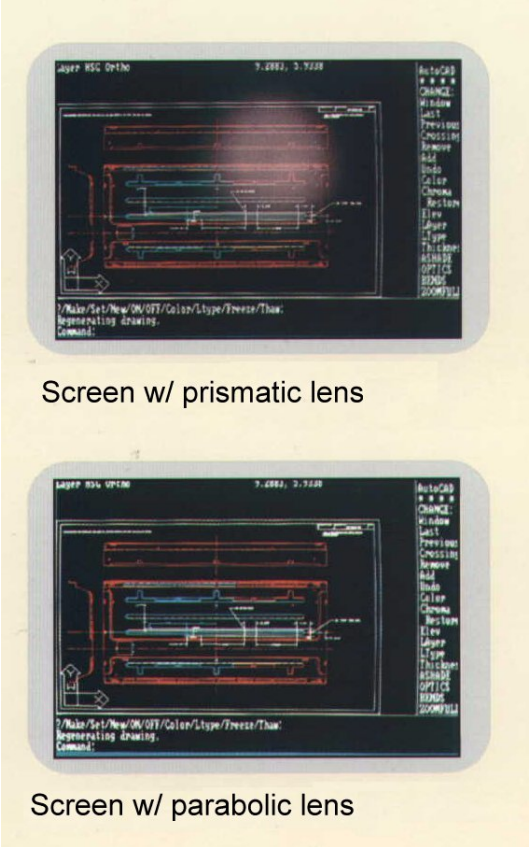
Professional, easy to read and understand signage is required for a quality space. Directional signage is needed in existing buildings to provide information to those entering when personnel are not readily available to provide guidance. Frames or easels for temporary signs give a more finished look when necessary in areas where the use varies such as training facilities.

Signage with professional appearance.

All types of buildings should address ADA issues. All functions that are available for ambulatory personnel must be available to the disabled.

3.3.2 Lighting

Lighting must be designed with the activity to be performed in mind. Operational/ industrial buildings have powerful lighting designed to last for long periods of time and cast the required light from higher ceiling heights. Administrative buildings require an appropriate lighting level at the worksurface, but special care must be taken to provide the type of overhead ceiling fixture that will reduce computer glare.



Glare on computer screens.

As more computers and technology are introduced into buildings, lighting needs change. Whereas office lighting was formerly designed to suit visual conditions for paper tasks in a horizontal plane, it must now take into consideration visual tasks comprised of a reflective visual display terminal (VDT) in the vertical plane. Parabolic lenses on fluorescent fixtures will reduce glare since the light is cast down.

This type of lens has less tendency to glow and create glare. Older buildings employ prismatic lenses, which are less suitable for computer work. These lenses should be replaced especially in computer training rooms and office spaces where the work is more computer oriented. Task lighting at the individual work space augments the overall lighting level, directs it to the appropriate surface and can be changed easily by the user.

Location and orientation of light fixtures can change the perception of a space. Fluorescent fixtures running parallel with the direction of a corridor make the corridor seem longer. Lights that are perpendicular to the direction of a long corridor perceptually shorten the length of it. The "color" of the lamp should be consistent within a space - either all cool or all warm fixtures.

Perpendicular lighting to "shorten" a long corridor.

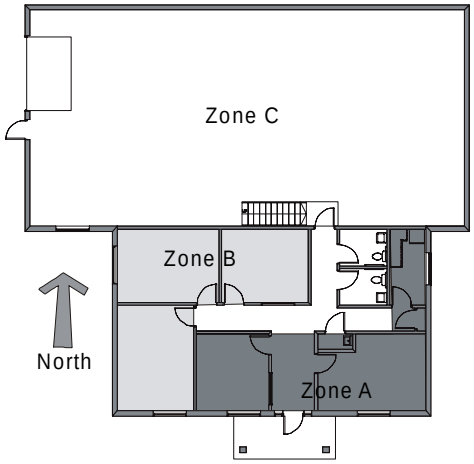
Because people spend the majority of their time indoors, the need to bring natural daylight into the workplace is important for providing a pleasant and more productive environment. It will brighten and warm the workspace and can also increase productivity by relieving the feeling of being in a cave-like environment. When it is not possible to have exterior penetrations, interior windows can give the perception of a more open space.

Interior windows.

It is very important to provide the proper window treatments to control light and visibility. Light coming through the windows can create glare. The direction of the sun and placement of equipment may require adjustments to the amount of daylight the space receives throughout the day and at different times of the year. Interior windows may also cause distractions if they look into a public space.
Mini-blinds provide the adjustability which is necessary and allow the individual to make changes. It is important that standard colors are used for all windows within a facility, and preferably for the whole base, creating visual continuity on the exterior.

3.3.3 Air Quality and Temperature

Air quality and temperature affect people and their productivity. Systems need to be designed by properly zoning areas which are compatible. Spaces adjacent to western exposures have different temperature requirements than those, with northern exposures. The interior plan of a building has a direct influence on the type of climate control system used.



HVA/C Zones should correspond to exposure

Building mechanically zoned for exposure.

Open offices provide better airflow and can be more energy efficient than a group of small offices. Individual heaters, fans, and ceiling fans should be avoided and are unnecessary if the mechanical system is properly designed. These items can also adversely affect the electrical system, because of the amount of amperage required. If plugged into the wrong circuit, additional problems may be created including a fire hazard.

3.3.4 Acoustics

Acoustic fabric panels on walls.

In areas where acoustic privacy is necessary, soft materials will enhance the acoustics for the work by deadening the sound from adjacent areas. In areas where there is customer interaction or phone conversations, acoustical partitions dividing workspaces will allow people to work without interruption or distraction. A certain amount of "white noise" is created in open office environments which aids in creating acoustic privacy. If necessary, additional "white noise" can be added.

Acoustics in industrial and maintenance buildings are much harder to control. The durable materials combined with the work often create livelier acoustics. If necessary acoustic panels can be applied to walls and ceilings to help absorb the noise.

3.3.5 Space Planning & Work Tools

Open office area at the Housing Office.

In lieu of building small private offices or work areas, the creation of larger spaces using ergonomically designed systems furniture can decrease the square footage required for administrative office area. It will increase the efficiency of space and the electrical and mechanical systems. The

initial cost and operating costs of an open space will also be lower.

Open office with shared conference area.

Proper analysis of the work performed is essential to designing the workstation. Systems furniture can be beneficial in providing wire management for electrical and communication needs. The flexibility of systems furniture in large areas allows changes to occur easily to meet the needs of individuals or groups within a space. It is very important to note, that space planning and the installation of systems furniture should be completed by trained professionals to avoid poor functioning plans and injury that may occur due to improper installation.

Systems furniture provides ample workspace.

Proper space planning can enhance the workflow. To properly plan a space, it is important to understand how the space will be used and what type of work will be performed within the space. As functions change, the space plan and furniture should be reviewed and changed if necessary. Proper planning can also enhance the environmental issues that affect productivity: acoustics, airflow, and lighting. These should also be reviewed whenever changes to the furniture occur.

Adjustable keyboard tray.

Work tools typically include the equipment and furnishings required to complete a particular job function. It is important to provide appropriate and proper work tools for both quality and quantity of output. Ergonomically correct furnishings, while increasing productivity, can protect individuals from physical problems that result from an improperly designed workspace.

3.3.6 Accessories

Accessories include anything that is not required for the specific work performed, but helps to create a more comfortable, efficient environment. However, some accessories, such as bulletin boards and signage, are important to communicate critical information.

Avoid plants on top of workstation components.

For interior spaces to maintain a professional appearance, certain limitations should be in place. Bulletin boards should be available for posting temporary information. Personal belongings should be kept within an individual's workspace, below low partitions, and away from exterior and interior windows.

Departmental artwork, photographs and awards should be framed in a consistent manner. All artwork should be framed and matted. Similar frames, material and color, should be used whenever possible. Artwork should be placed at locations where it adds visual interest. Items should be hung at eye level (between 60" and 72"). Rows of artwork down a long corridor will accentuate the length of the corridor. Instead, place the artwork at the end of the corridor or a grouping in one area.

Artwork at end of corridor.

Bulletin boards or tack boards should have frames that are the same material and color as the artwork. These should be hung in centrally located public areas. Information required for the notification of processes such as exiting should be displayed as a permanent sign.

Matching frames - material and color.

Signage should be professional in appearance and character. Because changes occur regularly, the signage system should incorporate the flexibility required to meet those changes. This flexibility is required for all sign types, informational, directional, and identity. In addition to changing the text, whenever possible the mounting method should also be flexible. The use of Velcro aids in the changing of signage.

Name insert easily changed.

Plants are another accessory which can add warmth to a space. Pots should be a consistent color throughout the space. A plant service can maintain plants and keep them looking nice and healthy. Individuals should be aware that bringing unhealthy plants to work could cause problems which may spread. It is important that plants be placed on the floor or on proper surfaces that will not stain or mark. Hanging plants should be avoided unless the proper hardware is used and the surface where it is hung is specifically designed for that purpose.

Plants add warmth to space.

Trophy cases are a source of pride and accomplishment. Locate these in public spaces so they are visible to everyone. Special lighting, either in the cabinet or directional fixtures, can help accent these.

Built in trophy case w/ lighting.

3.3.7 Ancillary Spaces

In a climate such as Montana, coat and outerwear storage is important. This should be located as close to the entrance as possible. The dirt, snow and water that are brought in on shoes can reduce the life of carpet and increase the maintenance costs of other flooring materials. Walk-off mats at entries can help, but a place for snow boots will help to reduce costs.

Coat area near entry.

The creation of reception and waiting areas helps with traffic flow. By clearly identifying a reception area, interruption is less likely to

occur to those not in a position to greet the public. It also creates a space for gathering and provides a buffer between public and private spaces. Reception and waiting areas are also a good place for artwork, awards and identification.

Supply, filing, and equipment areas should be consolidated in a common area that can be shared. By centrally locating these areas, they will be easily accessible to everyone. Creating a central location for these items will also allow access to more people and possibly limit the amount of space required reducing initial and operational costs over time.

Break rooms, vending and coffee areas should be planned so they are centrally located. These areas should also have access to water for preparation and clean up. They should have durable and easily maintained finish materials. These areas can also function as a space for informal meetings and for workers to relax within the work environment. If the break areas are shared, there may be opportunities to provide additional amenities such as microwaves, and refrigerators.

Combined kitchen and vending area.

These areas often have larger electrical requirements than typically provided in office spaces. Providing a space for people to eat will also keep workspace and conference rooms free of food remnants.

Flexible conference tables.

Conference rooms should be centrally located and shared. It is recommended that a single contact for scheduling rooms be provided or provide permanent signage adjacent to the door be installed. This signage should have a calendar which can be altered daily to indicate the rooms conference schedule. A sign that has an indicator for when the room is in use is also recommended. With these aids, locating a dedicated conference room is less time consuming than searching for an inappropriate space to hold a conference.

Conference / training room.

3.3.8 Dormitory

Lounge area.

A centralized main entry with shared amenities surrounding it will add to the social interaction that is important within residential living environments. These areas will also take the most wear and tear and require more durable finishes.

Mail area.

Use ceramic or sheet vinyl in wet areas such as laundry rooms and kitchen areas. A durable and easily maintained surface is also important in the vending areas. When possible combine the kitchen and vending functions.

Kitchenette.

Using individual wings radiating from a central core will eliminate long tunnel-like corridors. The addition of vertical breaks will also give the perception of shortening the corridors.

Individual bathroom facilities and kitchenettes in each room or suite will give the dormitories a “home” feel. The finishes for these areas should be appropriate for the plumbing and food preparation requirements.

3.3.9 Fire Protection

While required in all buildings, some options are available to integrate fire extinguishers, pull stations and alarms into the interior design.

Fire extinguisher cabinets should be recessed in the walls whenever possible and painted to match the adjacent surface. An appropriate sign can be placed to identify the cabinet. The locations should also be noted on the emergency egress signs.

Recessed fire extinguisher cabinet finished to match wall.

Visual alarms and fire station pulls are set in design and color. While building codes require minimum mounting heights, the location can be coordinated with new construction to produce an desirable appearance.

3.3.10 Craftsmanship & Installation

Library.

It is important to use materials appropriate for the use it is intended. Although a lower grade material may seem cost effective, the maintenance and shortened life expectancy of the product may end up costing more in the long run. Care should be taken when a project is performed by unskilled labor. Improper construction can lead to injury and may appear unprofessional and undesirable. A professional contractor is aware of industry standards, which are safe and consistent with workmanlike detailing.

Durable finishes at shower.

Wood trophy case at executive offices.

It is important that everyone take responsibility for and pride in the facilities. The cleanliness and neatness of a space will affect the perception of whether or not it is a professional space.

3.4 Space Planning Criteria

Space planning takes into consideration: who will be occupying a space, what activities and tasks will take place, what equipment and storage needs are required for those activities and tasks, when the space will be occupied or utilized, if there will be interaction with others within the building or the public. Without all the information, a space will not be used efficiently and the quality of the environment will suffer. The workflow must be thoroughly understood to maximize the efficiency and productivity.

The programming phase of design is when the designer collects the information which will answer the "who, what, when, where and how." From this information, the planning and design will take shape. The following information outlines areas of consideration which will contribute to the programming and the planning phases of any project.

Professional Interior Designers have been trained to complete the programming, planning and design of interior spaces. It is highly recommended that an interior designer is utilized for new construction and renovations projects. They are a crucial member of the design team and should be on board as early as possible in the process.

Construction of office spaces and installation of building systems should be handled by trained professionals. Installation of furniture should also be completed by trained professionals. Improper installation can be hazardous and may also void the manufacturer's warranty.

3.4.1 Ancillary Space

Ancillary spaces include reception and waiting rooms, coat storage, conference rooms, break rooms, file and supply areas, storage rooms, equipment areas, and training rooms. Not every project will require all of these spaces. Consolidating the needs for a whole building and sharing the ancillary areas may reduce the space required for these areas.

Reception areas are typically provided in buildings where there are many visitors which will need to check in or will need direction. When full-time personnel will not be manning such a desk or the building does not receive frequent visitors, a building directory and directional signs are important to provide assistance. The reception area should be located near the main building entrance.

Waiting areas should be provided in buildings with frequent visitors. If there is a particular department that receives guests, the waiting area can be located adjacent to or within their area. If multiple departments receive guests, the waiting area can be consolidated in a central location or near the reception area.

Coat storage is often overlooked. Most systems furniture manufacturers provide coat hooks for the workstations, however, not all workstations accommodate these and the coats add clutter to the workspace. In a climate with snow and cold, the coat storage area may also accommodate snow boots. Locating this near the building entrance will help with the maintenance and life of the flooring materials.

Conference room needs vary for each department. By sharing conference rooms,

the quantity may be reduced and additional sizes provided while using less square footage than would be used if each department had their own. It is more efficient use of space if multiple sizes of conference rooms are provided. A two or three-person meeting will not take up a twelve-person conference room. Larger conference rooms should use smaller tables which can be reconfigured to meet the various needs which can be accommodated in a larger room. Additional accessories can be provided such as marker boards, projection screens, television monitors, etc. These rooms become multi-purpose rooms that can be used for meeting, training, etc. Centrally locating conference rooms, keeps the more "public" activity away from the workspace. If located in a building where the conference rooms are used to meet with outside guests, the conference rooms should be located near the reception or waiting area.

Break rooms provide a location for coffee pots which would otherwise end up in many offices. It becomes a maintenance issue in the office space since water is usually not provided and the finishes are typically carpet and fabrics which stain easily. Providing a centralized break room with coffee pots, microwaves and even vending will keep food and drink preparation out of the workspace. Water and electrical can be provided. When space allows, tables and chairs should be furnished. This allows personnel to get up and away from the work area for breaks. The furniture also provides a place for informal meetings. Like the shared conference rooms, it is more efficient to have a centralized location which will cut down on the amount of equipment, water, and electrical requirements.

File, Supply and Storage Areas are often duplicated for each department or not even considered in the design phase. Filing needs should be reviewed to determine how the files are used. Files that are accessed daily should be located within the individual workspace. Long-term file storage should be located outside the workspace to reduce the clutter and make the workspace more efficient for the required tasks. Banks of files can be used to separate work areas instead of building walls.

Supply and storage areas also can be consolidated. Due to purchasing procedures, this is not always a possibility. If possible, furniture, shelving or cabinets, should be used instead of building rooms or installing permanent wall-mounted shelving. Furniture can be moved and reused easily. Locks can be provided on files and storage cabinets. If rooms for files, supplies and storage are required for security reasons, review who will have access and verify if the rooms can be shared to limit the amount of walled spaces.

Equipment Areas are provided for copiers, printers, faxes, and other equipment that is typically shared. These areas should be carefully planned whether in a separate room or within the workspace. The electrical and mechanical requirements are greater for multiple pieces of equipment located together in an area. The size of the equipment, the amperage, amount of heat produced and the space required around the equipment for servicing will affect the design of an equipment area. Providing a centralized location for the shared equipment can reduce equipment, electrical and mechanical costs.

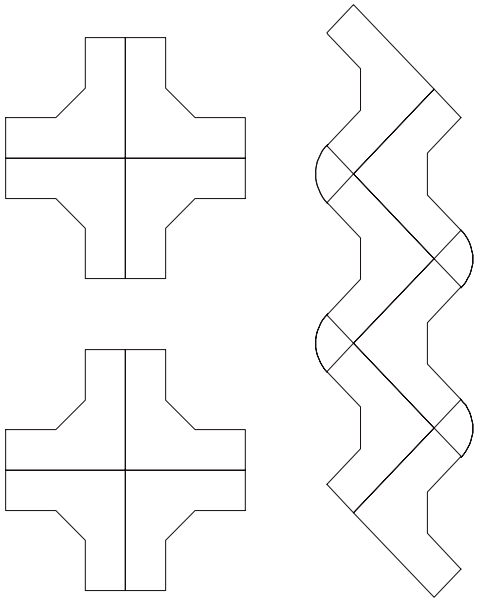
Training Rooms typically have special needs for furniture and equipment. The type of training often dictates how the room is arranged and furnished. Whenever possible a single facility, specially designed for multiple types and sizes of training rooms, should be used instead of duplicating training rooms in the individual buildings. Training rooms should have comfortable chairs for sitting for a longer length of time. The tables should be easily reconfigured to accommodate different types of training. Lighting and acoustics should be carefully planned depending on the size and types of audio visual equipment to be accommodated. Equipment to be considered: marker boards, projection screens, audio/visual equipment , speakers, video players and screens, and easels. Computer training rooms have additional lighting, electrical, communications and ergonomic considerations.

Shared ancillary areas should be centralized so they are easily accessed by everyone and not duplicated. It should not take away from the productivity of the staff to go to these areas. It should add to the efficiency of the space and the work.

Creating a building core with the centralized ancillary spaces, vertical circulation and restroom facilities allows them to be easily accessible to everyone. These areas can also be centrally located in the middle of the building permitting the workspace to be along the perimeter with access to windows and daylight.

3.4.2 Office Workspace Layouts

Planning and design of individual workstations is based on the tasks being performed, the communication and interaction requirements, the equipment necessary and the workflow. The size of the workspace, the type of furniture, and whether it is a walled or paneled space is sometimes dictated by rank. It is important, to also look at the individual's task requirements as well.

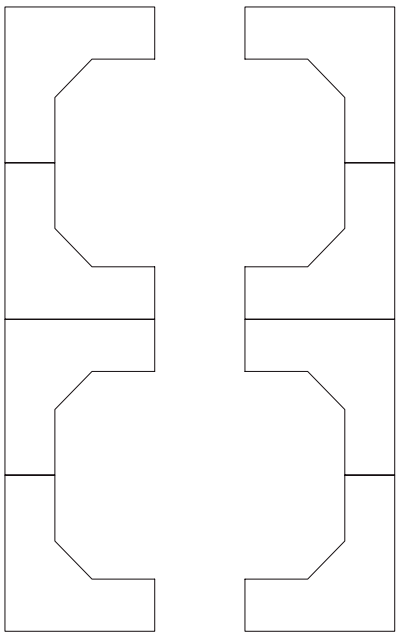


Individual Processing Workspace Layouts.

Proper analysis of the work performed is essential to design the workstation. A person whose work includes mostly computer oriented tasks and paper work may need more work surface. A person working on multiple long-term projects may need more filing and storage requirements. A person who often meets with others in their workspace, will need room to accommodate the guests.

Privacy requirements will often dictate the need for walls or doors or the height of systems furniture panels. Team and collaborative work environments may utilize lower panels and an open plan. Individual processing may utilize taller panels. Individual analyzing requires tall panels for focus.

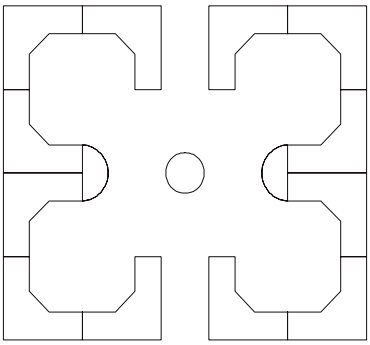
Floor to ceiling walls can be costly to build and more costly to change. They limit the flexibility of the space. An open office with systems furniture can be easily changed, will increase the efficiency of the space, electrical and mechanical systems. When security and privacy is required for a group of workstations, walls may be required. These should be carefully planned and limited as much as possible.



Work groups.

Minimize construction cost and concentrate building mass by utilizing existing gypsum board walls at the core with new taller panels for private functions and workspaces. File banks and common areas can provide a visual boundary and give an acoustic break between departments.

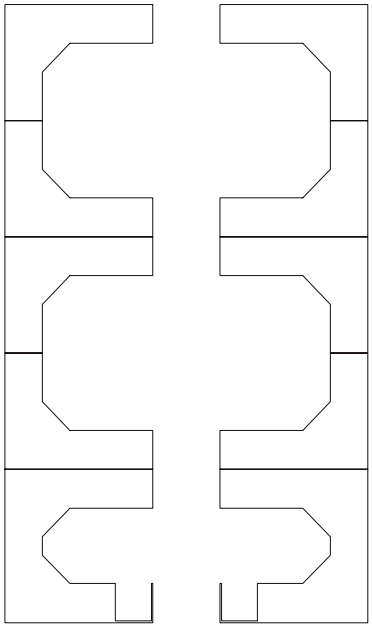
Keeping full height walls together and in a central core allows workspace to be around the perimeter of the building and gives access to windows and daylight to the general office. Because people spend so much time indoors, the daylight will make the interior a more pleasant work environment.



Collaborative Work Group Layout.

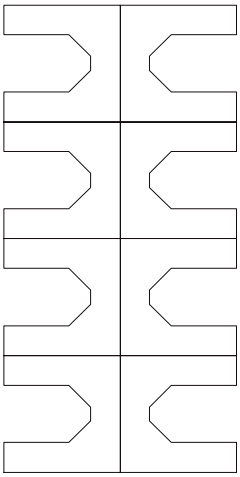
Systems furniture has additional benefits. The flexibility and acoustic capabilities make it a cost effective solution. It also allows for ergonomic flexibility. Work surfaces can be adjusted incrementally to meet the needs of each individual. Components can be added or removed to meet task and work changes. Electrical and communications can be provided within the panels. This will reduce wiring and cabling to wall connections which can be unsightly and create safety hazards. It provides better overall wire management for the cables and cords from the equipment to the outlets.

Storage is incorporated into the systems furniture. Pedestals with pencil, box and file drawers can accommodate tools and storage. Overhead cabinets provide binder and book storage. Additional file and storage cabinets can be utilized for additional needs.



Work groups with supervisory workstations.

Task lighting can be provided under the overhead cabinets or at desk top for use when necessary for detailed work. Additional accessories are available with each system to meet additional specialized needs. Computer intensive work can require the addition of an adjustable keyboard tray. This along with ergonomic seating, monitor lifts, foot rests, document holders can aid in creating a comfortable and safe work environment. Refer to Section 3.5 for examples of workspace layouts.



Refer to Section 3.5 for examples of workspace layouts.

3.5 Furnishings Standards

This section contains illustrations for recommended workstation standards for future projects. The different sizes should meet the needs for all levels and job functions of staff at the base.

Systems furniture provides flexibility for change, wire management, and electrical and communications access. It enhances communications, allows for better air flow than individual closed offices and can improve acoustics since there is ambient noise level created in a large area which will mask disturbing noises.

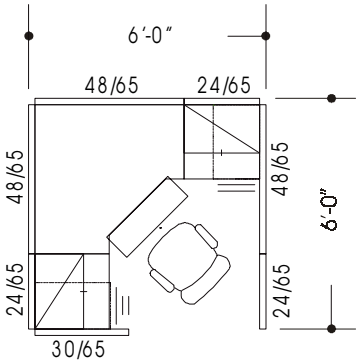
Modular and conventional furniture can be used to create similar layouts to those indicated here. The flexibility and wiring benefits may be lost.

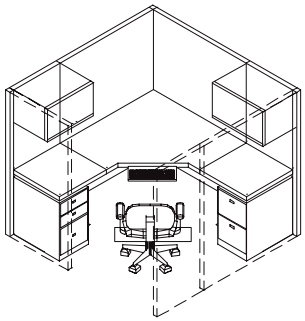
6' x 6' WORKSPACE

36 square feet
7/7.5 lineal feet of work surface
4 lineal feet of shelf
3 file drawers

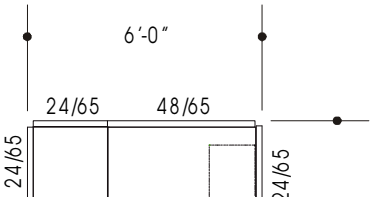
Components:
A1
1-24" X 48" corner worksurface
2-24" X 24" worksurface
2-24"w overhead cabinet with tasklight
1-15"w box/box/file pedestal
1-15"w file/file pedestal

A2
1-24" X 72" worksurface
1-30" X 48" worksurface
1-48"w overhead cabinet with tasklight
1-15"w box/box/file pedestal
1-15"w file/file pedestal





Workstation A1



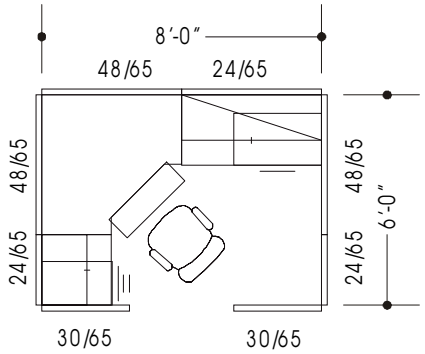
6' x 6' Workspace Layout

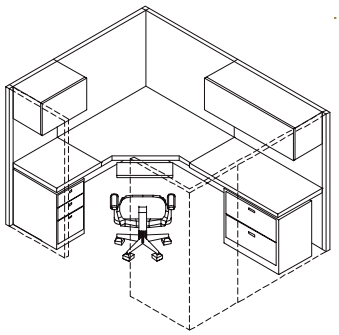
6' x 8' WORKSPACE

48 square feet
9/9.5 lineal feet of work surface
8/6 lineal feet of shelf
1 file and 2 lateral file drawers

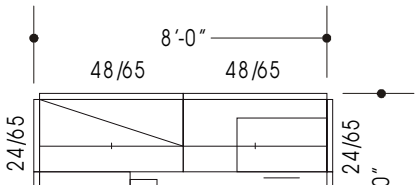
Components:
B1
1-24" X 48" corner worksurface
1-24" X 24" worksurface
1-24" X 48" worksurface
1-24"w overhead cabinet
1-48"w overhead cabinet with tasklight
1-15"w box/box/file pedestal
1-30"w two drawer file cabinet

B2
2-24" X 48" worksurface
1-30" X 48" worksurface
1-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-30"w two drawer file cabinet





Workstation B1



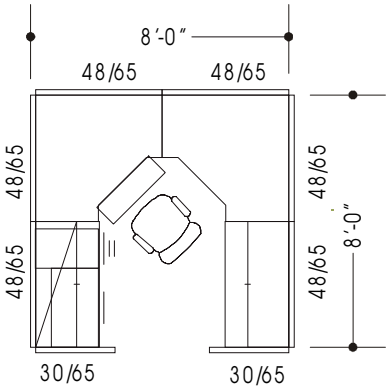
6' x 8' Workspace Layout.

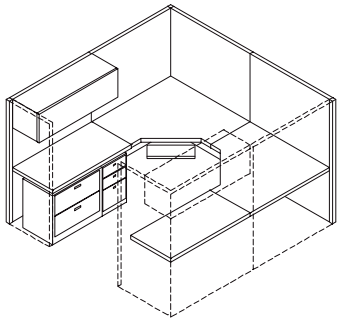
8' x 8' WORKSPACE

64 square feet
14/15 lineal feet of work surface
8 lineal feet of shelf
1 file and 2 lateral file drawers

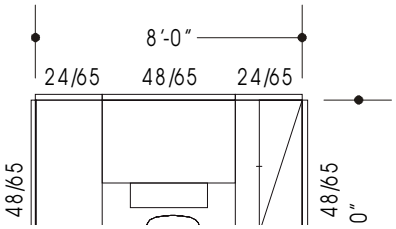
Components:
C1
2-24" X 48" corner worksurface
2-24" X 48" worksurface
1-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-30'w two drawer file cabinet

C2
4-24" X 48" worksurface
1-30" X 48" worksurface
1-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-30"w two drawer file cabinet





Workstation C1



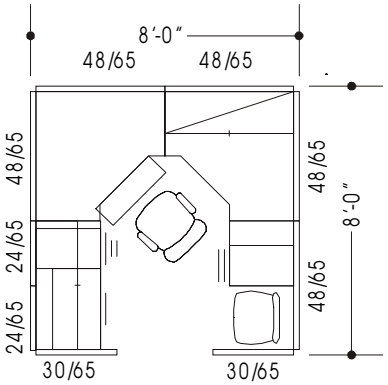
8' x 8' Workspace Layout.

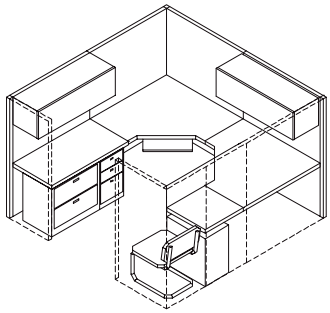
8' x 8' WORKSPACE

64 square feet
12/13 lineal feet of work surface
8 lineal feet of shelf
1 file and 2 lateral file drawers

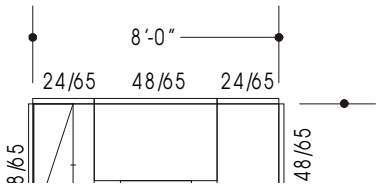
Components:
C3
2-24" X 48" corner worksurface
1-24" X 48" worksurface
1-24" X 24" worksurface
1-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-15"w file/file pedestal
1-30"w two drawer file cabinet

C4
2-24" X 48" worksurface
1-30" X 48" worksurface
1-24" X 72" worksurface
1-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-15"w file/file pedestal
1-30"w two drawer file cabinet





Workstation C3



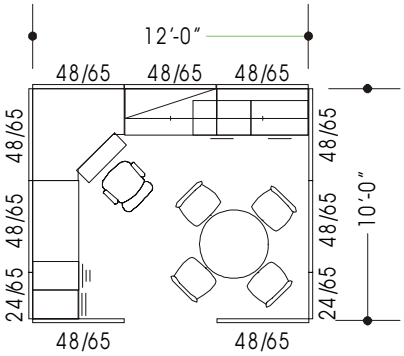
8' x 8' Workspace Layout.

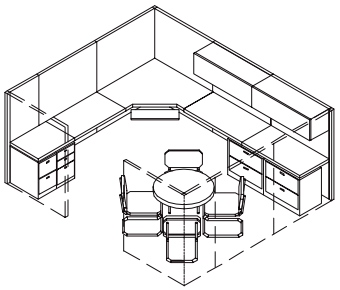
10' x 12' WORKSPACE

120 square feet
17/13.5 lineal feet of work surface
10 lineal feet of shelf
3 file and 4/2 lateral file drawers

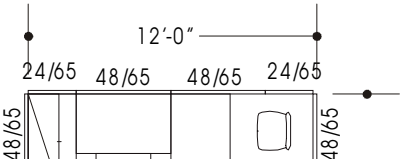
Components:
D1
1-24" X 48" corner worksurface
2-24" X 48" worksurface
1-24" X 72" worksurface
1-48"w overhead cabinet with tasklights
1-48"w overhead cabinet
1-15"w box/box/file pedestal
1-15"w file/file pedestal
2-30"w two drawer file cabinet

D2
2-24" X 48" worksurface
1-24" X 24" worksurface
1-30" X 48" worksurface
1-30" X 72" peninsula table
2-48"w overhead cabinet with tasklights
1-24"w overhead cabinet
1-15"w box/box/file pedestal
1-15"w file/file pedestal
1-30"w two drawer file cabinet





Workstation D1

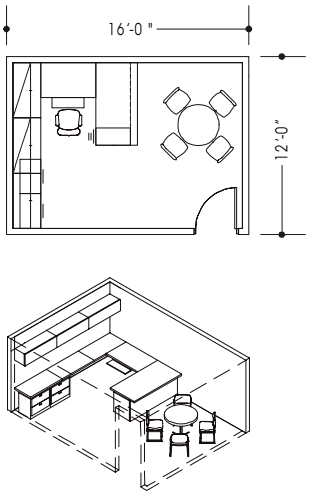


10' x 12' Workspace Layout.

12' x 16' WORKSPACE

192 square feet
17 lineal feet of work surface
12 lineal feet of shelf
1 file and 4 lateral file drawers

Components:
E
3-24" X 48" worksurface
1-30" X 48" worksurface
1-36" X 72" Single pedestal desk
with box/box/file pedestal
2-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
2-30"w two drawer file cabinet



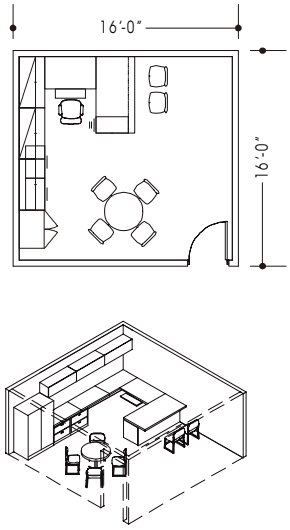
Office E

12' x 16' Workspace Layout.

16' x 16' WORKSPACE

256 square feet
17 lineal feet of work surface
12 lineal feet of shelf
1 file and 4 lateral file drawers

Components:
F
3-24" X 48" worksurface
1-30" X 48" worksurface
1-36" X 72" Single pedestal desk
with box/box/file pedestal
2-48"w overhead cabinet with tasklight
1-48"w overhead cabinet
2-30"w two drawer file cabinet
1-Wardrobe cabinet



Office F

16' x 16' Workspace Layout.

3.6 Finish Standards

Each building needs to have its own identity, which will aid orientation on the installation. However, certain standardization is important for administrative and financial reasons. This standardization presents a unifying element. It is also easier to manage, provides flexibility and is more cost effective.

Since it is not possible to change to new standards across the board all at once, it is important to at least try to maintain a certain standard for each building. When small projects are completed within a building, the new materials or furnishings must still work with the existing space. If the newer standards will not coordinate with the existing finishes and furniture, a different selection may be required. For example, if only the carpet is worn and needs to be replaced, a carpet should be selected that is similar to the new standard but that will coordinate with the colors and materials. Whenever possible, projects should be planned for a larger area of work so that the new standards may be installed.
Each building type has a particular image and function: administration, operational/ industrial, or dormitory. The finish standards vary for each of these based on durability, maintenance and quality requirements. The finish recommendations are separated by the image and function categories. Common finishes that may be used in all of the categories are grouped separately.

The selections for each image category is exclusive to that category. The individual finish selections are referenced by the alphanumeric code which is used in the index and specifications (Section 3.6.5).

3.6.1 Administration

3.6.1.1 Description

Administration buildings are typically brick or concrete masonry units with multiple penetrations to allow daylight into the space. There are more architectural elements on the exterior and interior to create focal points and add interest. The interiors are typically warm, comfortable, inviting and professional.

3.6.1.2 Administration Finish Recommendations

CPT-1 Carpet
CPT-2 Accent Carpet
PT-1 Wall Paint
PT-2 Accent Paint
PT-3 Multi-color Paint
PT-4 Ceiling Paint*
PL-1 Plastic Laminate
PL-2 Plastic Laminate
VCT-1 Vinyl Floor Tile
VCT-2 Vinyl Floor Tile Slip Resistant
VS-1 Vinyl Stair Tread*
VB-1 Vinyl Base*
WO-1 Walk-off Mat*
WC-1 Wallcovering
WC-2 Wallcovering
WC-3 Textile Wallcovering
CT-1 Ceramic Floor Tile*
CT-2 Ceramic Floor Tile*
CT-3 Ceramic Wall Tile*
CT-4 Ceramic Wall Tile*
ACT-1 Acoustical Ceiling Tile*
SF-1 Systems Furniture Panel Fabric
SF-2 Systems Furniture Panel Trim
SF-3 Systems Furniture Plastic Laminate
FP-1 Freestanding Metal Furniture Paint
FW-1 Freestanding Wood Furniture
Wood Finish

SU-1 Desk Seating Upholstery
SU-2 Desk Seating Upholstery
SU-3 Guest Seating Upholstery
BL-1 Horizontal Blinds*

3.6.2 Operational/Industrial

3.6.2.1 Description

The exterior cladding on most operational and industrial buildings is typically corrugated or fluted metal siding. The newer buildings also have concrete masonry units. There are fewer windows and the appearance is more utilitarian. The interior finishes need to be more durable to stand up to the tough working situations. Interior offices may be included in some of the industrial and operational buildings. These finishes tend to be warmer than the other areas of the buildings.

3.6.2.2 Operational/Industrial Finish Recommendations

CPT-1 Carpet
PT-1 Wall Paint
PT-2 Accent Paint
PT-3 Multi-color Paint
PT-4 Ceiling Paint*
PL-1 Plastic Laminate
PL-2 Plastic Laminate
VCT-1 Vinyl Floor Tile
VCT-2 Vinyl Floor Tile Slip Resistant
VS-1 Vinyl Stair Tread*
VB-1 Vinyl Base*
WO-1 Walk-off Mat*
WC-1 Wallcovering
WC-2 Wallcovering
CT-1 Ceramic Floor Tile*
CT-2 Ceramic Floor Tile*
CT-3 Ceramic Wall Tile*
CT-4 Ceramic Wall Tile*
ACT-1 Acoustical Ceiling Tile*
SF-1 Systems Furniture Panel Fabric
SF-2 Systems Furniture Panel Trim
SF-3 Systems Furniture Plastic Laminate
FP-1 Freestanding Metal Furniture Paint
FW-1 Freestanding Wood Furniture Wood Finish
SU-1 Desk Seating Upholstery
SU-2 Desk Seating Upholstery
SU-3 Guest Seating Upholstery

3.6.3 Dormitory

3.6.3.1 Description

The exterior of dormitory buildings at Malmstrom AFB is typically brick and concrete masonry units. The interior is warm, cheerful and comfortable to create a “home-like” environment. However, for most of the young people living in the dormitories, it is there first time away from home, so the finishes need to be durable and easy to maintain due to the abuse and wear.

3.6.3.2 Dormitory Finish Recommendations

CPT-1 Carpet
CPT-2 Accent Carpet
CPT-3 Accent Carpet
PT-1 Wall Paint
PT-2 Accent Paint
PT-3 Multi-color Paint
PT-4 Ceiling Paint*
PL-1 Plastic Laminate
PL-2 Plastic Laminate
VCT-1 Vinyl Floor Tile
SVF-1 Sheet Vinyl Flooring
SVF-2 Sheet Vinyl Flooring
VS-1 Vinyl Stair Tread*
VB-1 Vinyl Base*
WO-1 Walk-off Mat*
WC-1 Wallcovering
WC-2 Wallcovering
CT-1 Ceramic Floor Tile

CT-2 Ceramic Floor Tile
CT-3 Ceramic Wall Tile
CT-4 Ceramic Wall Tile
ACT-1 Acoustical Ceiling Tile*
FW-2 Wood Furniture Finish
FP-2 Plastic Laminate Furniture Finish

3.6.4 Common Finishes

3.6.4.1 Description

Because these finishes may be used in most all the other building categories, they are grouped together for easy reference.

3.6.4.2 Common Finish Recommendations

All door hardware to be a consistent finish – brushed chrome.

All door hardware for billeting and dorm rooms shall be key card locks.

All outlet and switch cover plates to be ivory to blend with the neutral color scheme.

All toilet accessories to be brushed stainless steel.

Acoustical ceiling grid to be white.
All ceiling mounted accessories: grilles, speakers, smoke detectors, etc. to be white to match ceiling. (Exceptions: sprinkler heads)

All doors within a building to be finished the same – either painted or stained.

All artwork to have black metal frames.

Refer to specifications for additional detail for all fixtures, furnishings and finishes.

PT-4 Ceiling Paint
VB-1 Vinyl Base
VS-1 Vinyl Stair Tread
WO-1 Walk-off Mat
CT-5 Ceramic Cove Base Tile
ACT-1 Acoustical Ceiling Tile
PT-5 Toilet Partition Paint
HW-1 Door Hardware Finish
BL-1 Horizontal Blind Finish/Color

3.6.5 Specifications

08710 – Hardware

Item:
Locksets/Latchsets
Item Code:
HW-1
Description:
Heavy duty mortise lock with lever handle conforming to Federal Specification FFH-106C/GEN 7-19-74 and ANSI A156.13. Ensure it meets ADA standards.
Material/Finish:
Antique Bronze – US10B

Item:
Door Closers
Description:
Surface mounted closer with sliding track arm. Provide hold-open on all doors except fire doors.
Mount closers inside rooms. Avoid mounting closers in corridors. Do not mount closers on door
head.
Material/Finish:
Painted-aluminum color (BHMA 689)

09300 – Ceramic Tile

Item:
Ceramic Floor Tile
Item Code:
CT-1, CT-2

Description:
2"x2" (51x 51 mm) unglazed ceramic mosaic tile for restroom floors
Color/Pattern:
Color and finish to match architect's sample.

Item:
Ceramic Wall Tile
Item Code:
CT-3, CT-4
Description:
Glazed 4-1/4" x 4-1/4" (108 x 108 mm) porcelain tile scored to look like 2"x 2" (51 x 51mm) tile.
Color/Pattern:
Color to match architect's sample.

09511 – Ceiling Materials

Item:
Acoustical Ceiling Tile
Item Code:
ACT-1
Description:
Standard for all new installations is 24" x 24" (610 x 610 mm) system. Acoustical fissured 24" x 48" x ¾" (614 x 1219 x 19 mm) ceiling panels scored in center to give appearance of 24" x 24" (610 x 610 mm) panels for existing ceiling grid system only. Use scored tile in retrofit areas to match existing 24" x 24" (610 x 610 mm) tiles.
Material/Finish:
Mineral base panels with white painted finish. Use black tile for specialty applications such as Audio/visual rooms that require blackout.

Item:
Ceiling Suspension System
Description:
15/16" (24 mm) exposed tee suspension grid.
Material/Finish:
Steel with baked white enamel finish. Use baked enamel black finish for specialty applications such as Audio/visual rooms that require blackout. Use only with black tile.

09660 - Resilient Tile Flooring

Item:
Vinyl Composition Tile
Item Code:
VCT-1
Description:
Class 2 through pattern, smooth surface, 1/8" x 12" x 12" (3 x 305 x 305 mm) vinyl tile.
Color/Pattern:
Color/pattern to match architect's sample.
Adhesives:
Water resistant type recommended by manufacturer suitable for the substrate.

Item:
Slip Resistant Vinyl Composition Tile
Item Code:
VCT - 2
Description:
For use at building entries. Class 2 through pattern, abrasive mineral coating factory applied to surface of tile in a grid pattern, 1/8" x 12" x 12" (3 x 305 x 305 mm) vinyl tile.
Color/Pattern:
Color/pattern to match architect's sample.
Adhesives:
Water resistant type recommended by manufacturer suitable for the substrate.

Item:
Rubber Stair Tread
Item Code:
VS-1
Description:
Johnsonite or equal. Conform to ASTM F-1344-93, Standard specification for Rubber floor tile. Treads: 13-1/4" (33.66

cm) overall depth, ¼" (6mm) gauge, Heavy Duty Safe-T-Grip (G), Square Nose Risers: Smooth, ¼" (6mm) gauge.
Color/Pattern:
Color to match architect's sample.

09678 – Resilient Base

Item:
Rubber Base
Item Code:
VB-1
Description:
2-1/2" x 1/8" (63 x 3 mm) rubber wall base. Cove profile at all flooring surfaces. Provide in rolls for seamless installation.
Color/Pattern:
Color to match architect's sample.

09680 – Carpet

Item:
Office and General Use Carpet
Item Code:
CPT-1, CPT-2, CPT-3
Description:
Carpet for office and general commercial uses to meet the following minimum requirements. Face Construction: Tufted or woven level loop, multi-level loop, cut and loop or woven. Fully cut pile is not acceptable.
Face Fiber: 100% branded nylon – either Antron, Ultron or Zeftron nylon with anti-stain treatment. Type 6,6 or 6 branded by the fiber manufacturer.
Gauge: Minimum 1/10 inch (3 mm).
Stitches: 13.5 per inch (25 mm) for woven and cut and loop. 10.3 per inch (25mm) for loop.
Pile Height:
Minimum 9/32" (7 mm) for cut and loop (.281) Minimum 5/32" (4 mm) for loop (.156)
Minimum 7/32" (6 mm) for woven (.219)
Pile Weight:
Minimum 79 oz. (2.2kg) for cut and loop. (30 oz. (0.8 kg) for cut and loop)
Minimum 64 oz. (1.8kg) for loop. (28 oz. (0.79 kg) for bonded)
Minimum 70 oz. (2.0kg) for woven. (28 oz. (0.79 kg) for loop pile)
Average Density: 6000 minimum
Primary Backing: Polypropylene
Static Control: Built into fiber; less than 3.5 Kv., for normal office environments; less than 2.0 Kv., for computer/technical rooms.
Fire Characteristics:Radiant flux - .45 or greater; Smoke density: - 450 or less
Wear Classification: Severe
Color/Pattern: To match architect's sample. Multiple colors (3 or more) in open areas.

Item:
Carpet Tile
Description:
Carpet for use on access flooring. Tile dimensions to match the access flooring grid. Color and material to match the color scheme for the appropriate category for the building. Carpet to meet the following minimum requirements.
Weave: Tufted.
Surface Texture: Cut pile
Face Yarn: 100% branded nylon – Antron, Ultron or Zeftron nylon.
Dye Method: Solution or approved yard dye.
Gauge: Minimum 1/8 inch (3 mm).
Stitches: 9 per inch (25 mm)
Pile Height: .177 inch (5 mm) to .203 inch (5 mm)
Face Weight: 28 oz. (0.79 kg) per sq. yd. (1 sq. yd. = 0.836 sm)

Total Weight: 138.4 oz. (3.9 kg) per sq. yd. (1 sq. yd. = 1 sq m)
Average Density: 6000 minimum
Primary Backing: Woven polypropylene
Secondary Backing: Reinforced thermo-plastic composite
Static Control: Built into fiber; less than 3.5 Kv., for normal office environments; less than 2.0 Kv., for computer/technical rooms.
Fire Characteristics: Radiant flux - .45 or greater; Smoke density: - 450 or less
Wear classification: Severe

Item:
Dormitory Carpet

Item Code:
CPT-4, CPT-5
Description:
Carpet for housing uses to meet the following minimum requirements.
Face Construction: Tufted level loop or multi-level loop.
Face Fiber: 100% solution dyed nylon with anti-stain treatment.
Gauge: Minimum 1/10 inch (3 mm).
Stitches: 10.3 per inch (25mm).
Pile Height: Minimum 5/32" (4 mm)(.156)
Total Weight:Minimum 64 oz. (1.8kg) per sq. yd.(1 sq. yd. = 0.836 sq m)
Primary Backing: Polypropylene
Static Control: Built into fiber; less than 3.5 Kv.
Fire Characteristics:Radiant flux - .45 or greater; Smoke density: - 450 or less
Color/Pattern: To match architect's sample

09800 – Special Coatings

Item:
Interior Industrial/Hangar Floor Coating
Description:
Polyamide epoxy, two-component high gloss enamel to be used on concrete floors in industrial and hangar spaces.
Color/Pattern:
White

09920 – Painting

Item:
Interior Solid Color Paint
Item Code:
PT-1, PT-2, PT-4
Application:
All interior wall surfaces and gypsum board ceilings.
Color/Quality:
Color to match architect's sample. Provide manufacturer's first quality materials.
Paint Schedule:
Eggshell finish: Gypsum board, plaster and cementitious surface.
Semi-gloss: Wood trim, doors, door frames, and metal surfaces.

Item:
Interior Multi-color Paint
Item/Code:
PT-3
Application:
Office environments, commercial spaces, and smooth textured walls.
Color:
Color to match architect's sample.
Material:
Spray applied polychromatic, polymer paint consisting of discrete beads of pigment coated with resin and suspended in an aqueous solution. Use materials recommended by the manufacturer for substrate to be applied.
Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application,

as demonstrated by the manufacturer based on testing and field experience.
Material Quality: Provide the best-quality grade of multi-colored coatings. Materials not displaying manufacturer's identification as a best-grade product will not be acceptable.

09950 – Wallcoverings

Item:
Vinyl Wallcovering
Item Code:
WC-1, WC-2
Application:
For use in conference rooms, offices, dormitory multi-purpose rooms, break rooms, corridors and other high use areas. (Also for installation over concrete block.)
Color/Pattern:
To match architect's sample.
Description:
Federal Spec: CCC-W-408A, Type II
Fire Characteristics:
ASTM E84 Flame spread not more than 25. Smoke developed not more than 50.
Backing:
Sheeting

Item:
Textile Wallcovering
Item Code:
WC-3
Application:
For use in executive offices and conference rooms (for 0-6 officers and above).
Color/Pattern:
To match architect's sample.
Description:
Federal Spec: CCC-W-408A
Fire Characteristics: ASTM E84 Flame spread not more than 25. Smoke developed not more than 50.
Fiber Content: 100% Olefin
Backing: Acrylic

10100 – Visual Display Boards

Item:
Marker/Tack Boards
Application:
Porcelain enamel marker boards and plastic-impregnated cork tackboards.
Description:
Fire Performance Characteristics: ASTM E84 Flame spread not more than 25 Smoke developed not more than 10
Material/Finish:
Design: Match design of systems furniture or related building finish standard, for a coordinated system.
Marker Boards: Provide balanced, high pressure-laminated porcelain enamel boards of 3-ply construction consisting of face sheet, core material, and backing. Provide writing surface with gloss finish for use with liquid felt-tipped markers.
Tackboards: Provide seamless sheet, 1/4 inch (6 mm) thick ground natural cork compressed with resinous binder with washable vinyl finish and integral color throughout, laminated to fabric backing. Factory laminate to 1/4 inch (6 mm) thick hardboard backing.
Accessories: Provide chalk tray for marker boards. Provide four markers (red, green, brown, and black) and an eraser for each unit.

Item:
Bulletin Board Cabinet
Application:
For use in lobbies and common areas for display:
Material/Finish:
Black anodized aluminum, square profile frame with double doors. 3 inch (76mm) depth with black hook fabric. Match design shown.

Item:
Trophy Display Case
Application:
For use in lobbies and common areas for display:
Material/Finish:
Black anodized aluminum frame with clear tempered glass on 4 inch (102 mm) solid base. Match design shown.

10425 – Interior Signage

Item:
Interior Name and Identification Signs
Description:
Layered construction of acrylic sheet providing a removable strip with die cut vinyl letters. Design shall provide for a monolithic, one-piece look when lettering strips are in place. Replacement lettering shall be easily accomplished by maintenance personnel without requiring the removal of sign frame. Replacement cost will not exceed 10% of sign cost. Signs to have radiused corners with framing line or reveal. Sizes and uses to conform to AFPAM 32-1099, *Sign Standards,* and American with Disabilities Act.
Sign System:
Unicor – System 2/90 - recommended sign type.
Material/Finish:
Acrylic sheet with contrasting border to match illustration. Lettering to be diecut vinyl.
Color:
Interior sign background: S-LN, Light Neutral.
Interior sign vinyl text: C-CB, Chocolate Brown.
Interior sign frame: S-CB, Chocolate Brown.

Item:
4 x 8 (102 x 203 mm) Panel Sign
Description:
Panel sign, includes locking end caps and tactile braille copy.
Color:
Insert: S-LN, Light Neutral.
Text: C-CB, Chocolate Brown.
Frame: S-CB, Chocolate Brown.

Item:
2 x 12 (51 x 305 mm) Room Sign
Description:
Room sign, includes locking end caps and tactile braille room number.
Color:
Insert: S-LN, Light Neutral.
Text: C-CB, Chocolate Brown.
Frame: S-CB, Chocolate Brown.

Item:
2 x 12 (51 x 305 mm) Cubicle/Work Space Sign
Description:
Includes locking end caps.
Color:
Insert: S-LN, Light Neutral.
Text: C-CB, Chocolate Brown.
Frame: S-CB, Chocolate Brown.

Item:
6 x 10 (152 x 254 mm) Conference Room Sign
Description:
Includes locking end caps and tactile braille room number. See graphic.
Color:
Insert: S-LN, Light Neutral.
Text: C-CB, Chocolate Brown.
Frame: S-CB, Chocolate Brown.

Item:
8 x 8 (203 x 203 mm) Restroom Sign
Description:
Includes locking end caps and tactile braille copy. Symbol and text to be vinyl.
Color:

Insert: S-LN, Light Neutral.
Text: C-CB, Chocolate Brown.
Frame: S-CB, Chocolate Brown.

Item:
Emergency Exit Sign
Description:
XPL 3000 Series
Wattage: 4.5 single face, 7 double face
Input Voltage: 120/277 dual input
Operating Time: 3-4 hours, using re-chargeable nickel-cadmium battery.
Light Output: More than 15 footcandle (161lx) face illumination, constant under all conditions including power failure; exceeds level requirements of NFPA-101 Life Safety Code.
Light Source: Green or red ultra-bright LEDs specially selected for consistency of color. Parallel circuitry eliminates multi-lamp failures. Use only one color consistently (red or green) throughout each building.
Reference: ETL 94-5 Fire Protection Engineering Criteria and Technical Guidance – Emergency Lighting and Marking of Exits.
Direct View or Diffused View LEDs:
Diffused view has prismatic lens providing an aesthetically pleasing appearance. Super visible letters are illuminated to the full ¾" (19 mm) stroke width. Both direct and diffused views have Lexan covers for the protection of the independently mounted LED circuitry.
Battery: Easily replaceable, high capacity, rechargeable, nickel-cadmium (life expectancy of 8-15 years). Sealed lead acid available as an option.
Construction: Extruded aluminum frame with baked on, white epoxy coated finish.
Arrows: Universal type (NFPA-101), site selectable.
Mounting: Low profile mounting canopy included with every sign allows for ceiling or side mounting. Back plate with various knockout positions allowing for surface mounting on any type of junction box.
Special Features:
Battery Lockout:
Cannot discharge until power is applied to sign.
Low Voltage Cutout Protection; Surge Protection; Brown Out Protection; Short Circuit Protection. Push to test button with visible LED.
Testing: 100% tested and 48 hours burn-in
Code Compliance: UL listed; NFPA-101, Life Safety Code; OSHA; NEC; UL924.

10800 - Washroom Accessories

Item:
Soap Dispenser
Description:
Recessed drawer-type soap vessel. 9-1/2" (241 mm) wide x 5-1/2" (140 mm) high x 4" (102 mm) deep. (If recessed unit cannot be installed, use similar surface mounted model.)
Material/Finish:
Stainless steel with brushed finish.

Item:
Paper Towel Dispenser
Description:
Recessed 14" (356 mm) wide x 28" (711 mm) high x 4" (102 mm) deep. (If recessed unit cannot be installed, use similar surface mounted model.)
Material/Finish:
Stainless steel with brushed finish.

Item:
Waste Receptacle
Description:
Fully recessed 14" (356 mm) wide x 28" (711 mm) high x 4" (102 mm) deep. (If

recessed unit cannot be installed, use similar surface mounted model.)
Material/Finish:
Stainless steel with brushed finish.

Item:
Partition Mounted Napkin Disposal
Description:
Surface mounted on toilet partition. 10-11/16" (271mm) wide x 15-1/8" (384 mm) high x 4-3/16" (106 mm) deep. Disposable liners.
Material/Finish:
Stainless steel with brushed finish.

Item:
Toilet Paper Dispenser
Description:
Surface mounted two roll dispenser. Extra roll drops in place when bottom roll is depleted. Provide tumbler lock. 5-7/8" (149mm) wide x 10-1/2" (267 mm) high x 5-5/8" (143 mm) deep.
Material/Finish:
Stainless steel with brushed finish.

Item:
Feminine Napkin-Tampon Vendor
Description:
Fully recessed. (If recessed unit cannot be installed, use similar surface mounted model.)
Material/Finish:
Stainless steel with brushed finish.

12511 – Horizontal Louver Blinds

Item:
Horizontal Louver Blinds
Item Code:
Color/Finish:
Color to match architect's sample.
Description:
Operation: Manual
Handrail: Channel-shaped section fabricated from minimum 0.025" (1mm) thick sheet steel with rolled edges at top, equipped with end braces. All hardware required for operation of blind at headrail to be enclosed in metal head. Finish of rail to be in same color as slats unless otherwise indicated.
Bottom Rail: Fabricate from steel with rolled edges. Contour section to match slat curvature. Provide metal or plastic end closure caps, or same color as rail. Finish rail in same color as slats unless otherwise indicated.
Slats: Spring-tempered aluminum, slats, alloyed for maximum strength, with forming burrs removed. Slat thickness and ladder support distances adequate to preclude visible sag or bow after continued use.
1" (25 mm) wide, lengths as required, not to exceed 142" (3,607 mm), other components sized to suit.
Ladders: Construction design to support and maintain slat at proper spacing and alignment in open or closed position.
Braided Polyester Cord: Fabricate of not less than 0.045" (1mm) nor more than 0.068" (1.73 mm) diameter. Integrally braided ladder rungs of not less than 4 threads; space ladders no further than 24" (610 mm) apart and no more than 7" (178 mm) from ends of slats.
Tilting Mechanism: Provide low friction gear tilter, drum and cradle at each ladder, tilt rod, tape clips and grommet guides to prevent wear on ladder and cords. Mechanism designed to hold slats at any angle and prevent movement of slats due to vibration.
Wand Operation: Detachable, clear plastic wand of appropriate length to suit blind installation and to provide convenient operation.
Lifting Mechanism: Crash-proof cord locks with cord separators, braided polyester cords fitted with pulls. Include cord

equalizers of self-aligning type designed to maintain horizontal blind position.
Installation Brackets: Provide pre-finished metal mounting brackets designed to facilitate removal of headrail. Provide intermediate brackets at spacing recommended by manufacturer. Include hardware necessary for secure attachment of brackets to adjoining construction and headrails. Provide brackets adequate to support the weight of blind assemblies plus force applied to operate blinds, with mounting holes located to accommodate either horizontal or vertical mounting.
Finish: Provide standard factory applied finish system; chemical conversion coating followed by baked-on synthetic resin enamel finish coat.
Fabrication:
Prior to fabrication, verify actual opening dimensions by site measurements. Do not proceed with fabrication until unsatisfactory conditions have been resolved. Adjust dimensions for proper fit at openings.
Cooperate with other trades for securing headrails to substrates and other finished surfaces.
Fabricate horizontal louver blind components from non-corrosive materials which do not require lubrication during the normal expected life.
Fabricate blind units to completely fill the opening from head to sill and jamb to jamb. For continuous installations, fabricate blind units so that breaks between units occur only at mullions or other defined vertical separation.
Space blind slats to provide overlap for light exclusion when in fully closed position.
Equip horizontal louver blind units with the following operations:
Full-tilting operation with slats rotating approximately 180 degrees. Place tilt-operating controls on left side of blind when facing blind unit. Exceptions may occur due to unique location of window, etc.
Height raising, with lifting cord locks for holding blind at any point of travel. Place pull cords on right side of blind when facing it.

12620 – Movable Furniture

Item:
Stacking Chairs
Application:
Used for Briefing Rooms, Lunch Rooms, Work Areas, Informal Conference Areas, Training Areas, and Cafeterias.
Description:
Multi-purpose seating with stacking, ganging and tablet arm options.
Finish/Upholstery:Chair frame to be chrome or epoxy finish black. Polypropylene seats to coordinate and be in the color direction indicated for seating for the particular building category. Upholstery, if desired for briefing or training areas, to coordinate and match the selections for the particular building category. All selections shall meet or exceed BIFMA Standards for abrasion and flammability.
Materials:
Plastic seat and back, one or two piece options. Steel frame, stacking dolly with casters.
Construction:
Hard floor glides and ganging guides must be available. 7/16" (11 mm) solid steel rod chair frame. Polypropylene seat, back and armcap, option for armless or armed version. Stacking height about 79" (2 m) high, approximately 45 chairs stack per dolly. Dolly to have casters for easy maneuverability. Tablet arm option available for training situations.

Item:
Managerial Seating
Application:
Seating for private offices – for 0-6 and above levels. Seating in high image or executive conference areas.
Finish/Upholstery:
All fabrics to be soil retardant, except for leather. Base to be chrome, powder coat or have wood caps. Arms, seat, and back – both sides – to be upholstered. Upholstery to coordinate and match the selections for the particular building category. All selections shall meet or exceed BIFMA Standards for abrasion and flammability.
Materials:
Molded plywood shells with mold polyurethane fill at back and seat. Base to be 5-prong cast aluminum. Enclosed upholstered arms.
Construction:
The chair back to provide upper back support and contour to provide lumbar support. The seat pan to angle slightly to the back for more comfortable sitting towards the back. Five prong base with dual hard carpet casters or soft single wheel casters option to be in a color to match base. Chair to have a free flowing tilt mode with tension control to continuously track and support the user. Chair to have locking devise to fix chair in upright position. Select the high back or mid back options.
Interior construction to be molded plywood shell ¾" (19 mm) thick with mold polyurethane fill. Arms to be molded polyurethane upholstered. Arms to be secured to the plywood shell with angled steel brackets. Arms not to be removable.

Item:
Operational Seating
Application:
Seating for offices, for seating in the systems furniture and for private offices below 0-6 level.
Finish/Upholstery:
All fabrics to be treated with soil retardant. Base, arms, outer shell, and casters to be all the same color. Upholstery to coordinate and match the selections for the particular building category. Refer to finish recommendations for the appropriate building category. All selections shall meet or exceed BIFMA Standards for abrasion and flammability.
Materials:
Base to be 5 prong. Outer shell to be molded plastic or fully upholstered. Arms to be loop style or T-arm molded plastic. Seat and back to be separate and upholstered.
Construction:
Five prong base to be constructed of die formed steel with polypropylene cap or chrome finish and with dual hard carpet casters or soft single wheel casters option in a color to match base. Chair seat and back to be either injection molded polypropylene on a wood or steel frame. Chair to have mechanical height adjustment and a pneumatic height adjustment option. Chair to have a seat pan adjustment or a self-adjusting seat front. The chair back and seat to tilt at a 2:1 ratio relative to each other. Arms to be field removable or replaceable. Pneumatic cylinder to be field replaceable. Chair must meet or exceed American National Standards Institute Human Factors Society 100-1988 standards.

Item:
Conference Seating
Application:
Seating for conference rooms, briefing areas, training rooms, and areas requiring temporary seating that could extend for 8 hours or more.
Finish/Upholstery:

All fabrics to be treated with soil retardant. Base, arms, outer shell and castors to be in the same color. Upholstery to coordinate and match the selections for the particular building category. Refer to finish recommendations for the appropriate building category. All selections shall meet or exceed BIFMA Standards for abrasion and flammability.

Materials:

Base to be 5-prong. Outer shell to be molded plastic or fully upholstered. Arms to be loop style, T-arm, or enclosed - upholstered or molded plastic. Seat and back to be upholstered – attached or separate.

Construction:

Base assembly to have five prongs, constructed of die formed steel with a polypropylene cap or a chrome finish.

Castors to be dual hard wheel carpet casters or soft single wheel casters option to be in a color to match base. Chair seat and back to be either injection molded polypropylene or wood or steel frame. Chair to have mechanical height adjustment and a pneumatic height adjustment option. All chairs to have a seat back tension adjustment and height adjustment on chairs with separate back. All chairs to be swivel tilt. The chair back and seat to tilt at a 2:1 ratio relative to each other. Arms to be field removable or replaceable. Pneumatic cylinder to be field replaceable. Chair must meet or exceed American National Standards Institute Human Factors Society 100-1988 standards.

Item:

Lounge Seating/Soft Seating

This includes only fully upholstered pieces.

Application:

Seating for lobbies, waiting areas, 0-6 and above private offices, and lounge areas. This seating includes chairs, loveseats, and sofas.

Finish/Upholstery:

Upholstery to coordinate and match the selections for the particular building category. Refer to finish recommendations for the appropriate building category. All selections shall meet or exceed BIFMA Standards for abrasion and flammability. On traditional pieces – only wood visible is the legs – finish to match other wood furniture for the building category.

Materials:

Fully upholstered, lumber frame construction. Cushions to be 180 density polyurethane foam. No wool on arms allowed.

Construction:

Lumber to be kiln dried to a moisture content of 6-8%. All internal frame parts to be of hardwood. All exposed frame parts to be cut from #1 common or better grade of hard maple with uniform grain and color conformity.

Frame construction: Frame joints to be carefully fitted and secured with glue and 7/16" (11 mm) dowels. Joints are doweled according to width and/or joint location up to 3 dowels per joint. Frames to be reinforced with corner blocks, mitered to fit, securely glued, and screwed into position while the frame is in the clamp so as to insure squareness and tightness of joints. All seating must meet the Heavy Service Grouping requirements, FNAE-80-214.

Seat Construction: Seat foundation to be 8-1/2 gauge sinuous wire spring construction. Springs to be stretched between the spring rails and secured into position with insulated clips, double stapled. Springs are clinched to insulate tie wires and strapped to the side rails and back posts to create a unified spring system. Cover the spring system with noise free insulating fabric, stapled to the frame on all sides. Back construction is 11 gauge sinuous wire spring

construction. Stretch springs between the top and bottom spring rails and secure and double staple. Cover with noise free insulating fabric.
Cushioning: Seat to be cushioned with 1.80 pounds (0.8 kg) density polyurethane foam with 32 pounds (14.5 kg) compression. Each seat cushion is wrapped with ¾ oz (0.02 kg) resin treated polyester fiber to give a smooth even finished cushion. The back and arm cushions are 1.10 pounds (0.5 kg) density polyurethane foam with 20 pounds (9.1 kg) for back and 35 pounds (15.9 kg) for arms compression. Back and arms to be topped with blended fiber batting for smooth even appearance.
Upholstery: All patterns to be matched on the vertical and horizontal for a uniform pattern on entire piece. No visible fasteners and 1-1/2 ounce (0.04 kg) per square yard black sheet at underside of frame (1 sq. yd. = 1 sq. m.).

Item:
Freestanding Office Furniture - Casegoods
Description:
Double pedestal desks, credenzas, returns, computer tables, single pedestal desks, wood lateral files, bookcases, and executive U-shaped units.
Material/Finish:
Wood: species to be oak, walnut or mahogany. To be a medium to dark oak, walnut or mahogany. All exterior surfaces to have a lacquer finish that insures toughness, imprint and mar resistance, adhesion and stability against checking.
Construction:
All casegoods to have:
All exterior surfaces to be plain sliced or quarter sliced veneers. The veneers to be selected and matched to assure proper balance and consistency. Top construction to be three ply balance construction, 1-1/2"+ (38 mm) thick with a ¼"+ (6 mm) solid wood edge banding on front and rear edges. End panel construction to be 1-1/4" + (32 mm) thick tree ply balanced construction with a 1/8"+ (3 mm) thick wood cap on the top edge. All end panels to have a hardwood base cap for secure mounting of the adjustable leveling glides. Drawers to have sides and backs of 7 ply 7/16"+ (11 mm) laminated oak or walnut with a hardwood core. Drawer bottoms to be 3 ply 1/8"+ (3mm) thick reinforced with anti-rattle glue blocks for quietness. Drawer construction to be dovetail joinery at all corners for maximum strength. Drawer interiors to be sealed, sanded and finished with a clear durable lacquer finish. Drawer fronts to be ¾" (19 mm) thick, 3 ply with vertically matched grain. Veneers to be matched horizontally on adjacent pedestal fronts. All drawers to be able to receive dividers. File drawers to utilize full extension, progressive action slides with precision ball bearing for no metal to metal connection for smooth, quiet operations. Box drawers to utilize 3/4 extension slide with positive stop action. File drawers to have heavy duty metal file rods to accommodate various filling requirements. All drawers to be lockable and keyed alike with removable cylinders to rekeying at a later date. All desks tops to have 2 grommets minimum 2" (51 mm) diameter in size to allow for electrical cords and cabling. Location can vary per applications. All desks to have the options of a pencil drawer at center or a pencil tray provided for the box or file drawer if a pencil drawer is not desired.

Item:
Tables
Application:
Tables for Conference Rooms, Briefing Rooms, and Break/Lunch Rooms or Areas.
Description:

Laminate or wood top tables. Various sized and shapes. Bases to be metal or wood, various sizes and shapes. Tops may have laminate insets with wood edge.
Material/Finish:
Laminate top with vinyl edging, self edge, or solid wood edge. Refer to finish recommendations for laminate color for the appropriate building category. Wood top in veneer top with solid wood edge. Species to be oak, walnut or mahogany. Metal or wood bases as required. Wood tops to have lacquer finish that insures toughness, imprint and mar resistance, abrasion and stability against checking.
Construction:
Tops: Not to exceed 30" (762mm) in height if being used for a sitting application. Not to exceed 36" (914 mm) in height if to be used as a standing application.
Attachment: Base plate to be molded cast iron and appropriately sized for the top size. The casting to be seamless and without welds. The hub and column to be machine polished to insure a smooth finish. Glides to be included. Bases are fastened to the top with 7/8" (22 mm) pan head sheet metal screws.
Cylinder Base or Drum Bases: The core to be smooth moisture resistant substrate, the bottom end cap ¾" (19 mm) moisture resistant particle board, painted black with T-nuts and levers pre-installed. Drum base caps are ¾" (19 mm) thick with a 10" (254 mm) hole pre-drilled for a weighted ballast. Veneers to be book matched, 2 ply, equally spaced. Veneers to be laminated to the drum with special adhesive formulated for vertical surfaces and radius molding. Veneers are then hand sanded and finished to spec. metal mounting plates to be provided.
Tops: One piece construction. Core material to meet or exceed strength requirements of commercial standards and federal specification. Particleboard must have a minimum density of 48 pounds (21.8 kg) per cu. ft. (1 cu. ft. = 0.028 cu. m.). Must have a minimum screw holding strength of 225 in the face. Core to be sanded top and bottom. Laminate to be glued uniformly and evenly to insure adhesion and stability. Edging applied, used miter corners to ensure a perfect edging. For wood edge use hardwood free of blemishes, stained to match other wood casegoods or trim.

Item:
Filing Cabinets
Description:
Freestanding lateral files and vertical files, 2-high, 3-high, 4-high, and 5-high including fire rated file cabinets.
Material/Finish:
Rolled metal seamless on 3 sides. Electrostatically applied paint by manufacturer. Color to match color finishes for the appropriate building category.
Construction:
Seamless cabinets with rounded corners for smooth look. Drawer pulls to be recessed. All cabinets to have a locking option. Glides or leveling devices provided on each file. Ball-bearing suspension on all drawers with anti-rebound device All cabinets to have an interlock system on drawers so only one drawer may be extended at a time. All lateral files to have front to back and side to side filing options. All lateral files to provide options for a fixed shelf on 5-high units, roll-out shelves and drawers. Lateral files to meet BIFMA X5.2 standards. Vertical files to meet BIFMA X5.3 standards.

12626 – Residential Furniture

Item:
Dormitory Furniture – Casegoods
Item Code:

FW-2
Application:
Dormitory furniture
Description:
Pieces must include headboard and bed frame, night stands, bunk beds, wardrobes, units with drawers and open shelves, TV, shelf, drawer unit, TV armoire, desk, writing tables, dressers, chests, mirrors, TV refridge unit, table, end table, cocktail table, desk chair, and upholstered pieces.
Material/Finish:
Exposed parts: northern red oak, solids, and veneers.
Interior parts: poplar and other selected hardwoods.
Finish:
Medium to Dark Oak
Construction:
Type of Wood: All solid parts and wood veneers to be northern red oak. Particle board and cardboard are not acceptable materials.
Furniture Backs: Must be of equal thickness to the sides of furniture and finished.
Drawer Fronts , Doors, Table Tops and Other Components: Must be removable and replaceable on the site.
Construction/Assembly: Dry construction method with metal to metal connections.
Edge Banding: Exposed edges must be a hardwood impact edge.
Construction Hardware: Screws, hinges, etc. must be concealed or inserted into the solid lumber components.
Drawers:
Drawer and Door Pulls: Pulls must be flush or recessed into the drawer or door fronts.
Joinery: Must be dove-tail joinery

Drawer Bottom Attached to the Drawer: Drawer bottom must sit in a grooved area of the drawer sides and must be reinforced with glue and screws. Drawer bottoms must be constructed of hardwood and washable.
Drawer Glides: *All* drawers must have glides with an automatic stop feature. Glides must be epoxy coated metal with nylon bearing rollers. Glides must be rated for heavy duty use.
Type of Door Hinge: Doors must open 180 to 270 degrees.

Casegoods:
Grommet Holes: Grommet holes must be provided to allow for electrical lines and cables. Rubber grommets must encircle the edge of the hole. Hole must be large enough to handle multiple sets of wires.
Shelves: Shelves must be adjustable, when designated, and washable.
Drop Lids: Must be secured by a continuous piano hinge and two adjustable tension support arms.
Drop Lid Desks: Must have a built in light with easily accessible on/off switch.
Leveling Glides: Must be provided on large units.

Chairs:
Materials and Construction of Chair Frame: Made of solid northern red oak. Reinforced mortise and tenon construction. Corner blocks provided under the seat that are both screwed and glued into place with grooved rails.
Upholstery: Configured to allow for field cleaning or reupholstering. Fabric must be rated as 2500+ double rub, Wyzenbeek Test. Moisture barrier must be in place to protect liquid from penetrating foam.
Sled Base: Two position sled base to allow someone to lean back in chair without putting pressure on legs. Furniture Style, Measurements, and Quantity:
Furniture Style and Finish: Style of furniture must be similar to American of

Martinsville "SPACEMATES". Color of finish to match "FLAX".
Furniture:
Twin bed: Headboard, full, free standing, 40" (1,041 mm) wide x 2-1/2" (63.5 mm) deep x 41" (1,041 mm) high.
Bachelor Chest: Three drawers, 19-1/8" (486 mm) wide x 17-3/4" (451 mm) deep x 28-7/8" (733 mm) high.
Wardrobe: Two doors, one shelf (non-adjustable), one clothing rod, lock hasp and scuff plate, 42" (1,067 mm) wide x 24" (610 mm) deep x 76" (2m) high.
Drawer Bookcase: Open storage unit, three shelves (top two shelves adjustable), three drawer, 30" (762mm) wide x 19" (483mm) deep x 76" (2m) high.
Drop Lid Desk Armoire: Three drawers, two fixed shelves; one adjustable shelf; with adjustable light, 30" (762 mm) wide x 19" (483 mm) deep x 76" (2m) high.
Square Guest Table: 34" (864 mm) wide x 34" (864 mm) deep x 29-1/2" (749 mm) high.
Desk Side Chair: Sled base, without arms, fabric bottom and back cushion. Fabric color to coordinate with finish recommendations for the Dormitory building category.

12910 – Artwork

Item:
Artwork Frames
Material/Finish:
Frames to be aluminum extrusions with gloss black anodized finished. Frames to be standard for all buildings. All poster pieces to be dry mounted on foam core and wired for hanging. Alternate methods of hanging are not permitted.

15540 - Plumbing Fixtures

Item:
Break Area Faucet
Description:
Goose neck design with paddle wrist handles or single lever mixing valve. Aerator with 2.5 GPM (15.8 cu m/sec) flow. 8" (203 mm) centers.
Material/Finish:
Chrome

Item:
Break Area Sink
Description:
Single compartment stainless steel sink with three holds at 4" (102 mm) centers; 25" (635 mm) wide x 22" (559 mm) deep x 6-1/2" (165 mm) high.
Material/Finish:
Brushed Stainless Steel

15942 – Air Diffusers

Item:
Air Diffusers
Description:
Air devices shall be steel, square diffusers, flush core, fixed pattern, lay in type for use with a "T" bar suspended or framed ceiling. Coordinate for type of ceiling construction and location. Spline ceiling construction surface mounted air devices shall be used in ceilings, and use sidewall bar type registers in the case of vertical surfaces. All air device supply ducts shall incorporate a lockable balancing damper where the diffuser/register run out interfaces with the zone trunk duct, for balancing purposes. In spline ceilings, provide accessible ceiling tile access at the location of these balancing dampers.
Material/Finish:
Steel construction, baked White enamel finish.

16515 – Light Fixtures

Item:
Retro-Fit Diffuser
Description:
2" (51 mm) squares parabolic diffuser conversion kit. For use in converting existing 2' x 4' (610 x 1,219 mm) prismatic lenses.
M*aterial/Finish:*
Chrome finish.

Item:
Retro-Fit Diffuser
Description:
2" (51 mm) squares parabolic diffuser conversion kit. For use in converting existing 2' x 2' (610 x 610 mm) prismatic lenses.
Material/Finish:
Chrome finish.

Item:
2' x 2' (610 x 610 mm) Fluorescent Layin Fixture
Description:
2" (51 mm) squares parabolic fluorescent fixture with semi-specular lens. Provide 90 min emergency battery pack as required for emergency lighting.
Material/Finish:
Chrome finish.

Item:
2' x 4' (610 x 1,219 mm) Fluorescent Layin Fixture
Description:
2" (51 mm) squares parabolic fluorescent fixture with semi-specular lens. Provide 90 min emergency battery pack as required for emergency lighting.
Material/Finish:
Chrome finish.

Item:
2' x 4' (610 x 1,.219 mm) Fluorescent Surface Mounted Fixture
Description:
Surface mounted 2" (51 mm) squares parabolic fluorescent fixture.
Material/Finish:
Housing to be white baked enamel steel. Lens to be semi-specular clear anodized aluminum.

Item:
Linear Fluorescent Cove Light
Description:
Continuous linear parabolic fluorescent lighting constructed of die formed, 19 gauge steel with factory applied enamel finish. Prefabricated extensions and corner boxes for uninterrupted runs. No holes or knock-outs on exposed surfaces. Continuous appearance of louver. Mitered louver at corners. 6-1/4" x 6" (159 x 152 mm) housing. At all cove lighting direct lamps to provide light on wall and /or ceiling surfaces above the cove location.
Material/Finish:
White baked enamel steel.

Item:
Compact Fluorescent Downlight
Description:
8" (203 mm) diameter recessed downlight with semi-specular clear alzak reflector and a minimum lamp size of 2-26 watt quad compact fluorescent lamp. For use in lobbies, corridors and other public spaces.
Material/Finish:
White trim ring with clear alzak reflector.

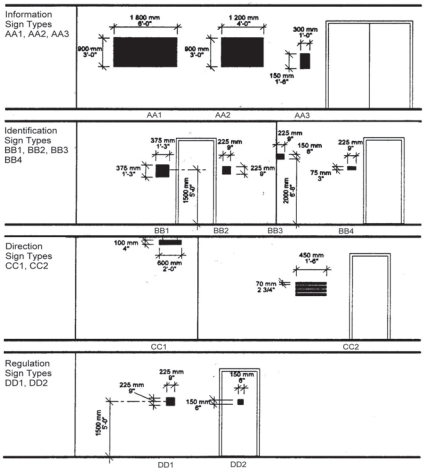
Item:
Compact Fluorescent Wallwasher
Description:
8" (203 mm) diameter recessed wall washer with semi-specular clear alzak reflector and a minimum lamp size of 1-26 watt quad compact fluorescent lamp. For

use to highlight artwork and to lighten walls of small spaces. Optional incandescent fixture when required for color rendition.
Material/Finish:
White trim ring with clear alzak reflector.

3.7 Interior Signage Standards

While a well designed building will clearly identify immediate destinations such as reception and waiting areas, the most intuitive design cannot direct people through the building to specific areas. Additional systems must be utilized to visually assist a visitor to locate their destinations. A signage program should compliment the interior architecture and color schemes. Maintaining concise and clear information is important to efficiently convey a message or direction.

The Air Force Pamphlet 32-1097 should be referenced before designing and specifying signage.



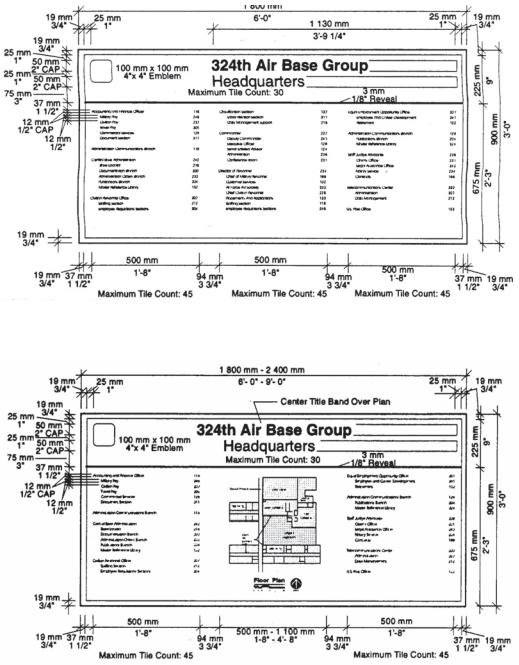
Sign placement information from Air Force Pamphlet 32-1097.

3.7.1 Sign Types

To efficiently direct a person through a building without causing unnecessary distractions to personnel performing other tasks, several types of signage are used. The five main categories are Information, Identification, Directional and Regulation and Bulletin Boards. Their usage and location must be carefully designed to maximize their intent.

3.7.1.1 Information Signs

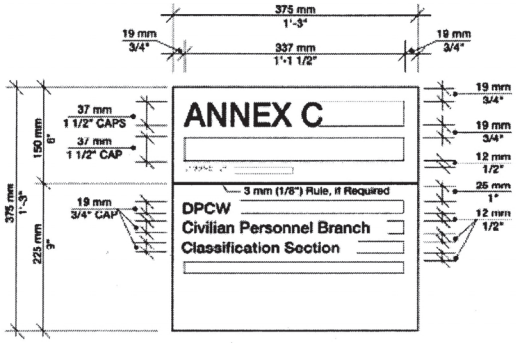
Usually located in the main entrance or elevator lobbies and clearly visible, this type of sign instructs visitors upon entering the building. It is considered a building or floor directory.



Information Signs.

There are two components to the sign. A header panel indicates the name of the building or organization. It may also include an organization emblem. The directory section is a changeable letter board that lists the name of each tenant of the building. A schematic building plan to assist in orientation can be included as well.
Floor directories should include a header panel indicating the floor and a directory panel that will list each tenant.

3.7.1.2 Identification Signs

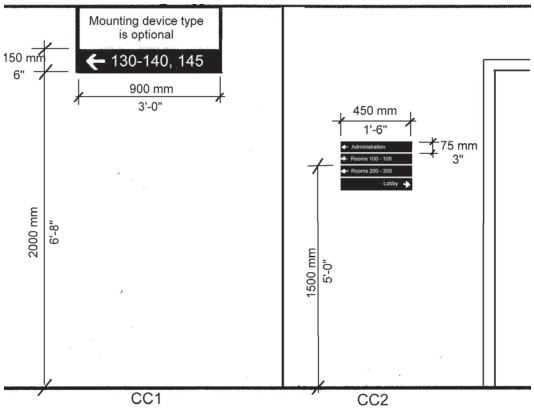


Identification Sign.

Identification signs are used to identify wings, major offices, secondary offices, semi-public and public rooms. Their placement is adjacent to the door of the room or opening in the panel workstation.

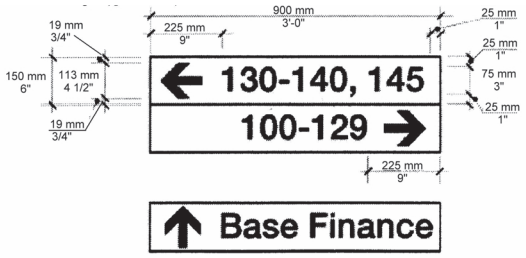
This type of sign consist of a header panel to hold the room number, wing, or annex designation and an insert panel that indicates the name of the occupant. If the room is semi-public or public, the insert panel will contain the name of the function. The panels should be removable since personnel will be relocated as needed.

3.7.1.3 Directional Signage



Placement of Direction Signs.

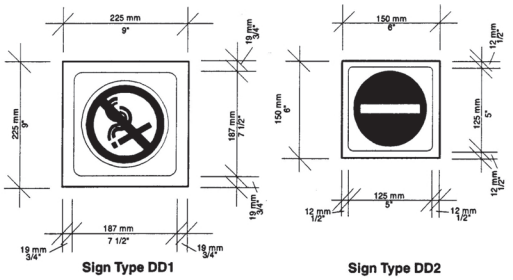
Directional signs should be located at decision points in a direction of travel. An arrow is utilized to indicate the direction to travel. These signs may either be ceiling or wall mounted. Care should be taken in placing the signs so that they do not conflict with regulatory signs, which indicate emergency paths to an exit.



Direction Signs.

Direction signs should list only room numbers. However, room destinations that are most sought by people entering the building for their initial visit, should be listed by name. Limiting the rooms listed by name will be clear for all to understand.

3.7.1.4 Regulation Signs



Regulation Signs.

Signs required by the Air Force or local, state, and federal regulations are strictly limited as to mounting location. Generally they are located where a specific warning, prohibitive information or fire and safety regulations need to be conveyed.

A regulatory sign may require text messages to convey a point such as to limit the number of people in a room at one time. It may be graphic as in the case of ADA information.

3.7.1.5 Bulletin Boards

Useful in displaying many kinds of information, including notices, regulations, memoranda, and posters, these signs promote causes and advertise specials.
The border should be of the same design and color utilized by adjacent artwork in the corridor. If possible, this design should be consistent throughout the building. The unit commander or person in charge should insist that materials be current and neatly arranged.

3.7.2 Typography

Helvetica Medium Typeface.

Style, size and spacing of letters compose typography. A font or typeface is a style of

letter that can range in size. Sizes for fonts are typically listed as points.

As referenced in the Air Force Pamphlet 32-1097, the use of Helvetica Medium and Helvetica Regular is recommended due to their simplicity and readability. Helvetica Medium is used for primary information on most signs and Helvetica Regular is used for the secondary information and some regulatory signs.

All fonts have a tile system, supplied by letter manufactures on proportional paper-board tiles, that detail proper spacing. This insures that the proportion of spacing will remain the same for narrow letters as with wide letters.

3.7.3 Materials

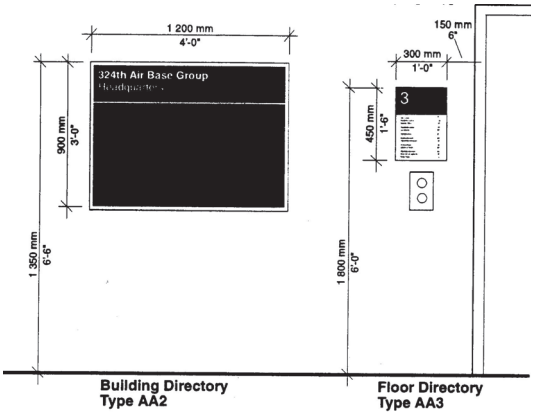
Interior signs should relate to the interior design as closely as possible. Suitable materials for the interior are aluminum or plastic for frames and faces. If a frame is used, polished or clear plate glass with clean cut edges or acrylic plastic should be supplied for protection.
Paints and inks should be qualified for inclusion on GSA Qualified Products List. A manufacturer qualified for the application onto the selected materials must supply silk screen inks.

3.7.4 Colors

The background should be a neutral color and frames are a contrasting color. Refer to section 10425 in the Specifications (3.6.5). Some regulatory signs will require specific colors, therefore, applicable codes and regulations must be followed.

3.7.5 Mounting

Signs must be mounted so as to conceal the hardware. The type of mounting and location will vary according to the sign type. Manufacturer's recommendations should be adhered to during installation.



Sign mounting information. See Air Force Pamphlet 32-1097 for specific mounting information.

Malmstrom AFB Administration Finish Recommendations


SU-1


SU-2


FW-1


FP-1


SF-1


SU-3


FW-2

SF-1

SF-2


WC-1

PT-1


WC-2


PT-2


PL-1


PL-2


WC-3

PT-3


VCT-1


VCT-2


CPT-1


CPT-1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Malmstrom AFB Operations/Industrial Finish Recomenndations


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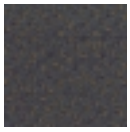
SU-3

SF-3

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VCT-1


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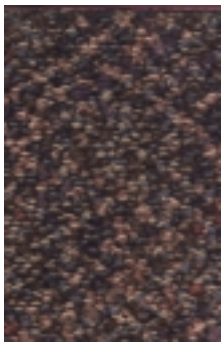
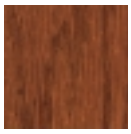
CPT-1


CPT-1

Malmstrom AFB Dormitory Finish Recommendations


SU-2


SU-3

SU-3


PT-1

PT-1


PT-2


PL-1


PL-2


PT-3


VCT-1


VCT-2


CPT-1

Section 4:

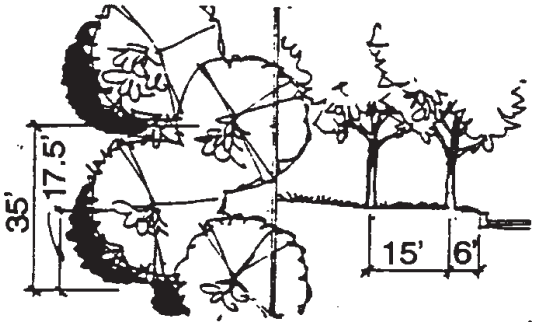
Landscape Standards

4.1. Street Trees

Street tree plantings are used to visually define and reinforce the basic roadway organization of the installation. They provide the ordering element that orients and directs vehicular traffic as well as defining roadway hierarchy. Street trees provide visual scale, reduce roadway glare, heat gain, and physically separate pedestrian and vehicular circulation. When street trees and parking lot peripheral tree planting areas overlap, trees should generally be selected from the Street Tree category for that location. All caliper measurements mentioned in this section are assumed to be specified as diameter breast height (dbh). See Figure A.7 Roadway Hierarchy Map which identifies three different roadway classifications: 1. Primary, 2. Secondary, and 3. Tertiary at Malmstrom AFB. Various levels of landscape treatment are proposed for each roadway that will provide visual clues to their hierarchy and help orient and direct vehicular traffic.

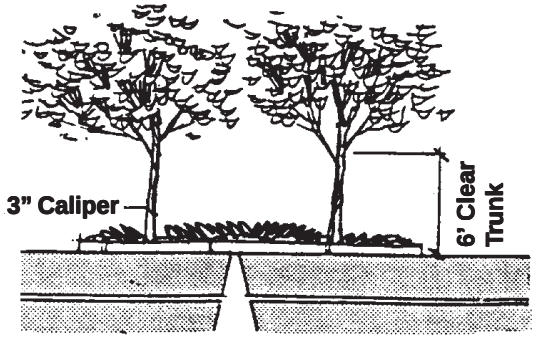
4.1.1. Primary Streets

To emphasize visual effect and channel views, an offset double row of large deciduous trees should be planted along each side of the street. Tree spacing should be 30-35 feet on center, with the first row of trees planted a minimum of 6 feet from the back of curb. The second row should be located an additional 15 feet from the first. Nominal spacing variations may occur to maintain rhythm while avoiding curb cuts and utilities.



Street tree planting for primary streets.

Trees planted along major streets should have a minimum caliper of three inches and have a clear trunk of six feet.

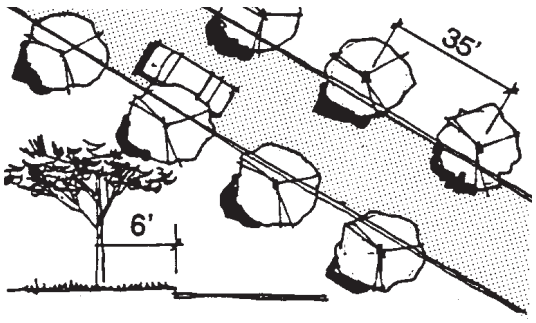


Street tree caliper and clear trunk requirements for primary streets.

The use of trees which have thorns or produce fruits which may be a tripping hazard should be avoided in all areas adjacent to sidewalks or pedestrian areas. One tree should be selected from the Landscape Planting Palette, page A4-20 and A4-21 and used continuously along the designated street.

4.1.2. Secondary Streets

A single row of street trees should be planted along both sides of designated secondary streets. Typical spacing should be 35 feet on center with a minimum setback of 6 feet from the curb edge. Nominal variation may occur to maintain rhythm (i.e., spacing) while avoiding curb cuts, utilities, or sidewalks.



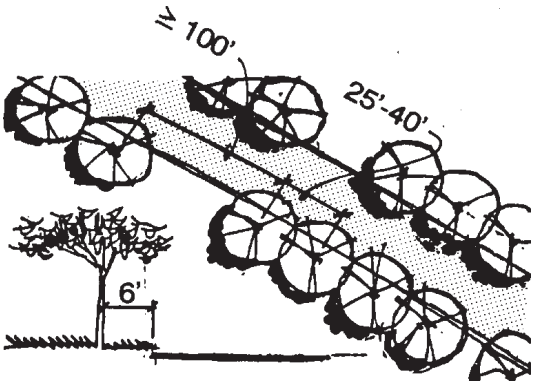
Street tree planting for secondary streets.

Trees planted along secondary streets should have a minimum caliper of 2½ inches and have a clear trunk of 5 feet.

For any given length of street between intersecting street, single tree species should be planted. Trees should be selected from the Landscape Planting Palette, page A4-20 and A4-21.

4.1.3. Tertiary Streets

Street trees planted along tertiary streets should be planted in a single row of three or more tree groupings planted on 25-40 foot centers. Spacing between groupings should not exceed 100 feet except to avoid curb cuts, drainage ditches, or utilities. A setback of six feet from the road edge should be maintained.

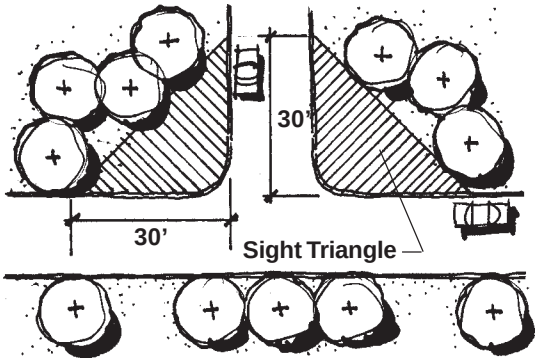


Street tree planting for tertiary streets.

Trees should have a minimum caliper of two inches and a clear trunk of five feet. Large deciduous trees should be planted except where specific site limitations dictate the use of a smaller tree. Only one species of tree should be used along any section of street between intersections. When tree replacement is necessary, the same species of tree should be used to replace the one removed. Trees should be selected from the Landscape Planting Palette, page A4-20 and A4-21.

4.1.4. Sight Distance Requirements

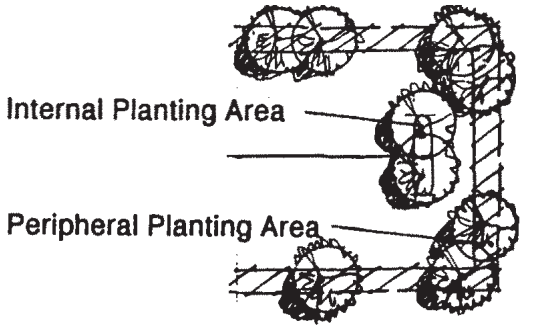
In order to maintain safe travel between roadways and intersecting streets or driveways, a clear unobstructed sightline should to be maintained. A sight triangle using a 30 foot distance back from the edge of the intersecting curb, should be used along all intersecting roadways and driveways. No trees shall be planted within this sight triangle. Any shrub plantings within this sight triangle shall have a maximum height of 24-26 inches.



Intersection sight distance requirements.

4.2. Parking Lots

Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berming can greatly improve the appearance of these areas as well as help define circulation and reduce heat gain during summer months.



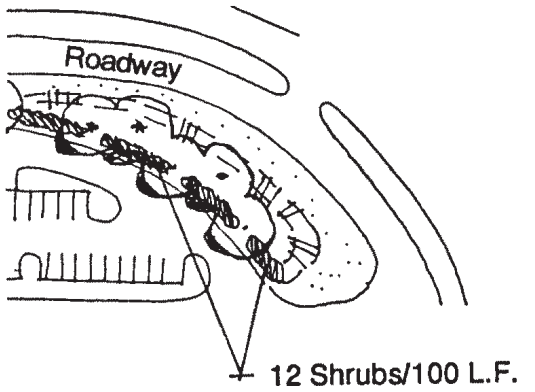
Internal and peripheral parking lot planting areas.

4.2.1. Peripheral Landscape Treatment

Where parking lots are adjacent to roadways, earth berms should be used to screen parked vehicles. Berms should not exceed 4 feet in height and have a maximum side slope of 3:1. Berms should be graded to provide a uniform appearance. Slopes

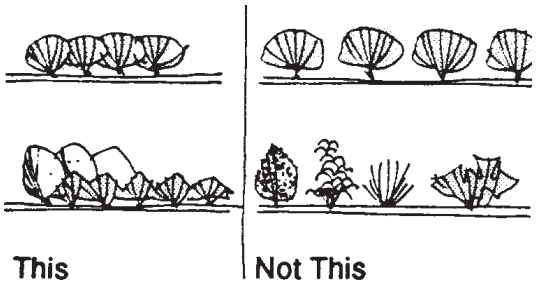
should be planted with ground cover and turf.

Where parking lots are adjacent to roadways, a landscape hedge should be used in addition to berms to screen parked vehicles. For every 100 linear feet of parking lot perimeter, 12 shrubs are to be planted and located where they will screen a majority of the parking area from the roadway. Plantings should not impede or block sight lines at driveway/street intersections. Hedges should be set back from the parking lot curb a minimum of four feet. Plants used should be of a single species to provide a uniform formal appearance. All plants will be matched in size and habit to a minimum of 18 inches in height and planted not more than 24 inches on center at the time of planting. In no case should shrubs be spaced to appear as individual plants.



Parking lot landscape hedge requirements.

In informal areas, shrub plantings are optional; however, if used, they should be massed in groupings of not less than five to seven plants to provide an opaque screen. In no case are shrubs to be spaced to appear as individual plants. No more than two species of shrubs should be used per parking area. All shrubs should have a minimum height of 18 inches. Plantings should be located a minimum of three feet from the curb and should not impede or block site lines at entrances.



Shrub massing guidelines.

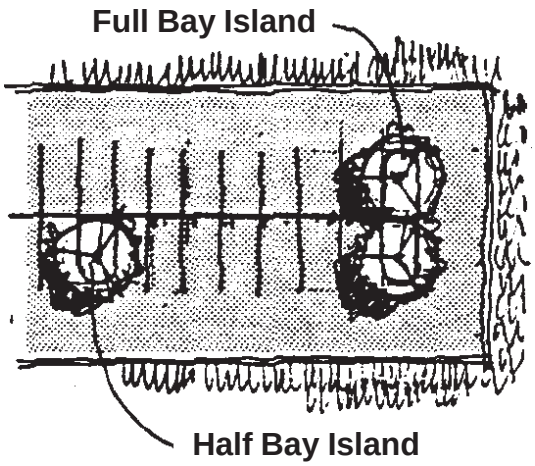
Shrubs for parking lot peripheral landscape treatment should be selected from the shrub section of the Landscape Planting Palette, page A4-24.

For every 45 linear feet of parking lot perimeter, including service areas and drop-offs, one deciduous three-inch caliper tree should be planted. Trees may be clustered or regularly spaced around the perimeter of the parking area. All trees should be located a minimum of three feet from the parking lot curbs. One tree should be used consistently around the perimeter of any one parking lot and be selected from the list below. At least 75 percent of these plantings should be from the large tree section of the Landscape Planting Palette, page A4-20.

Grass or ground cover should be planted on all portions of the parking lot perimeter not covered by shrubs, trees or paving material. Plants should be selected from the vines, groundcovers, and ornamental grasses section of the Landscape Planting Palette, page A4-25.

4.2.2. Interior Landscape Treatment

Each full bay parking island will be planted with two deciduous trees, with one tree required in a half bay island. Medians shall be planted with one deciduous tree for every 25 linear feet of length. Spacing should be regular. Trees planted in parking lots shall be a minimum caliper of three inches with a clear trunk of at least four feet. One tree should be consistently planted in the median areas in any given parking lot, but may be different from island plantings. Trees should be selected from either the large, medium, or small deciduous tree section(s) of the Landscape Planting Palette, pages A4-20, A4-21, and A4-22.



Parking lot landscape island planting.

Islands and medians should be planted with approved ground cover or single species shrubs. Shrubs shall be matched in size and habit, have a minimum height of 18 inches, and be spaced not more than 30 inches on center at the time of planting. Vine type ground covers should be spaced on 12 inch centers. All planted areas should be covered with wood bark; mulch a minimum of three inches in depth. Plants should be selected from the shrub, vines, groundcovers, and ornamental section(s) of the Landscape Planting Palette, page A4-25.

4.3. Buildings

Foundation plantings are those types of plantings which occur along building entrances and walls. Their purpose is to visually integrate the structure into the landscape or to accent special areas such as building entrances. Foundation plantings typically occur within 15 feet of a building wall, and may consist of trees, shrubs, groundcovers and/or annual plantings used solely or in combination. All buildings on the installation should incorporate some type of foundation plantings.

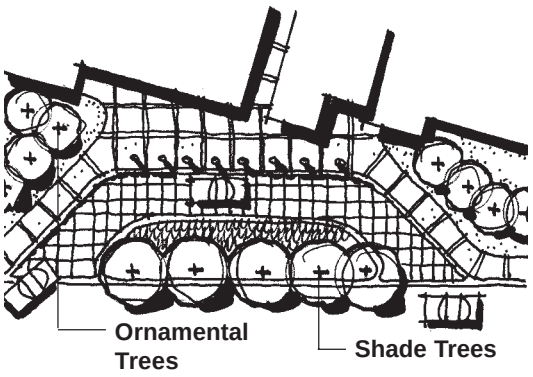
4.3.1. Entrance Plantings

Landscape planting at building entrances should be designed to direct attention toward the entrance, and guide users toward them. Designs for these areas should be simple in form and shape in order to reduce excessive maintenance. Plant materials should be selected by considering the level of detail which is perceivable at close range. Canopy and ornamental accent trees should be used to frame shrubs and groundcovers with strong flowering color and texture characteristics. These characteristics should emphasize entrances from more standardized foundation plantings around them.

Landscape entrance planting which emphasizes a building entrance.

Vehicular arrival areas often occur in conjunction with building entrances. Landscape planting at vehicular arrival areas should focus attention towards the building entrance. An orderly balance of canopy and ornamental shade trees should line entrance drives enclosing and shading the space. Arrival plantings should aid in directing vehicular movement and make final destination points more visible.

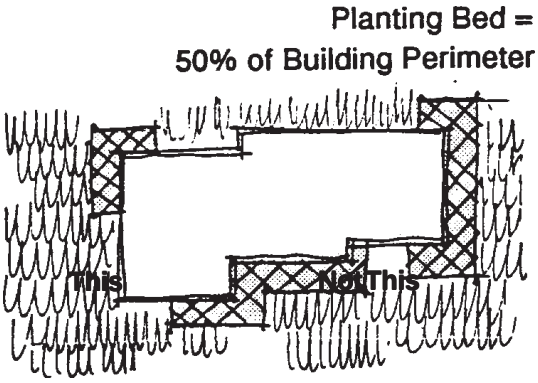
Plantings should be arranged in bold masses and set a positive tone by employing either a symmetrical or informal balance. Formal balance can be achieved by planting the same size and type of material on each side of the entry. This emphasizes the overall importance and function of the entry.



Landscape treatment for vehicular arrival spaces.

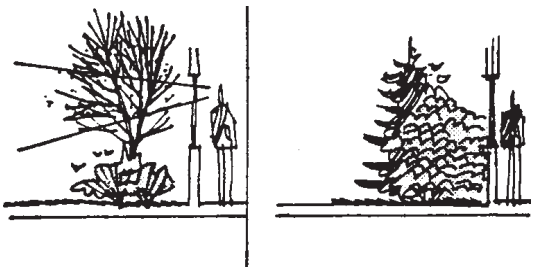
4.3.2. Foundation Plantings

The layout of planting beds around buildings should concentrate development at the entrances and main facade of the structure. The layout should complement the building design and can be rigidly geometric or curvilinear in nature. The minimum width of planting beds shall be 15 feet for large trees, six feet for small trees, three feet for shrubs and two feet for ground cover plantings. Buildings should receive foundation planting beds within 15 feet of the building walls along a minimum of 50 percent of the building perimeter. The layout of planting beds should allow mower access to all lawn areas which are adjacent to building walls. Small lawn areas adjacent to buildings should be avoided.



Foundation planting perimeter requirements.

The selection of appropriate foundation planting materials depends largely on the building facade. A hierarchy of plant types and heights should be used to frame and enhance the building. Care must be taken to select plants which at mature size will not block views from windows or access to building entrances. Large shrubs and evergreen trees should generally be reserved for use along blank facades. Deciduous trees in conjunction with low shrubs and groundcover will allow filtered or open views from windows. Year round interest should be provided by using a combination of deciduous and evergreen plant materials. Plant materials which are selected as foundation plantings should: (a) include no more than five plant species along landscaped buildings; (b) each grouping shall include not less than three individual plants of each selected shrub species.



Foundation plantings should be designed so as to not block views or building entrances when mature.

Correct placement of plant material is crucial to the success of foundation plantings. Evergreen trees, and low branched trees and shrubs should be centered a minimum of one-half the distance of their mature spread size away from entrances, walks and building walls. This minimizes potential conflicts between mature plants and pedestrian circulation. Mature plant width for the different plant types is given in all sections of the Landscape Plant Palette, pages A4-20 through A4-26.

Excellent example of foundation planting at the Consolidated Skills Development Center.

Plant selection of foundation plantings shall be made with regard to site suitability requirements.

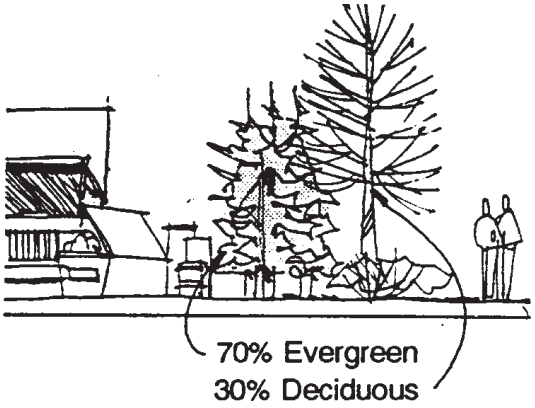
Foundation plantings will receive high-level maintenance around main building entrances, and mid-level maintenance in other areas. Plant materials have been specifically chosen to minimize the need for extensive maintenance. Shearing of hedges is inappropriate in informal use areas. The use of plants with thorns and/or messy fruits should be avoided near building entrances. Planter boxes and raised planter beds should also be avoided. All planting beds should be contained by edging and mulched to reduce landscape maintenance. Bark chip or stone mulch is recommended as an appropriate mulch material for foundation planting beds.

4.4. Landscape Buffers

Landscape buffers are intended to screen and separate use areas at Malmstrom AFB. When effectively implemented, buffers can be classified as (1) visual screens, and (2) edge treatments.

4.4.1. Visual Screens

Plantings used to provide visual screens should be upright and dense material planted close together. Evergreen trees are typically used; however, mass plantings of shrubs can be used to screen views below eye level. Deciduous trees should be planted in the foreground to provide seasonal interest. Visual screens should consist of 70 percent evergreen and 30 percent deciduous plant materials.

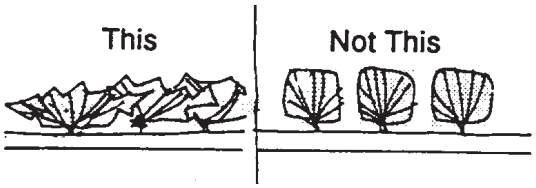


Visual screens should consist of 70% evergreen and 30% deciduous plant materials.

For every 100 linear feet of area to be screened, a minimum of 10 evergreen trees should be planted in a staggered row and arranged to visually block a majority of the area to be screened. Trees should be typically planted on center at 8 to 10 feet. Plantings should be integrated into the total landscape design. Trees should vary in height and be a minimum of six feet high.

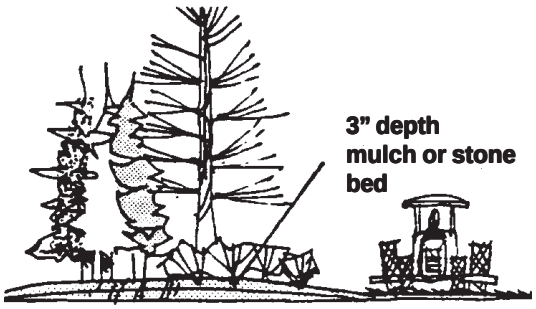
For every 100 linear feet of area to be screened, a minimum of 3 deciduous trees should be planted for accent and visual interest. Trees should be a minimum caliper of two inches.

Shrub plantings, when used to provide a low screen, should be tightly spaced at no more than three feet on center and left unsheared to create a solid mass and eliminate added maintenance. In no case are shrubs to be spaced to appear as individual plants. No more than two species of shrubs should be used in any one mass planting. Shrubs should not be less than 18 inches in height at the time of planting.



Shrub plantings should be left unsheared to create a solid mass.

Spade cut planting beds are recommended around visual screen plantings to eliminate damage to plant material by mowing operators. Planting beds should be mulched with shredded bark or stone mulch to a minimum depth of three inches.



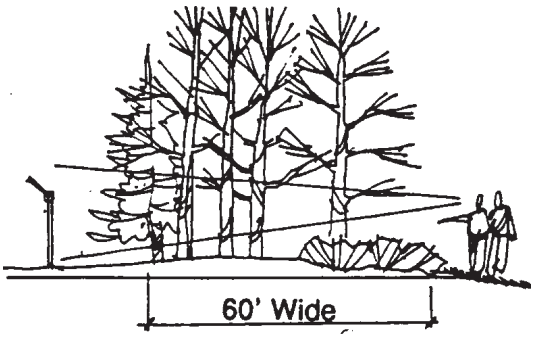
Planting beds should be mulched with shredded bark or stone mulch to a minimum depth of three inches.

All plantings should be selected from the Landscape Plant Palette, pages A4-20 through A4-26. Specific plant selection shall depend on site suitability and location on the theme plan.

4.4.2. Edge Treatment Plantings

Plantings used to provide edge treatment buffers are generally more open than visual screen plantings and are intended to allow filtered views into areas beyond. Plantings should consist of approximately 70 percent large overstory deciduous trees with 30 percent evergreen trees, flowering trees and shrub masses as accent.

Edge treatment planting areas should typically be a minimum of 60 feet wide. For every 200 linear feet of area, a minimum of 15 large overstory trees should be planted in a loose arrangement or grouping. On-center spacing may or may not vary. Trees should range in caliper size from 1½ to 3 inches. No more than three species of trees may be used in any one buffer planting.



Edge treatment planting areas should typically be a minimum of 60 feet wide.

Evergreen trees, if used, should be arranged in groupings of three 3 to 5 plants at 6 to12 feet on center. Trees should vary from four to eight feet in height and be located as a back-drop element.

Small flowering trees, if used, should be in groupings of 3 to 5 trees spaced 8 to 10 feet on center. Trees should be located on the edge of the buffer. Trees should have a minimum caliper of one inch.

Shrubs, if used, may be deciduous and/or evergreen and should be planted and spaced to create a solid mass and left unsheared for a naturalistic appearance. In no case are shrubs to be spaced to appear as individual plantings. Planting beds are recommended around shrub masses to eliminate damage by mowers. Beds should

be mulched or treated with a herbicide to eliminate grass growth.

All plant material used in edge treatment planting should be selected from the Landscape Plant Palette, pages A4-20 through A4-26. Specific plant selection shall depend on site suitability and location on theme plan.

4.5. Open Space/ Lawn Area Plantings

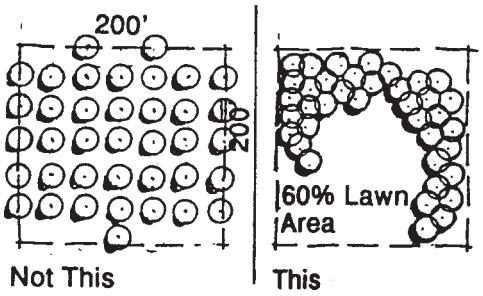
Open space/lawn areas are to be considered as areas on the installation not covered by buildings or parking lots, and fall outside the standards developed for buffers, foundations, or pedestrian area plantings.

4.5.1. Formal Areas

For every acre of open area, a minimum of 38 trees should be planted. This is equal to approximately 40 percent of the lawn area being under tree canopy.

Planting should be limited to deciduous trees. Flowering trees may be used for accent and seasonal interest.

Trees should be in a geometric arrangement with a minimum on center spacing of 20 feet. Any arrangement or grouping should be a minimum of five trees. Groupings should be limited to a single species. Consideration should be given to the location of the trees so they do not interfere or restrict the use of the open space.



Formal open space plantings.

Large deciduous trees planted in open areas should have a minimum caliper of 2½ inches and be selected for their uniform appearance. Flowering trees should have a minimum caliper of 1½ inches.

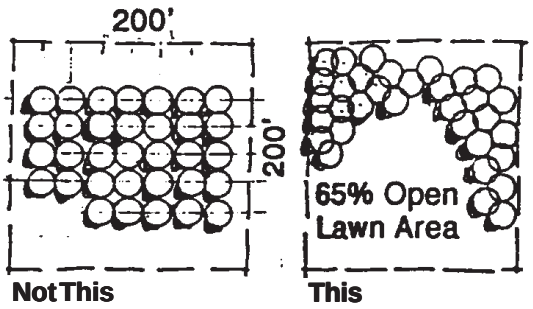
All trees should be selected from the Landscape Planting Palette, pages A4-20, A4-21, and A4-23, with regard to their site suitability requirements.

4.5.2. Informal Areas

For every one acre of open area, a minimum of 33 trees should be planted. This is equal to approximately 35 percent of the open area being under tree cover. Plantings should be limited to deciduous trees. Flowering trees may be used to provide seasonal interest and accent.

Earth berms may be used to help define and add interest to open areas. Berms should be integrated into the existing topography. The maximum height should not exceed 6 feet; side slope should not exceed 3:1.

Trees should be uniformly and asymmetrically spaced and arranged to contain and define lawn areas. On center spacing may vary from 8 to 35 feet. Any arrangement or groups should be a minimum of seven trees. No more than two species may be used in a grouping.



Informal open space plantings.

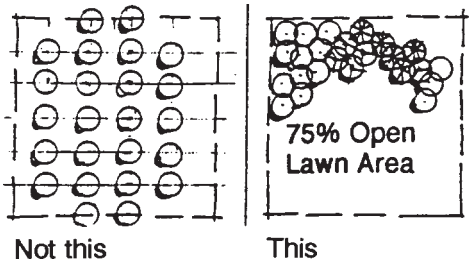
Large deciduous trees planted in open areas should have a minimum caliper of two inches. Flowering trees should have a minimum caliper of 1½ inches.

All trees should be selected from the Landscape Planting Palette, pages A4-20 through A4-23, with regard to their site suitability requirements.

4.5.3. Naturalized Areas

For every acre of open area, 24 trees should be planted. This is equal to approximately 25 percent of the area being under trees.

Plantings may be a mix of plantings with 60 percent being large deciduous, 25 percent flowering trees, and 15 percent evergreen trees. Their layout should be a mix to provide a naturalized appearance. Generally, flowering trees should be massed and located to provide accents while evergreens are planted for a back drop.



Naturalized area plantings.

Large deciduous trees should vary in size from 1½ to 3 inches in caliper, flowering trees should have a minimum caliper of 1½ inches, while evergreens should vary in height from 6 to 8 feet.

All trees should be selected from the Landscape Plant Palette, pages A4-20, A4-21 and A4-23 with regard to their site suitability.

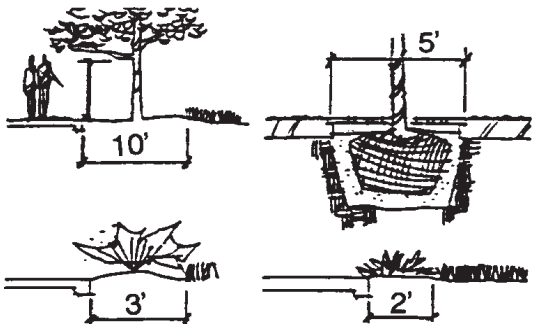
4.6. Pedestrian Areas

Pedestrian areas on the base fall into one of two categories: (a) pedestrian nodes and (b) pedestrian walkways. Pedestrian nodes are those areas which by nature of their location and proximity to major pedestrian circulation routes have an increased concentration of pedestrian activity. Such areas represent potential sites for the development of outdoor plazas and gathering spaces. The second category of pedestrian walkways includes sidewalks, low use building entrances, and nature/jogging trails.

Pedestrian area at Medal of Honor Park.

4.6.1. Pedestrian Nodes

Planting beds in formally designed pedestrian node areas should be linear arrangements of single species. A hierarchy of plant materials should be developed to frame and enhance the adjacent area. Shade trees shall be located in beds of not less than 10 feet in width. In pavement areas near direct pedestrian access, tree grates of a minimum five feet diameter are recommended. Shrub planting beds shall be a minimum of three inches in width and groundcover beds shall be a minimum of two inches in width.



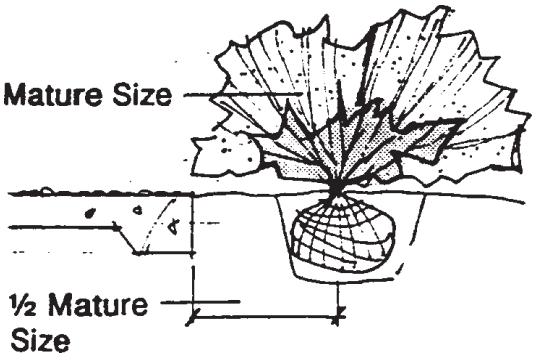
Minimum planting bed sizes.

Planting beds in informal pedestrian node areas should be in non-linear arrangements. A hierarchy of plant materials should be developed to frame and enhance the adjacent area. Shade trees shall be located in beds of not less than 10 feet in width. In large paved areas, trees may be located in tree pits of mulch or ground cover plantings with a minimum diameter of five feet. Shrub planting beds shall be a minimum of three inches in width and ground cover beds shall be a minimum of twoinches in width. Fixed objects such as signs, or lights should be placed a minimum of one foot from the edge of the sidewalk. Overhead vertical clearance should be a minimum of eight feet from the sidewalk surface.

Accent plantings should be encouraged to enhance plazas as visual focal points. In general, accent plantings should include mass plantings of a single species with outstanding plant characteristics such as flower, foliage, bark and/or branching patterns. Accent plantings can include trees, shrubs, groundcovers or annual plantings. Such plantings should provide year round interest by incorporating evergreen materials within accent planting beds. Plant materials which are selected for use in plazas should (a) include no more than two species from each section of the Landscape Plant Palette, pages A4-20 through A4-26; individual beds should (b) include no more than two plant species along formally landscaped buildings. Plants of the same species should be matched in size and habit and arranged in a linear fashion.

Correct placement of plant material is important in high use pedestrian areas. Care should be taken to choose plant materials whose mature size will not exceed the limits of the planting beds and thereby restrict pedestrian movement. Evergreen trees and low branched trees should be centered a minimum of one-half the distance of their mature spread size away from

entrances, walks and building walls. Trees should be specified with an eight foot clear trunk to avoid conflicts with pedestrians and low branching patterns.



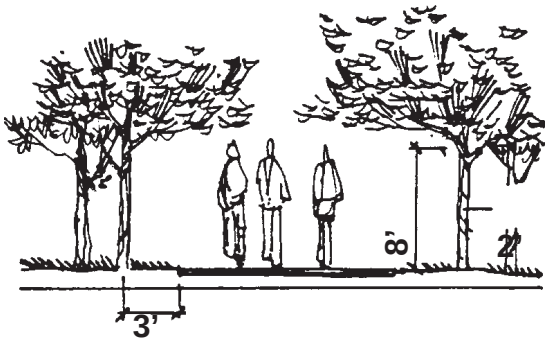
Planting requirements for mature landscape material.

All plant material should be selected from the Landscape Plant Palette, pages A4-20 through A4-26.

Trimming of shrubs to form clipped hedges and the use of annual plantings is appropriate in formal use areas, although not required depending on the plant material selections. The use of plants with thorns and/or messy fruits should be avoided near building entrances. Planter boxes and raised planter beds should also be avoided. Shredded bark or rock mulch is recommended as an appropriate mulch material for planting beds located within pedestrian nodes.

4.6.2. Walkways

Formal pedestrian walkways shall be lined with a single or double row of street trees on both sides of the walk. Trees shall be setback a minimum of three feet from the edge of walk. Shrubs may be used when necessary in a linear arrangement and centered at a distance of two feet from the edge of walkways. In no case shall shrub planting beds be less than three feet in width.



Space requirements for planting near walkways.

Plant materials along informal walkways should be limited to a linear arrangement of overstory trees in irregular groupings on both sides of walkways where possible. Major pedestrian routes should receive a greater concentration of such trees than secondary walkways. Trees shall be setback a minimum of three feet from the edge of walk.

Plant materials which are selected for use along formal walkways shall be limited to (a) a single species overstory tree, and when appropriate (b) a single species shrub suitable for hedges. Plants of the same species should be matched in size and habit.

Care should be taken to select plant materials whose mature size will not exceed the limits of the planting bed and thereby restrict pedestrian movement. Trees should be specified with an eight foot clear trunk to avoid conflicts with pedestrians. All plant material used should be selected from the Landscape Plant Palette, pages A4-20 through A4-26.

4.7. Xeriscaping

4.7.1. Water Budgeting Concepts

Xeriscape design is based on the concept of budgeting water use. In order to budget water use for any landscape design, plants with similar water-use requirements should be concentrated together in similar areas called hydrozones. Hydrozoning a landscape project also includes considering site use patterns, plant material spacing, supplemental water requirements, and existing microclimates. Typically three hydrozones are designated when developing a xeriscape scheme; an inner zone, an intermediate zone, and an outer zone.

The inner zone of a xeriscaping planting scheme is the area which will have the highest visibility and be important to the facility in terms of image, appearance, and usage. This zone will typically have a higher demand for water than other zones, yet it should require less water than a traditional landscape. Supplemental irrigation will most likely be required. Examples of an inner zone planting would include, entry plantings at a Base Exchange, or plantings associated with a memorial area within a park. Typically this zone is kept small in size. Plants with high water requirements can be used in this zone if they are located where irrigation or other rainwater runoff can be utilized.

The outer zone is characterized by plants having the least water requirements and the lowest intensity of human use. Once plants within this zone are established, this outer zone requires very little to no irrigation for maintenance, except for pruning and weed control. It is especially important to select plant materials which are very hardy, and have extremely low water requirements.

The intermediate zone functions as the transitional area between the inner and outer cones. Plants in this zone may require more water than available from natural precipitation. In drier climates like that of Malmstrom AFB, they will most likely require some supplemental irrigation. Plant spacing within this zone will be greater, while maintenance will be minimal. Taking advantage of runoff from paved areas or roof drains can further help reduce the need for supplemental irrigation.

4.7.2. Design Fundamentals

Several basic fundamentals should be considered when incorporating xeriscaping into any existing landscape. By applying the following fundamentals, Malmstrom AFB can realize valuable water savings while improving the visual qualities of the landscape.

Developing A Plan Developing a xeriscape sensitive plan before starting any landscape project is the single most important step in the design process. For Malmstrom AFB this might include an overall base plan for incorporating xeriscape and water budgeting principles.

Minimize Turf Area Since turf requires the most water and highest maintenance of all plant types, the designer should consider the amount, location, and variety of turf grass for each project. Additional issues to consider might include:

- Select and maintain turf areas where they will have the most impact functionally and visually.

- Select turf varieties that will thrive in the Malmstrom AFB climate while requiring minimal additional irrigation.

- Consider using alternative plant material which is less water demanding, or inert mulch materials.

- All foundation planting beds should be irrigated with a drip type system.

Improve the Soil Soils vary from site to site even within Malmstrom AFB. Improving the soil in xeriscape plantings helps plants grow better and use water more effectively and efficiently. Since rainfall will be more readily absorbed by the soil surrounding the plants, runoff, erosion, and the frequency of supplemental irrigation will be reduced.

Irrigate Efficiently Slow and even irrigation allows for proper soil moisture to be maintained in the root zone, providing for the best growing conditions for plant material while eliminating or minimizing runoff and potential erosion. Irrigate each plant variety long enough for water to reach the root zone. Deep infrequent watering promotes deeper roots further reducing irrigation requirements by naturally providing more soil between the hot dry sun and tender roots. Avoid watering more than every other day, and during high winds.

Select Water-Efficient Plant A key aspect of any well designed landscape solution is to use the correct plant in the proper location for the right reason. This is especially true when xeriscaping. Malmstrom AFB should utilize native plants which have demonstrated their long term landscape value through their hardiness, availability, and minimal maintenance and water requirements.

Water efficient plants utilized in an area with lower water requirements.

Use Mulches Organic or inert mulches applied to proper depth (typically four to six inches) will reduce water needs and weed growth while providing visual interest, and controlling surface erosion. Organic mulches provide the added benefit of improving the soil through slow decomposition. Mulch should be placed directly on the soil surrounding plant materials. Avoid plastic sheeting and certain plastic-based fibrous matting.

Practice Proper Maintenance Practice maintenance procedures which directly save water. These are:

- Raise the height of turf grass mowers.

- Inspect irrigation sprinklers for leaks or breaks on a regular basis.

- Prune and thin heavily-foliated trees and shrubs to reduce evapotranspiration through the leaves.

- Replenish mulch around plants.

4.8. Irrigation

Although many of the landscape schemes at Malmstrom AFB focus around minimizing the use of water through xeriscaping, several areas of the installation will still require an irrigation system. The design of these systems will vary based on the unique functional requirements for the areas which these irrigation systems will serve. The following standards will help insure that irrigation systems installed at Malmstrom AFB function efficiently while requiring a minimum amount of maintenance.

Typical irrigation area at Malmstrom AFB.

4.8.1. System Requirements

4.8.1.a. Back Flow Preventors

Backflow prevention devices prevent irrigation system water or other contaminates from flowing back into the potable water supply. A back flow preventor shall be used for all irrigation systems at Malmstrom AFB. If possible, install backflow preventors in heated mechanical rooms. When an outdoor installation is necessary, install preventor within an insulated removable enclosure. All backflow preventor installations must meet or exceed current City of Great Falls backflow preventor requirements.

4.8.1.b. Piping

All irrigation piping for Malmstrom AFB shall be Schedule 40 PVC Class 200. All joints shall be solvent welded. Polyethylene pipe for drip or low flow systems shall be 100 psi, and ultraviolet light stable. Crimp clamps shall be used when necessary.

4.8.1.c. Control and Drain Valves

Control valves are devices connected to a pipe which regulate water flow automatically upon command from the controller. Valves may be constructed of brass, bronze, or plastic. Drain valves shall be installed on all low points of main lines in order to drain sections for maintenance and winterization. All drain valves shall be brass valve assemblies.

4.8.1.d. Valve Boxes

All valves shall be located within valve boxes. Valve boxes shall be a minimum of 10 inches in diameter if round. These boxes shall be installed such that the top of the box is flush with the finished grade.

4.8.1.e. Controllers and Wiring

All irrigation controllers used at Malmstrom AFB shall be electric, either electromechanical or solid state. At present, no central controller is used to control other irrigation controllers on the installation. However all new controllers should have the ability to be computer controller. Mount all controllers at five feet above ground level. Each controller shall have its own electric breaker switch.

All control wiring shall be 14 gauge solid copper, installed by direct burial. Common wire shall be white in color, and individual control wires shall be the same color. Wiring shall be installed below and to the side of main lines. Prefilled watertight connectors shall be used. Wire nuts are not acceptable. Note all wiring on as-built drawings.

4.8.1.f. Sprinkler Head and Riser Assemblies

Quick couplers valves are used to connect above ground rotary sprinklers and/or hoses to the irrigation system. At Malmstrom AFB, these types of valves can be used as a temporary means of watering areas which require infrequent watering. These types of valves directly support xeriscape principles, and should be utilized where appropriate.

4.8.1.g. Sleeves

Class 200 PVC sleeves shall be installed under, and 12 inches beyond, all hard pavement surfaces such as sidewalks, driveways, and parking lots. All sleeves shall be straight without bends, and wrapped in magnetic tape. Cap all end of unused sleeves for future use. All sleeves shall be 6 inches inside diameter, and installed 10 to 20 inches deep for main lines, and 8 to 10 inches deep for lateral lines.

4.8.1.h. Trenching, Backfill, and Compaction

Irrigation system trenches shall be straight and smooth, and of the depth necessary for the type of pipe being installed.

Main Line Depth: 18-20 inches
Lateral Line Depth: 8 to 10 inches

All trenching backfill shall be clean soil free of clods, rocks, and deleterious material that could damage pipelines or prevent proper compaction. Compaction shall be accomplished in six-inch lifts with only a vibratory plate compactor. Puddling, flooding, or any other means of achieving compaction is not acceptable.

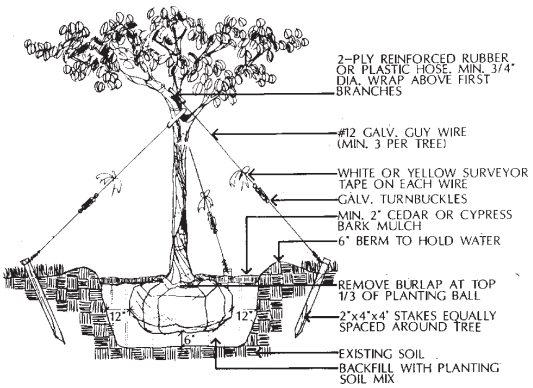
4.8.1.i. As-Built Drawings

As-built drawings are required for all irrigations systems installed at Malmstrom AFB and must be full size (22” x 34” or larger). These should include the location of all installed components, wiring, and sleeves which have changed during the construction process.

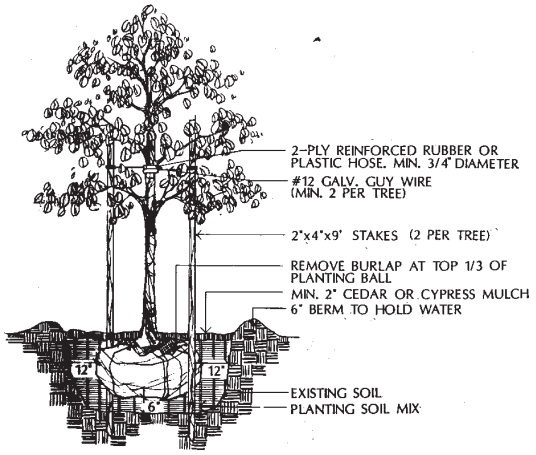
4.9. Landscape Details

Shown on the following pages are planting details which should be utilized when packaging a landscape project for installation at Malmstrom AFB. A short discussion of appropriate mulch materials for Malmstrom AFB is also included in this section.

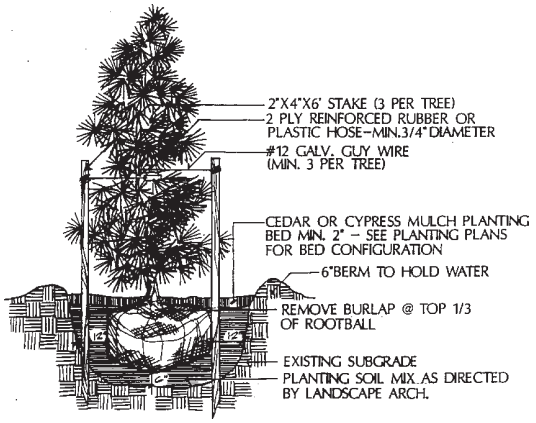
4.9.1. Large Tree Planting Detail



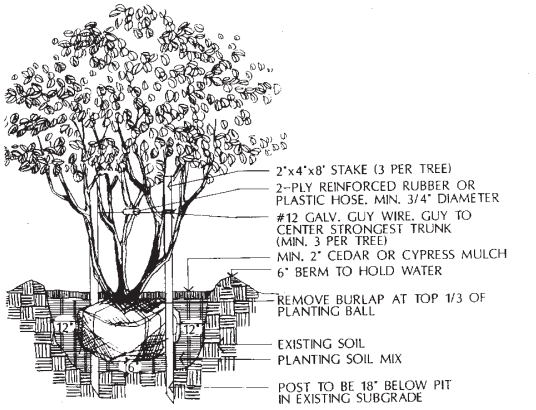
4.9.2. Small Planting Detail



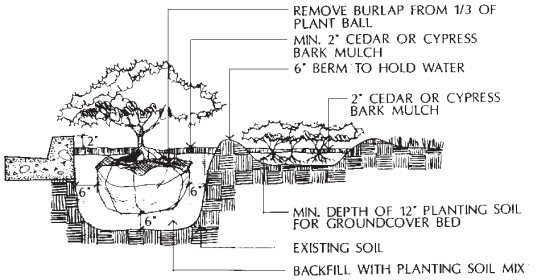
4.9.3. Coniferous Tree Planting Detail



4.9.4. Multi-Trunk Tree Planting Detail



4.9.5. Shrub / Groundcover Planting Detail

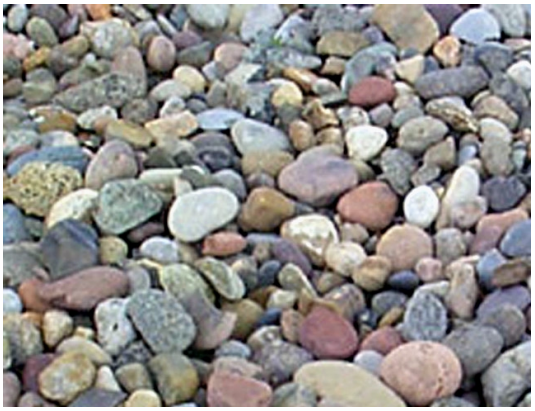


4.9.6 Mulches

Various organic, and inorganic mulches are currently used at Malmstrom AFB. This creates a visual impression of unorganization, and haphazard maintenance. One type of organic and inorganic mulch type should be used consistently throughout the installation:

Organic Mulch Shredded bark mulch similar to the type used by the City of Great

Falls, Montana, shall be used for all landscape beds requiring an organic mulch type. This mulch shall be placed at a depth of 4 inches.



Inorganic mulch: Montana gray/white river rock.

Inorganic Mulch Montana gray/white river rock shall be used for all landscape beds requiring an inorganic mulch type. This type of mulch blends well with the surroundings, and is locally available. This mulch should be placed at a depth of four to six inches.

4.10. Plant Palette

The proper selection of trees, shrubs and groundcover is critical to good landscape design, development and maintenance. This section discusses the criteria for selection of plant material and presents a plant material palette for trees, shrubs, ornamental grasses, ground cover plantings, and wildflowers.

The ability of plant material to perform a desired landscape function is dependent upon the plant's hardiness in relation to local climatic and specific site conditions. Major factors affecting plant survival are soils, temperature, moisture and light. These climatic conditions can be modified by specific site conditions, such as wind protection, solar orientation and planting design, to create micro-climates. The type of soil and its organic content are other site specific conditions having major effects on plant survival.

Trees, shrubs, ground cover and turf are the major elements of a planting composition. Design objectives for plantings include creating a unified composition by limiting the varieties of plants to reduce clutter, incompatible colors, textures and forms. Consistent use of similar plant material, with occasional contrast for accents, contribute to this objective.

The plant material palettes are designed to help the designer choose the best plant for each particular set of design requirements. To use them effectively, the design requirements must be well defined for the specific landscape development site.

The plants which appear on the following lists were selected for their ability to survive the climatic conditions found at Malmstrom Air Force Base. They are all hardy which means that they are capable of withstanding the adverse conditions of local climate, such as cold winters, and hot, dry summers. Because the alkalinity of the soil at Malmstrom AFB slows the growth of many types of plants, trees and other landscape materials take longer to have a visual impact. New landscape material, including trees, will need additional care in order to become established and thrive.

On each list, the plants appear in alphabetical order by their botanical name, followed by their common name, design characteristics, cultural information, recommended use and miscellaneous notes.

Section 5:

Hardscape Standards

5.1. Roadways

The vehicular roadway system provides the primary means of circulation within Malmstrom AFB, and establishes the primary vantage point in which people observe the installation. The consistent treatment to a street is important in providing a means of orientation and making a positive first impression to visitors.

5.1.1. Roadway Hierarchy

The Roadway Hierarchy Map Figure A.7 identifies three types of streets or roadways: (1) primary, (2) secondary, and (3) tertiary. When treated with varied intensities of landscape development, lighting, building and parking lot setback, pedestrian walkways, and other elements, a street hierarchy is easily identifiable.

Refer to Section 4.1 for landscape treatment, acceptable plant materials, and spacing for all roadways at Malmstrom AFB

5.1.2. Primary Roads

Primary streets are identified on Figure A.7, Roadway Hierarchy Map, and include Goddard Drive, 72nd Street North, and 107th Avenue North.

5.1.2.a. Design Criteria

Refer to the AFH 32-1084, AFM 88-7, Chapter 5, and AFSPCH32-1004 for road width, curbing, and paving requirements for Primary Roads at Malmstrom AFB.

5.1.2.b. Landscape Planting

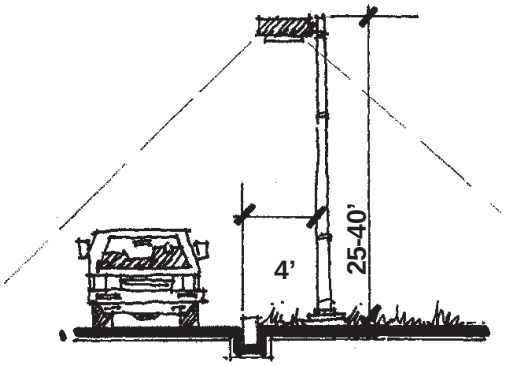
Refer to Section 4.1.1 for landscape treatment, acceptable plant materials, and spacing.

5.1.2.c. Pedestrian Walks

Pedestrian walks should be concrete and a minimum of five feet wide, separated from the road by a nine-foot grass planting strip. Pedestrian ramps and crosswalks should be provided at all driveway and street intersections. Where walks are intended to be used jointly by pedestrians and bicyclists, the walks should be increased in width by two additional feet.

5.1.2.d. Lighting

Lighting should be provided to illuminate all primary streets for safety and nighttime orientation. Poles should be uniformly located and setback from the curb edge a minimum of four feet. Aluminum poles and fixtures should be of a uniform type and height with a dark brown finish. A shoe box type fixture mounted on a 25- to 40-foot pole is recommended. All light sources should be standardized to high pressure sodium.



Typical light fixture for primary roadways.

5.1.2.e. Signing

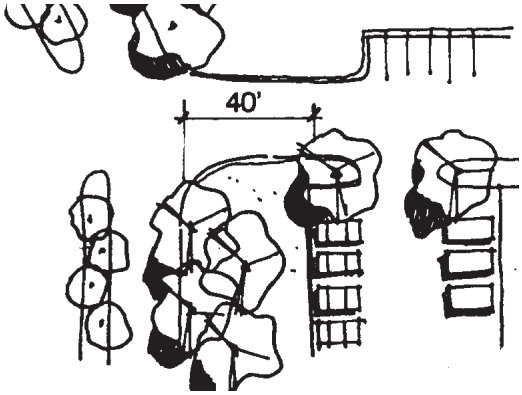
Signing along primary streets should be limited to base identification signs at entrances, directional signs that identify major destination points, and regulation signs that prescribe rules of travel. All signs should be located back from the curb edge so that they do not impede pedestrian travel or block site lines.

5.1.2.f. Utilities

All above-ground utilities including steam, electric lines, and drainage ditches should be relocated away from primary streets or placed underground. When this is not possible, all attempts should be made to screen the utility from view with landscape planting or screen walls that conform to approved buffer treatment standards.

5.1.2.g. Setbacks

All building and parking lots should maintain a minimum setback of 40 feet to accommodate landscape plantings and pedestrian walks. Where possible, existing parking lots should be redesigned or relocated to meet this standard.



Parking lots should maintain a minimum setback of 40 feet.

5.1.3. Secondary Streets

Secondary streets are identified on Figure A.7, Roadway Hierarchy Map, and include Flightline Drive, 23rd Street North, 76th Street North, 77th Street North, 78th Street North, and Perimeter Road .

5.1.3.a. Design Criteria

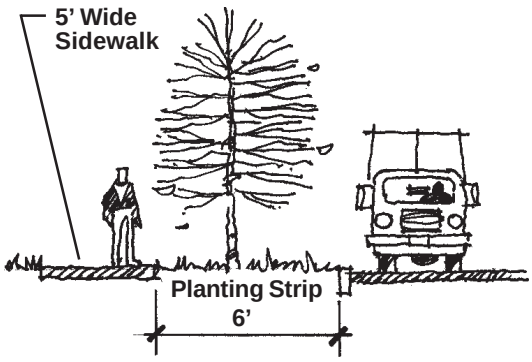
Refer to the AFH 32-1084, AFM 88-7, Chapter 5, and AFSPCH32-1004 for road width, curbing, and paving requirements for Secondary Roads at Malmstrom AFB.

5.1.3.b. Landscape Planting

Refer to Section 4.1.2 for landscape treatment, acceptable plant material, and spacing.

5.1.3.c. Pedestrian Walks

Pedestrian walks along secondary streets should be concrete paving with a minimum width of five feet and separated from the road edge by a six foot wide grass planting strip. Pedestrian ramps and crosswalks should be provided at all street intersections.



Typical pedestrian walk along secondary streets.

5.1.3.d. Lighting

Lighting should be provided to illuminate all designated secondary streets to provide safety and nighttime orientation. Light poles should be uniformly spaced on one side of the street and setback a minimum distance of four feet from the curb edge. Aluminum poles and fixtures should be of uniform type and height with a dark brown finish.

All light sources should be standardized to high pressure sodium. A shoe box type fixture on a 30 foot high square pole is recommended.

5.1.3.e. Signing

Signing along secondary streets should be minimized to avoid visual clutter. Applicable types of signs include directional, building identification and regulatory signs. All signs should be located so they do not impede pedestrian movement or block motorist site lines.

5.1.3.f. Utilities

All above-ground utilities including steam, electric lines, and drainage ditches should be relocated away from secondary streets or placed underground. When this is not possible, all attempts should be made to screen the utility from view with landscape planting or screen walls that conform to approved buffer treatment standards.

5.1.3.g. Setback

All building and parking lots should maintain a minimum setback of 30 feet to accommodate landscape plantings, berming, and pedestrian walks. When possible, existing parking lots should be redesigned or relocated to meet this standard.

5.1.4. Tertiary Streets

Tertiary streets can be considered as those streets not previously identified including those in the residential areas.

5.1.4.a. Design Criteria

Refer to the AFH 32-1084, AFM 88-7, Chapter 5, and AFSPCH32-1004 for road width, curbing, and paving requirements for Tertiary Roads at Malmstrom AFB.

5.1.4.b. Landscape Planting

Refer to Section 4.1.3 for landscape treatment and spacing.

5.1.4.c. Pedestrian Walks

Pedestrian walks along tertiary streets should be concrete paving in formal and informal land scape areas. Asphalt paving may be used in natural areas. Walks should be a minimum of five feet wide with a minimum four foot wide grass planting strip separating it from the road edge. Where the walk is intended to be used by bicyclists, the path should be widened an additional two feet. Pedestrian ramps should be provided at all street intersections.

5.1.4.d. Lighting

Lighting should be used along tertiary roads where there is a need for security or where pedestrian movement occurs at night. Aluminum poles and fixtures should be of a uniform type with a dark brown finish. A shoe box type fixture on a 25 foot square pole is recommended. All light sources should be high pressure sodium.

5.1.4.e. Signing

Signing along tertiary streets should be minimized to avoid visual clutter. Applicable types of signs include directional, building identification and regulatory signs. All signs should be located so they do not impede pedestrian movement or block motorist site lines.

Typical street signs for all types of roadways at Malmstrom AFB.

5.1.4.f. Utilities

All utilities should be screened from view with landscape plantings that conform to approved buffer treatment standards, or screen walls.

5.1.4.g. Setback

All buildings and parking lots should maintain a minimum setback of 25 feet to accommodate landscape plantings. Where possible existing parking lots should be redesigned to meet this standard.

5.2 Parking Lots

Sensitive design to parking lots is an integral part of the site design process. Parking lots that are properly designed and located with a good relationship to building entrances are easy to use and limit pedestrian vehicular conflicts. The landscape design standards identified in Section 4.2 address varied planting requirements for parking lots at Malmstrom AFB. The hardscape standards address issues regarding layout, lighting, islands, etc. that are common to all areas of the base. All lots should provide sufficient, well-designed off-street parking to meet their particular need as well as Force Protection needs.

5.2.1. Design Criteria

5.2.1. Parking Requirements

Refer to AFH 32-1084 for criteria to determine the number of parking spaces for nonorganizational vehicles.

Allocate 400 square feet per car (including access drives and planting islands) for preliminary planning process.

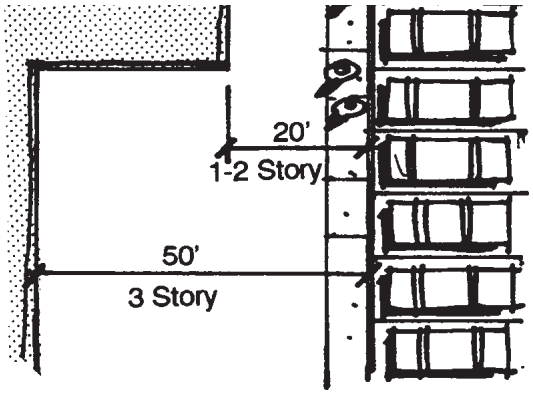
Small parking lots are preferable to large lots because they enhance the visual environment by increasing the amount of landscape plantings.

5.2.2. Location/Layout

Locate and layout lots for convenience and safety. Proper location and circulation can reduce the visual impact as well as improve the internal function of the lot.

Minimize conflicts with street intersections. Entrances and exits should be minimized, yet handle peak use periods. Locate entrances/exits a minimum of 60 feet from street intersections. Provide adequate setback for landscape plantings.

Avoid placing parking stalls immediately adjacent to a building. Provide a minimum of 20 feet for plantings, loading, and pedestrian circulation along one- and two-story buildings and 50 feet from three-story buildings.



Minimum parking lot setbacks from buildings.

Walks immediately adjacent to parking areas should be a minimum of six feet wide.

Parking space dimensions shall be 9 feet by 16 feet, 6 inches where vehicle overhang is permitted, and 9 feet by 18 feet, 6 inches without an overhang. Aisles shall be no less than 26 feet wide.

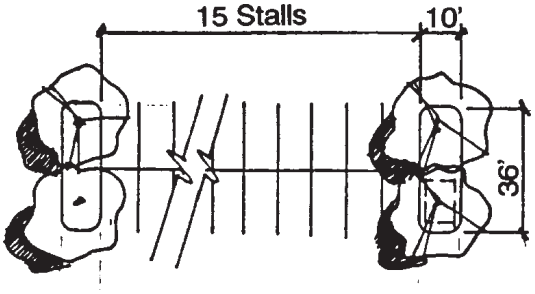
Parking lots should be laid out with 90 degree stalls and two-way circulation for ease of circulation and economy of space where users are anticipated to stay all day. Angled parking (45 or 60 degrees) may be used where high turnover (one hour or less) and site limitations restrict the use of 90 degree parking stalls.

Parking aisles should be oriented perpendicular to building entrances. Where this is not possible or feasible, internal walkways delineated by islands should be used. Dead-end parking lots shall be avoided for parking lots exceeding 20 spaces. Two access drives shall be provided for lots exceeding 20 spaces.

5.2.3. Landscape Islands

Islands provide the means of defining vehicular movement and when planted greatly reduce the visual impacts for parking lots.

Islands should be provided at the end of all rows. Islands should be a minimum of 10 feet wide by 36 feet long measured from inside curb edge. A continuous poured-in-place concrete curb should be provided to define the island and prevent vehicle intrusion.



Typical parking island configuration.

Where parking aisles exceed 15 stalls, intermediate islands, a minimum of 10 feet wide, should be used to help define circulation and reduce the appearance of the parking lot. Islands in formal areas should be regularly located while islands in informal and naturalized areas may be staggered and irregular.

To reduce the appearance of large parking areas, medians should be used after every four parking aisles. All medians should have a minimum width of 12 feet.
All parking islands and medians should provide a minimum six feet by six feet unpaved planting area for each tree that is required to be planted, per the landscape design standards, Section 4.2.

5.2.4. Signing

Signing of parking lots should be minimized. When stalls are reserved to assure available parking in an immediate area, curb markings are recommended. Curb markings should be signs affixed to the curbs, not painted on the curbs.

5.2.4 Lighting

A shoe box type fixture on a 25 foot square pole should be used to illuminate parking lots in formal and informal areas. Naturalized areas should be illuminated if used at night.

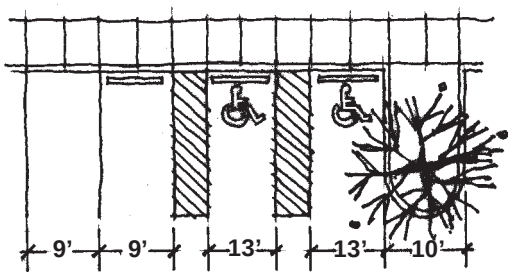
All fixtures and poles should have a dark bronze finish. Poles should be located in islands or at the edge of the parking area. When located in paved areas, poles should be placed on top of round 24 inches high concrete piers to eliminate damage by automobiles.

Building-mounted lights may be used in industrial areas of the base. Fixtures should be shoe box type to relate to pole-mounted design.

5.2.4. ADA Requirements

All parking lots shall provide adequate handicapped parking stalls and ramps as specified in the current ADA Accessibility Guidelines for Buildings and Facilities. Disabled spaces shall be a minimum of 13 feet by 18 feet, six inches, and shall include

a ramp access to the adjacent pedestrian circulation system. All stalls and ramps shall be clearly identified for handicapped use. All major pedestrian crossings in parking areas should be barrier-free and should provide drop curbs sloping the entire walkway width to road level.



Typical disabled parking space and aisle configuration.

5.2.5. Building Service Areas

Service and dumpster locations should be integrated with the parking lot design. They should be located to have a minimal visual impact on surrounding uses while providing convenient access. In order to accomplish this, locate service areas at the end of parking areas, away from major circulation routes. Walls and landscape planting should be added as necessary to reduce the visual impact of these areas.

5.3. Sidewalks/Pathways/ Plazas

Pedestrian-oriented site planning and design contribute to the comfort and enjoyment of outdoor activities. Walkways and plazas should be safe to use, properly constructed of durable material, and free from obstructions and hazards.

5.3.1. Design Criteria/ Configuration

Formal pedestrian walkways should be laid out along axis lines relating to adjacent building entry plazas or streets. Informal walkways should be laid out to relate to building entrances, plaza areas, or streets but may be less direct and more curvilinear than formal walkways. Walkways should be sized to accommodate anticipated pedestrian use. The minimum width of a walk should be 6 feet, with a maximum width of 10 to12 feet in high use areas.

Sidewalks at building entrances should be widened to 6 to12 feet to create a visual statement and sense of place, while providing space for informal meeting and conversation areas.

All major pedestrian pathways should be designed to accommodate wheel chairs, especially at building entrances and access to parking lots. Gradients must not exceed seven percent.

Seating areas should be placed at regular intervals along formal walks. Seating areas should be located parallel to the walk and facing the flow of pedestrian traffic. Benches should be located at least 12 inches back from the edge of the walk so they do not impede pedestrian movement.

Walks with slopes ranging from two to four percent shall typically be used whenever possible. All walks shall have a sideslope of two percent.

5.3.2. Materials

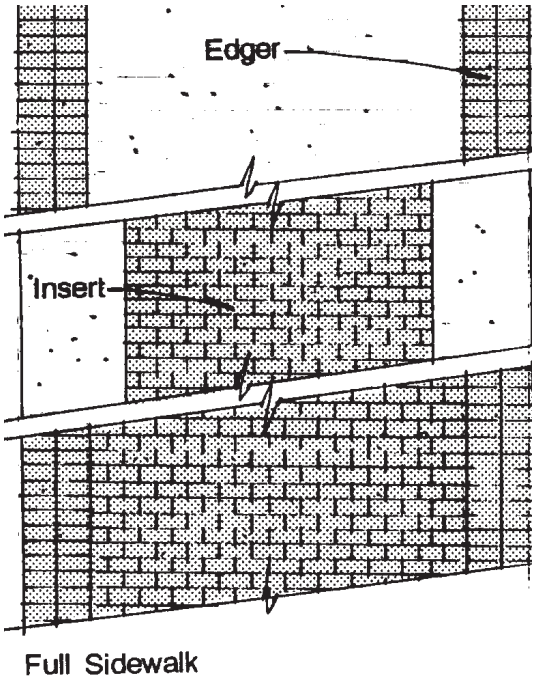
Sidewalks should be troweled or broom finished concrete with appropriate expansion and construction joints. In high visibil-

ity areas, a medium brown color brick with grouted joints may be used as edgers or inset panels. See Architectural Materials and Color Palette, page A2-43 for brick color and specification. Brick walks should have sand swept, dry laid joints. Paving patterns should be limited with the following being recommended:

Edgers:double header course on each side of sidewalk.

Inset: running bond perpendicular to traffic flow.

Full Walk: running bond perpendicular to traffic flow with double header on each side of sidewalk.



Alternative sidewalk paving patterns.

The type and scale of paving should reflect the use and scale of a given outdoor pedestrian space. Smaller scale paving patterns should be used in more personal, informal areas, while larger public gathering spaces should use a larger scale pattern. A distinct change in paving material should be used to accentuate the separation of pedestrian and vehicular areas.

In situations where buildings are directly associated with courtyards or entry plazas, techniques should be used to link the two together. The extension of the same paving material and/or detailing from the inside of the building out will help unify spaces and extend outdoor space into the building.

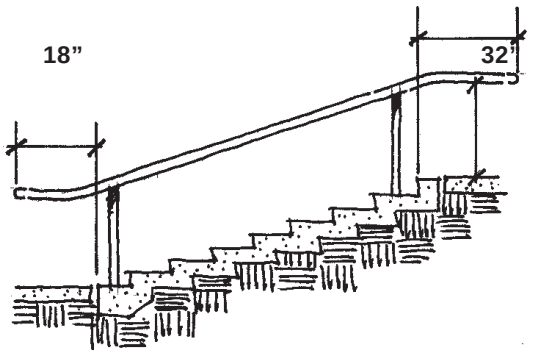
5.3.3. Ramps

Ramps shall be incorporated into pedestrian walkways to accommodate changes in elevation and provide barrier free access for the disabled to all buildings and parking lots. The slope of any ramp shall not exceed seven percent. Ramps shall have landings at the top and bottom, and shall have at least one intermediate landing for each five feet of vertical rise. Top landings and intermediate landings shall have a dimension measured in the direction of the ramp run of not less than five feet. Landings at the bottom of ramps shall have a minimum dimension in the direction of ramp run of six feet. All ramps shall be provided with handrails on each side of the ramp, running the entire length of the ramp, if steeper than 1:15 slope.

5.3.4. Steps

Steps should be avoided as a design solution within the pedestrian circulation system at all buildings. When steps must be used, the minimum clear width of all steps shall be four feet. For all exterior steps, two risers plus one tread shall equal 26 to 27 inches. The minimum tread depth shall be 11 inches.

Handrails shall be provided at all exterior steps containing three steps with three or more risers. All handrails shall be approximately 32 inches high and extend 18 inches beyond the top and bottom tread. In addition, all handrails shall be round (three inches diameter) and coordinated with other site furnishings with regard to color, material, and finish.



Typical exterior handrail.

5.3.5. Intersections

Pedestrian safe crosswalks shall be provided at all roadway intersections. At all intersections, clear sight lines shall be created and maintained which permit pedestrians and motorists unobstructed views of each other. Suitable signage warning of pedestrian crossings shall be placed at all appropriate intersections. Limit the number of pedestrian/roadway crossings to a minimum, and use mid-block crossing (between street intersections) for only rare instances.

5.4. Fencing/Screening

Walls and fences should be consolidated into a few standard types which provide a coordinated system throughout Malmstrom AFB. A coordinated system will establish standards for creating a consistent appearance installation wide. Wall and fencing types should include: perimeter, security, chain link, screening fences, and screen walls. This section also includes standards for screening berms, which may be used as alternatives to , or in conjunction with screening fences, and /or planting.

5.4.1. Fence Plan

Fences are necessary to protect property, define boundaries, and screen unsightly areas of Malmstrom AFB. The installation should have a Fence Plan that minimizes fence requirements, identifies fencing priorities, and recommends appropriate solutions for utilizing fencing where appropriate. The overall goal of the Fencing Plan should be to minimize the amount of fencing, and the associated costs of maintaining it. The Fencing Plan should also address priorities, phasing, and tentative schedules for funding and implementation.

5.4.2. Fence Types

5.4.2.a. Perimeter Fences

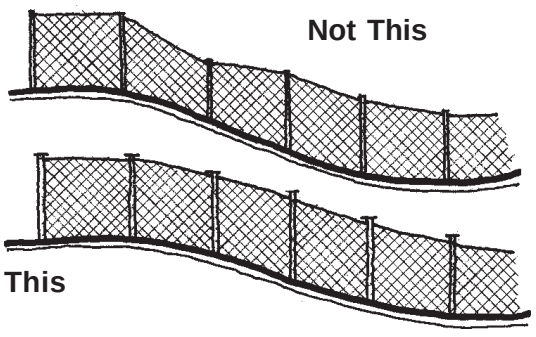
The primary purpose of a perimeter fence is to establish the installation's legal boundary, and provide a physical barrier to unauthorized entry onto the installation. Perimeter fences also serve as a deterrent to encroachment or civilian intrusion. At Malmstrom AFB, perimeter fencing shall consist of chain link fencing, constructed of galvanized steel #9 gauge wire with a two inch mesh pattern. Fence posts should be a maximum of 10 feet on center, and approximately 7 feet in height. Top and bottom rails should be used where necessary to prevent sagging and other maintenance problems. Where perimeter fencing is adjacent to installation entry gates, the chain

link fence shall be vinyl coated non-luster flat brown. The vinyl shall be fused to galvanized steel #9 gauge wire with a two inch mesh pattern.

5.4.2.b. Security Fences

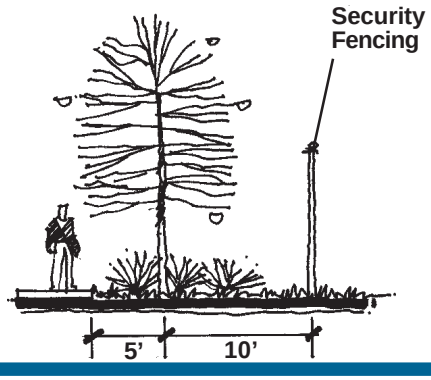
Security fences located within the interior of Malmstrom AFB should be minimized and present an appropriate degree of security depending on the resources being protected. These fences should consist of non-luster flat black vinyl coated chain link fence. The vinyl shall be fused to galvanized steel #9 gauge wire with a two inch mesh pattern. Fence posts should be a minimum of 10 feet on center, and approximately 7 feet in height. Top and bottom rails should be used where necessary to prevent sagging and other maintenance problems. In high visibility areas a solid screen wall or fence should be considered as appropriate concealment. See Sections 5.4.2.d and 5.4.2.e for more information regarding solid screen fences and screen walls.

Security fencing must be aligned smoothly and evenly, both vertically and horizontally. Avoid vertical misalignment by setting posts at a consistent slope on undulating terrain. Fencing should be parallel with straight adjacent elements such as building walls, and sidewalk edges.



Align security fencing vertically and horizontally.

Security fencing should be set back from sidewalks a minimum of 15 feet whenever possible to provide a sufficient landscape buffer areas. Trees should be planted a minimum of 10 feet from the fence, and only low growing shrubs should be used between fencing and surrounding walkway.



Security fencing setback.

5.4.2.c. Chain Link Fences

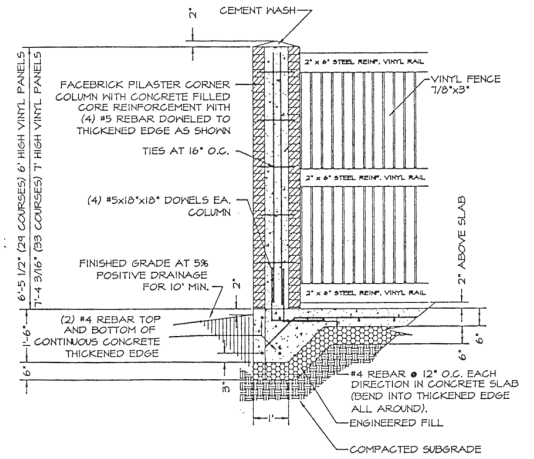
Chain link fencing should be used only for perimeter fencing, and security fencing for controller areas such as flightlines, launch complexes, missile alert facilities, and some critical industrial areas. Some sports fields and courts such as tennis courts, softball fields, and multi-purpose courts also require chain link fences. Chain link fencing should not be used for Military Family Housing, unless housing units are adjacent to perimeter fencing or areas requiring security fencing. Fencing within Family Housing areas should be consistent with the design character and materials used for each individual neighborhood.

5.4.2.d. Screen Fences

Screen fences should be used to screen utility lines and/or equipment, service areas and storage areas which are located within areas of high public use and visibility. Where space allows, screen fences should

be combined with planting and berming to enhance unsightly areas.

Screen fences should range between approximately six to eight feet tall, and be constructed of vinyl picket fence. The vinyl fence shall include five-inch square posts, two-inch by six-inch rails, with reinforcement and seven-eights inch by three-inch slats. Screen fences can also include columns in lieu of posts, constructed of either split faced concrete block or plain concrete block faced with a brick veneer. See the Architectural Materials and Color Palette found in Section 2 Visual District Standards for appropriate materials for each visual district.



Utility line screen fencing detail.

When enclosing dumpster areas and utility equipment, screen fences as described above may be used. A matching vinyl gate should be used to complete the enclosure.

5.4.2.e. Screen Walls

Screen walls should be used to enclose service areas, separate areas of incompatible uses, and screen other visually undesirable areas such as maintenance yards and, utility equipment, and trash dumpsters, within formal areas. Where space allows, screen walls should be combined with planting and berming to enhance unsightly areas. When screen walls are an extension of a building, they should be constructed of materials similar to the adjoining building.

Free standing screen walls should be approximately 7 feet tall, and a maximum of 12 inches thick. Walls shall be constructed of either split-faced concrete block or plain concrete block faced with a brick veneer. See the Architectural Materials and Color Palette found in Section 2 Visual District Standards for appropriate materials for each visual district.

When enclosing dumpster areas and utility equipment within a formal area, a free standing screen wall, ranging between 6 and 8 feet tall, and 12 inch thick may be used in lieu of an enclosure constructed of screen fencing. Walls shall be constructed of either split faced concrete block or plain concrete block faced with a brick veneer. A pvc fence gate should be used to complete the enclosure.

Utility equipment enclosure.

5.4.2.f. Screening Berms

Where parking lots are adjacent to roadways, earth berms should be used to screen

parked vehicles. Berms should not exceed four (4) feet in height and have a maximum side slope of three (3) to one(1). Berms should be graded to provide a uniform appearance. Slopes should be planted with shrubs, ground cover and turf. Where trees or large shrubs are to be planted on the berm, the top of the berm should be at least 20 feet wide to provide adequate area for root growth. On long berms, the top should gently undulate to avoid visual monotony.

Parking lot screening berm at Clinic.

5.5. Exterior Signing

An effective exterior signing system provides a hierarchy of sign types that effectively direct personnel and visitors from entry gate to final destination. Signing should be standardized and applied in a coordinated manner throughout the entire base. This portion of the Facilities Excellence Plan is intended to serve as an overview to explain exterior signing topics and concepts. Refer to Air Force Pamphlet 32-1097 Sign Standards Pamphlet for additional detailed information for all signs at Malmstrom AFB.

5.5.1. Master Sign Plan

The development of a Master Sign Plan is necessary in order to establish an effective sign system at Malmstrom AFB. This plan typically shows the location and content of every proposed exterior sign on the installation. The components of a sign plan usually include a Site Plan, a Sign Schedule, and a Sign Inventory. The Master Sign Plan should be kept up to date, and a periodic inventory and updating should occur as new signs are installed.

5.5.2. Sign Types

Air Force Pamphlet 32-1097 Sign Standards Pamphlet identifies nine types of exterior identification signs which can be used at Malmstrom AFB. These include: Base Identification Signs, Military Identification Signs, Community Identification Signs, Direction Signs, Regulatory Signs, Motivation Signs, Information/Base Map Signs, Signs for Historic Buildings, and Wall Mounted Signs. Specific information for each sign type is specified within Air Force Pamphlet 32-1097 Sign Standards Pamphlet, and should be followed at Malmstrom AFB.

Main entry sign.

5.5.3. Typography/Color

Typography describes the style, size, and spacing of letters placed on a sign. Different styles of letters are referred to as fonts or typefaces. Each font is typically available in a range of sizes. Helvetica medium, and Helvetica regular are the principle approved fonts used on all signs at Malmstrom AFB. No other fonts shall be permitted. Helvetica medium is used for all primary information on most signs, while Helvetica regular is used for secondary information on identification signs and for certain regulatory signs.

All sign colors, including letter color, rule color, and background are specified within Section 2.18 of Air Force Pamphlet 32-1097 Sign Standards Pamphlet. All signs at Malmstrom AFB should comply with these color specifications.

Typical exterior sign.

5.5.4. Placement/Location

Section 2C of Air Force Pamphlet 32-1097 Sign Standards Pamphlet addresses sign placement for each sign type. These location guidelines should be followed at Malmstrom AFB.

For Malmstrom AFB, generic building names such as “Bank”, “Post Office”, and Commissary” should be used instead of official titles on all buildings located within the Community Visual District. Wall mounted signs have been selected for this area in order to promote a community atmosphere by making buildings easier to identify. Place these signs on the corner most visible to the main flow of traffic passing the building.

5.6. Site Furnishings

Site furnishings include utilitarian items such as benches, trash receptacles, bike racks, bollards, etc.. Site furnishings should fulfill an intended function and contribute positively to the visual quality, image and identification of the base. Currently an inconsistent palette of site furnishings exists at Malmstrom AFB, which contribute to a cluttered inconsistent appearance. The selection of site furnishings should be coordinated with the overall design theme of the installation.

5.6.1. Trash Receptacles

Trash receptacles which are compatible with other furnishings should be located in high use areas including building entrances, pedestrian nodes, walkways, and recreation areas. Trash receptacles similar to those manufactured by Terra-Form model TF 1210 or equal are recommended for use throughout Malmstrom AFB. All Trash Receptacles shall have a Tan w/ Brown Matrix color. Trash receptacles should have a top and lid constructed of hot dipped galvanized steel, with brown top (Federal Color #37056).

Left: Existing incompatible trash receptacle.
Right: Trash receptacle for all areas of Malmstrom AFB.

5.6.2. Bicycle Parking

Bike racks should be provided in community and commercial areas, parks, and near buildings where there is a high number of bicyclists. Bike racks should be located on paved areas where they will not impede pedestrian movement or block building entrances. One primary bicycle rack design should be used throughout the installation in order to achieve visual consistency at all bicycle parking locations. A metal bike rack similar to the one manufactured by Kay Park Recreation Corp Model 3102 or equal is recommended for use in all areas of the base. Color: Federal Standard Color #37056.

Bike racks should be provided in community and commercial areas.

5.6.3. Bollards

Bollards should be used to separate and control traffic, and can be used at access drives, parking lots, pedestrian paths, displays, and above ground utility structures. Bollards should be constructed of round tubular steel with a steel top which is welded and ground smooth. They may be either permanently set in a concrete base, or installed with a steel sleeve for easy removal. Color: Federal Standard color #37056. Lighted bollards may be used provided they are round, and finished the same color as other bollards on the installation. When bollards are used together in groups, the shall be placed at one height only.

Left: Typical unlit bollards which should be utilized for protecting utility structures.
Right: Lighted bollard for use in pedestrian areas.

5.6.4. Benches

Benches shall be similar to the benches manufactured by Wabash Valley, signature model S565 or equal, constructed using # 9 expanded steel mesh with “Plastisol” coating. (Federal Color #37056)

Bench to be used for all areas of Malmstrom AFB.

5.6.5. Bus Shelters

A single bus shelter design should be used to achieve visual compatibility and consistency for all bus shelter locations. Use area lighting and pavement as a part of the shelter design. For protection from inclement weather, the shelters must be fully enclosed with a 30-inch wide entrance on the street side.

Typical bus shelter design.

Anodized aluminum should be used for all visible metal components, with laminated or Plexiglass for panels on the enclosed sides. For seating, use benches specified in Section 5.6.4.

Colors: Aluminum Hardware-Dark Bronze
Vision Panels: Clear
Benches: Federal Color #37056
Skylight: Gray

5.6.6. Planters

When planted with annual flowers, movable planters may be used outside of building entrances in formal and informal areas to provide seasonal color and interest. Planters should be located so they do not impede pedestrian movement. Several planters of various sizes should be grouped together when possible. A round planter similar to one manufactured by Terra-Form model TF4030 and TF4035 Color Tan w/ Brown matrix, or equal should be used. Planters shall have a minimum height of 18 inches.

5.6.7. Picnic Tables

Picnic tables shall be similar to the picnic table manufactured by Wabash Valley, signature model S511 or equal, constructed using # 9 expanded steel mesh with "Plastisol" coating. (Federal Color #37056)

Typical picnic table to be used for open areas and picnic shelters.

5.6.8. Pavilions/Shelters

Pavilions and picnic shelters need to serve a wide variety of needs. If not designed carefully, they can produce negative visual images. In order to prevent this from

happening, pavilions and shelter buildings should be designed in a consistent manner. Pavilions and shelters should be designed using exposed wood construction, sloped roofs with composition shingles, and simple detailing. Fretwork and cupolas should be avoided if possible. Exposed wood should be stained medium to dark brown.

5.6.9 Playground Equipment

Playgrounds should be developed to provide a variety of fun, creative, and active space for users to enjoy. Modular play structures should be compact in form, neat in appearance, and incorporate colorful accents where possible. Impact-absorbing materials which promote safety, should always be utilized. The design of all playgrounds at Malmstrom AFB should be based on guidelines from the Air Force Space Command Facilities Excellence Guide 2000 and the U.S. Consumer Product Safety Commission's "Handbook for Public Playground Safety".

5.6.10 Exterior Drinking Fountains

Drinking fountains should be freestanding, or attached to a wall or building surface. All drinking fountains used at Malmstrom AFB should compliment other site furnishings by incorporating similar materials. Drinking fountains shall be designed to accommodate handicapped users, and meet all applicable ADA guidelines. All controls should be self closing to minimize inefficient or improper water usage. The location of drinking fountains should not obstruct pedestrian circulation. All drinking fountains should be sited for easy maintenance, and include a convenient method for winterproofing.

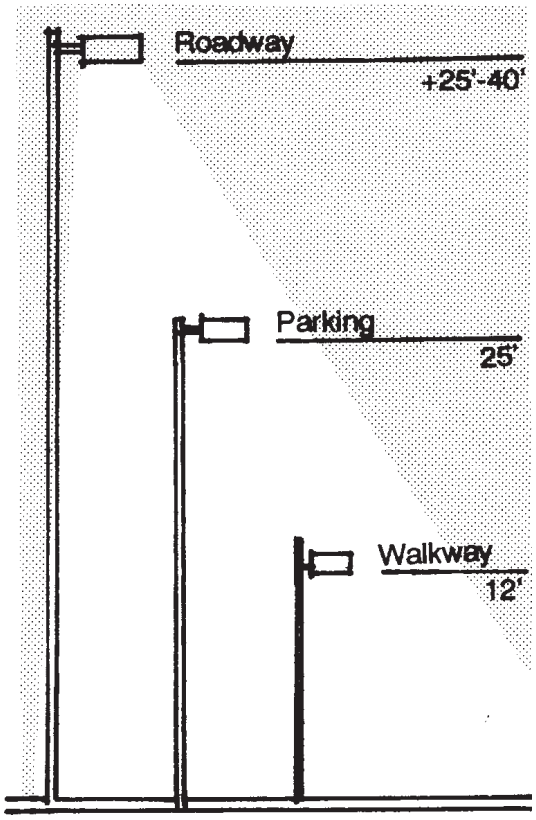
5.6.11. Site Furnishings Color Scheme

See the Architectural Materials and Color Palette, page A2-43 for a summary of colors to be used for all site furnishings at Malmstrom AFB.

All above grade utility equipment such as meter boxes, covers, pedestals, etc., should be painted either color specified in the Architectural Materials and Color Palette, page A2-43 for exterior paint. Colors should be selected in order to minimize the visual effect of this equipment.

5.7. Lighting

Lighting systems should provide adequate illumination for nighttime safety, security and pathfinding. The use of standard light fixtures and poles, illumination levels, and light sources can provide uniformity and improve the appearance of the base during the day as well as at night.



Typical lighting hierarchy for roadways, parking lots, and pedestrian walkways.

5.7.1. Street Lighting

Roadways are best illuminated by lights mounted on poles on an average height of 25-40 feet. The height is dependent on areas of use and spacing. High pressure sodium should be used as the primary light source. Anodized dark bronze (match Federal Color 37956) aluminum shoe box type fixtures and square poles are recommended to be used along all streets to be illuminated at night. Existing brushed aluminum pole and cobra head fixture should be painted dark brown (match Federal Color 37956) to be visually compatible with the recommended lighting. This will also help reduce their visual appearance during the day.

5.7.2. Parking Lot Lighting

Parking lot lighting should be anodized dark bronze (match Federal Color 37956) aluminum shoe box type fixtures and square tapered poles with a mounting height of 25 feet. High pressure sodium should be the standard light source.

5.7.3. Pathway Lighting

Anodized dark bronze (match Federal Color 37956) aluminum shoe box type fixtures mounted on 12-15 foot square poles should be used along walks and plazas. Metal Halide should be the standard light source.

Adequate lighting should be provided in areas that receive heavy pedestrian and vehicular use at night. Illumination levels are based on expected use and follow IES (Illuminating Engineers Society) Lighting Handbook Standards.

	High Activity Areas	Medium Activity Areas	Low Activity Areas	Security Areas
Building Entrances	5.0	1.0	0.5	5.0
Parking Lots	2.0	1.0	0.5	2.0
Roads				
Primary	2.0	1.4	1.0	2.0
Secondary	1.2	0.9	0.6	1.2
Tertiary	0.9	0.6	0.4	0.9
Pedestrian Areas	0.9	0.6	0.2	2 - 4

Minimum average footcandles for activity areas at Malmstrom AFB.

5.8. Utilities

Above grade utilities and associated buildings are visually dominant elements throughout Malmstrom AFB. To reduce the visual impact of existing and future utility systems, the following guidelines should be followed:

- Consistent and sensitive siting of utility buildings and above-grade utilities should be used.
- All utility buildings, transformers, etc. should be screened with plant materials and/or walls.
- Materials should be consistent on utility type buildings, poles, and other structures throughout Malmstrom AFB.

5.8.1. Structures/Equipment

Utility buildings and transformers should not be sited in visually prominent locations, but in areas which are not noticeable the public. Utility buildings and transformers should be screened from view by means of plant materials, berming, or enclosure walls. In newly constructed areas, utility buildings and transformers should be set back from sidewalks and roadways a minimum of 20 feet and sited in areas away from major public circulation areas.

All above grade utility equipment such as meter boxes, covers, pedestals, etc., should be painted either color specified in the Architectural materials and Color palette, page A2-43 for exterior paint. Colors should be selected in order to minimize the visual effect of this equipment.

5.8.2. Service Lines

Overhead and above grade utility lines are typically located along roadways, throughout Malmstrom AFB. These lines often stretch across roadways and are visually disturbing. The impact of these lines can be reduced by consolidating different lines into one system, eliminating a substantial amount of visual clutter. Whenever possible, utilities should be placed underground, especially in areas of high traffic, high visual impact, and areas where an important view or vista should be maintained. The installation has recently remove all overhead electric lines along Goddard Drive, significantly improving the aesthetics along this roadway.

Existing unscreened above-ground utility lines.

The negative visual impact of above ground steam lines throughout Malmstrom AFB has been addressed on portions of the installation through the use of screen walls and enclosures. These enclosures utilize a consistent pattern of materials which help reduce the visual impact of these utility lines. See section 5.4.2.d for specific information regarding the design standards for these screening fences used at Malmstrom AFB. In order to reduce the monotony of these screen walls, shrubs and other plantings should be used to break up the visual impact of long expanses of the screen walls.

Section 6:

Systems Furniture Specifications

6.1 PART 1 - GENERAL

1.1 SUMMARY: (Not Applicable)

1.2 REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI 297.1 (1984) Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 423 (1990A) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM E 84 (1991A) Standard Method of Test for Surface Burning Characteristics of Building Materials
ASTM E 290 (1987) Semi-Guided Bend Test for Ductiligy of Metallic Materials

ASTM C 1048 (1990) Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass

BUSINESS & INSTITUTIONAL FURNITURE MANUFACTURERS ASSOCIATION (BIFMA)

BIFMA X 5.5 (1989) Office Furnishings – Desk Products
BIFMA X 5.6 (1986) Office Furnishings – Panel Systems

FEDERAL COMMUNICATIONS COMMISSION (FCC)

FCC Part 18 (Oct 1991) Rules and Regulations: Industrial, Scientific and Medical Equipment

FEDERAL STANDARDS (FED STD)

FED STD 795 (1988) Uniform Federal Accessibility Standards

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEEERS (IEEE)

IEEE C 62.41 (1991) IEEE Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

NEMA WD 1 (1983; R 1989) General Requirements for Wiring Devices
NEMA WD 6 (1988) Wiring Devices – Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1990) National Electrical Code
NFPA 101 (1991) Life Safety Code
NFPA 255 (1990) Standard Method of Testing for Surface Burning Characteristics of Building Materials

UNDERWRITERS' LABORATORIES (UL)

UL 723 (Nov. 21, 1983; 6th Ed.; Rev thru Apr 28,1987) Test for Surface Burning Characteristics of Building Materials
UL 1286 (Apr. 20, 1988; 2nd Ed.; Rev thru Dec 18,1991) Office Furnishings

1.3 GENERAL:

This specification establishes the minimum requirements for the acquisition and installation of a complete and usable system of prewired workstations composed of interconnecting prewired panels. Panel-supported components, electrical hardware and accessories. Prewired workstation requirements and configurations shall be in accordance with the furniture layout and typical workstation types shown provided by a single manufacturer and shall be standard product as shown in the most recent published price lists or amendments. Electrical components shall be products of a single manufacturer to the extent practicable (different types of components can be of different manufacturer, but all units of a given component shall be from a single source). The completed installation shall comply with FED STD 795 and NFPA 101. The Contractor shall coordinate the work of this section with that to be performed under other sections. The scope of this specification may include requirements which would not be supplied by the prewired furniture manufacturer; but any such requirements shall be furnished by the Contractor under this section.

1.4 SUBMITTALS:

A. Government approval is required for submittals with a "GA" designation; submittals that have an "FIO" designation are for information only.

B. Manufacturer's Product Data; GA: Manufacturer's product and construction specifications which provides technical data for all prewired workstations panels and components specified, including task lighting and illumination performance information. Literature shall include adequate information to verify that the proposed product meets the specification.

C. Prewired Workstations; GA: Drawing showing the proposed prewired workstation installation at a scale of ¼" = 1 foot (1:48) unless other specified. Drawings showing communications, electronic data, electronic data processing (EDP) and local area network (LAN) locations may be provided as a separate submittal from remaining workstation drawings. Drawing requirements which are the prewired furniture manufacturer's responsibility shall be provided as a single submittal.

1. Overall reference drawings: Drawings showing workstation locations and overall plan view within each floor. The scale shall be 1/16 inch = 1 foot (1:192). Layouts shall reflect field verified conditions.

2. Installation drawings: Drawings showing workstations, panels, components, and plan view within each floor. Workstations shall be identified by workstation type. Scale of drawings shall be identical to Architectural plans. Installation drawings shall reflect field verified conditions.

3. Workstation elevations: Dimensioned workstation elevations showing each type of workstation with all components identified with manufacturer's catalog numbers. Elevations shall be drawn at ½ inch = 1 foot (1:24) scale.

4. Panel drawings: Drawings showing panel locations and critical dimensions from finished face of walls, columns, panels, including clearance and aisle widths. Panels shall be keyed to a legend which shall include width, height, finishes and fabrics (if different selections exist within a project), power or non-power, panel connectors and wall mount hardware. Panel drawings shall reflect field verified conditions.

5. Panel electrical power drawings: Drawings showing power provisions including type and locations of feeder components (service entry poles, base or ceiling feeds), activated outlets and other electrical components. Identify wiring configuration (circuiting, switching, internal and external connections). Provide legend if applicable.

6. Wire management capacity drawings.

7. Panel communication drawings showing telephone provisions: Drawings indicating the type and location of feeder components and outlets with wiring configuration identified where applicable.

8. Panel communication drawings showing electronic data processing provisions: Drawings indicating the type and locations of feeder components, outlets or accessories with wiring configuration identified where applicable.

9. Panel communication drawings showing local area network provisions: Drawings indicating the type and location of feeder components and outlets with wiring configuration identified where applicable.

D. Parts list; FIO: One complete listing of parts/model numbers for all components to be furnished under each contract including names and codes of components referenced on drawings.

E. Qualification; FIO: One statement indicating that the manufacturer has specialized in commercial prewired workstation manufacturing for the past five years.

F. Test Reports; GA: One complete set of test reports for the proposed system:

BIFMA; GA
Panel Acoustics; GA
Fire Safety; GA
Electrical Systems; GA

G. Certificates of Compliance; FIO: Two complete sets of certificates attesting that the proposed prewired workstation meets specified requirements. The certificate must be

dated 60 days before the award of the contract, must name the project, and must list specific requirements being certified.

H. Warranty; GA: The Contractor shall provide two copies of the warranty. Warranties shall be signed by the authorized representative of the manufacturer. Warranties accompanied by document authenticating the signer as an authorized representative of the guarantor, shall be presented to the Contracting Officer upon the completion of the project. The Contractor shall guarantee that the workstation products and installation are free from any defects in material and workmanship from the date of delivery.

I. Samples, Prewired Workstations; GA: Four sets of the following samples. The Government reserves the right to reject any samples that do not satisfy the construction or color requirements identified in the Base Facilities Excellence Plan. The Contractor shall submit additional samples as required to obtain final approval. No work shall proceed without sample approval in writing from the Contracting Officer.

1. Panel, tackboard, and flipper door fabric, if applicable. Samples shall measure a minimum of 6" x 6" (150 x 150 mm) and shall have labels on the back designating the manufacturer, color, fiber content, fabric weight, fire rating, and use (panel and/or tackboard).

2. Worksurface panel, and component finish. Samples shall measure a minimum of 2-1/2" x 3" (63 x 76 mm) and shall have labels on the back designating the manufacturer, material composition, thickness, color and finish.

J. Product Assembly Manual; FIO: Three sets of assembly manuals which describe assembly and reconfiguration procedures.

K. Product Maintenance Manuals; FIO: Three sets of maintenance manuals which describe proper cleaning and minor repair procedures.

L. Electrical Systems Manual; FIO: Three sets which describe the functions, configurations, and maintenance of the electrical system (power). This material may be included in the above two manuals at the Contractor's option.

1.5 QUALIFICATIONS:

The manufacturer shall be a company specializing in the production of prewired workstations for a minimum of five years.

1.6 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the job site in the manufacturer's original packaging with the brand, item identification, and project reference clearly marked thereon. Components shall be stored in a dry location that is adequately ventilated and free from dirt and dust, water, and other contaminants, and in a manner that permits easy access for inspection and handling.

1.7 PATTERN AND COLOR:

Pattern and color of finishes and fabrics for panels, components, and trim shall be as identified in the Base Facilities Excellence Plan and approved by the government.

1.8 ALTERNATE DESIGN:

Manufacturers who are unable to provide workstations that conform exactly to the furniture layouts and typical workstation types shown in the contract drawings may submit alternative designs for consideration by the Contracting Officer. For an alternative design to be submitted, it must meet the following criteria. Alternate designs that are submitted but do not meet this criteria will be rejected.

1. Workstation size and configuration: The alternate design shall provide workstations of the same basic size and configuration shown with only the sizes of the individual components within the workstation changed to meet the standard product of the manufacturer.

2. Component requirements: The types of components utilized shall be as shown on the drawings.

3. Layout: There shall be no reduction in the number of workstations accommodated and the width of aisles shall not be reduced below requirements defined in NFPA 101 and FED STD 795.

4. Panel wiring configuration: Alternate configuration must support the circuiting and connection capabilities identified under the provisions pertaining to powered panels of paragraph ELECTRICAL. Generally any alternate will be acceptable which involves only a variation in size or quantity that exceeds the specified configuration.

1.9 WARRANTY:

The Contractor shall warranty the prewired workstation components for a period of ten (10) years with the following exceptions: fabrics and other covering materials, and paper handling products shall be guaranteed for one (1) year, and tasklights shall be warranted for

two (2) years. Electromagnetic ballasts shall be warranted for two (2) years. Electronic ballasts shall be warranted for three (3) years.

6.2 PART 2 – PRODUCTS

2.1 PREWIRED WORKSTATION PERFORMANCE AND SAFETY REQUIREMENTS:

A. Panels, connection system, worksurfaces, pedestals, shelf units, flipper door units, lateral files, locks, accessories, and miscellaneous hardware shall meet testing as specified. With the exception of the ANSI, testing shall be performed by an independent testing laboratory. ANSI testing may be completed in a manufacturer's certified in-house testing laboratory. Component specific requirements are listed in appropriate paragraphs.

B. BIFMA: Prewired workstations shall conform to the requirements of BIFMA X 5.5 and BIFMA X 5.6 with the following exceptions: Panels and panel supported components shall be tested in accordance with the requirements of the BIFMA X 5.6 – 1986 and representative items shall be selected for testing based on worst case situations (i.e., the deepest and widest work surface or shelf). The keyboard drawer or shelf test shall be performed applying a 50-lb. (22.7 kg) load to the center of the keyboard shelf for a period of five minutes. Any loosening of attachments, permanent deflection or damage to the operation of the drawer or shelf shall be cause for rejection.

C. Panel acoustics: Acoustical panels shall have a minimum noise reduction coefficient (NrC) of 0.80 when tested in accordance with ASTM C 423 and a minimum sound transfer coefficient (STC) of 37 when tested in accordance with ASTM E 290. The test shall be conducted on the entire assembled panel, full face area (the complete core, adhesive, decorative fabric, frame and joining components).

D. Fire safety: Components shall meet Class A requirements for flame spread and smoke development as specified by the NFPA 101 and by the Underwriters' Laboratories requirements for use with energy distribution components and systems (listed by UL under Office Furniture QAWZ). Testing shall have been conducted in accordance with either ASTM E-84, UL 723, or NFPA 255 on the entire assembly panel and each different combination of fabric and interior construction. Panel flame spread shall not exceed 25 and panel smoke development shall not exceed 150.

E. General safety: Prewired workstation products shall be free of rough or sharp edges. Panel components shall have a positive, integral locking devise which secures components to the support panels without the use of additional screws or clamps so that the components cannot be accidentally pulled or knocked off the panels.

F. Electrical system: Lights (task or ambient) shall be UL approved. The panel electrical system shall be 4 circuit/8 wire with two oversized neutrals to reduce the harmonic imbalance created by computer and related equipment and meet the requirements of US Standard 1286.

G. Glazed panels: Tempered glass shall conform to ASTM C 1048, Kind FT, Condition A, Type I, Class 3 – Light reducing, tinted.

2.2 THE PANEL SYSTEM

A. Accessories and appurtenances for a completely finished panel assembly shall be supplied complete with the system. The system shall be capable of structurally supporting cantilevered work surfaces, shelves, files and other components in the configurations shown on the drawings. The panel system shall be capable of structurally supporting more than one fully loaded component per panel per side.

B. All panels shall be either tackable or capable of accommodating fabric covered tackboards. The panel system shall be available in a variety of nominal widths and heights as designated on the drawings. Panel height shall not exceed 80 inches (2 m). Heights shall be measured from the finished floor to the top of the panel. All powered and non-powered panels shall be compatible in heights. Panel thickness shall be 2 inches (51 mm).

C. Finishes: The panels shall be available in the following options: acoustical, safety glazed. Exposed panel trim shall have a factory baked enamel or epoxy powder and/or wood finish (as specified on the drawings). Filler trim shall either match the panel trim or be fabric covered to match the panel fabric. Each fabric-faced panel shall have a seamless width of fabric stretched over the entire face of the panel and the color of each fabric used shall be consistent throughout the installation. The fabric should be a grade 3 minimum. Curved panels may use adhesives on curved sections. The fabric shall be attached securely and continuously along the entire perimeter of the panel and shall allow for easy removal and replacement in the field. Fabric shall be factory installed and panel fabric content shall be polyester, nylon, wool, blends, or other fabric compositions as required. Specify type of fabric, material and weight per linear foot or weight per square yard. The panel fabric should be a plain weave construction with a tweed pattern. door panels shall have a rigid metal frame with rails, a threshold, and a wood or laminate clad door adaptable to either hand swing. Door panels shall be of a dimension that will allow for a 32 inch (813 mm) clear opening. Door panels shall include connectors, hinges, brushed chrome door knob, and keyed lockset.

D. Raceways: Raceways shall be an integral part of the panel. All panels, whether powered or non-powered, shall be provided with a raceway cover. Magnet held base covers will not be accepted.

E. Leveling glides: The system shall provide precise alignment of adjacent panels and shall include leveling glides to compensate for uneven floors. On panel to panel products each panel shall have two leveling glides. On panel to post products each connector shall contain a leveling glide. A minimum ¾ inch (19mm) adjustment range is required for both panel to panel and panel to post systems.

F. Panel connection system: The panel system shall have connectors which accommodate a variety of panel configurations as shown on the drawings. A straight line connection of tow panels (180 degrees), corner connection of two panels (90 degrees). T connection of three panels (90 degrees), cross connection of four panels (all 90 degrees), and a connection of two panels for setting the panels at any angle. The panel connector system shall provide tight connections with continuous visual and acoustical seals. The connector system shall allow removal of a single panel within a typical workstation configuration, without requiring disassembly of the workstation or removal of adjacent panels. The connector system shall provide for connection of panels of similar or dissimilar heights. Right angle (90 degree) connections between panels shall not interfere with the capability to hang work surfaces and other components on any adjacent panel. The connector system shall provide, as required, for the continuation of electrical and communications wiring within workstations and from workstation to workstation. Filler posts shall be level with the panel top rail.

G. Wall mounted panels: Panel system wall-mount accessories shall be used when it is necessary to attach panels to the building walls.

2.3 WORK SURFACES

A. Work surfaces shall be of a balance construction to prevent warpage. All work surfaces shall be wither fully supported from the panels or supported jointly by the panels and supplemental legs, pedestals, or furniture and panels. Supplemental end supports should only be used under work surfaces when the workstation configuration does not permit full support by the panels. Metal support brackets shall be used to support work surfaces from the panels, provide metal to metal fitting to the vertical uprights of the panels, and shall lock the work surfaces in place without panel modifications. Abutting work surfaces shall mate closely and be at equal heights when used in side by side configurations in order to provide a continuous and level work surface. Work surfaces shall either have pre-drilled holes to accommodate storage components, pedestals and additional supports, or holes must be able to be drilled at the job site to accommodate these items. Work surfaces shall be provided in sized and configurations shown on the drawings. Work surfaces shall be available in nominal depths of 20 (508 mm), 24 (610 mm), and 30 inches (762 mm) plus or minus 2 inches (51 mm), nominal lengths from 24” (610 mm) to 72” (1,829 mm), and a nominal thickness from one (1) inch (25 mm) to 1-3/4 inches (44 mm). Work surfaces shall be height adjustable in one (1) inch (25 mm) to 1-1/2 inches (38 mm) increments from 25 inches (635 mm) to 41 inches (1,041 mm) above the finished floor. Work surfaces abutting at equal heights shall provide a continuous and level work surface. Corner work surfaces,

peninsula work surfaces, and counter/transaction work surfaces shall be provided as shown on the drawings and shall include hardware necessary to provide firm and rigid support.

B. Finishes: The work surfaces shall have a finished top surface of high pressure plastic laminate, wood veneer, or composite wood grain (as specified on the drawings) and shall have a smoothly finished underside. The work surface shall not be affected by ordinary household solvents, acids, alcohols, or salt solutions, and shall be capable of being cleaned with ordinary household cleaning solutions. Metal support brackets shall match the color and finish of the panel trim. Edges shall be post formed or solid wood (as specified on the drawings).

2.4 PEDESTALS

A. Drawer configurations and pedestal height shall be shown as on the drawings. The deepest possible pedestal shall be provided for each work surface size specified.

B. Construction: With the exception drawer fronts, pedestals and drawers shall be of steel construction. Drawer faces shall be securely attached to the drawer front. All pedestals shall be attached to the work surface or freestanding as specified in the drawings.

C. Finishes: The finish of steel surfaces shall be a factory baked enamel finish. Drawer fronts shall be either steel, molded plastic or veneer.

D. Drawer requirements: All 12 inch (305) file drawers shall have either a cradle type or full extension ball bearing suspension with hanging folder frames or compressor dividers. Drawers shall stay securely closed and not open when in the closed position. Each drawer shall contain a safety catch to prevent accidental removal when drawer is fully open. Drawer pedestals shall be field interchangeable from left to right, or right to left, and shall retain the pedestal locking system capability. Pedestals shall be designed to protect wires from being damaged by drawer operation when wire management runs behind or along the side of the drawers. Box drawers shall be provided with pencil trays and stationary trays. All 15 inch (381 mm) high EDP file drawers shall accommodate EDP printout sheet. The center drawer shall be mounted under the work surface and shall contain a pencil tray.

2.5 PANEL SUPPORTED STORAGE

A. Flipper door cabinets, shelf units and lateral files shall be provided in the sizes and configurations shown on the drawings. Flipper door and shelf unit cabinets shall accommodate task lighting and shall have a depth to accommodate a standard three ring binder and minimum 15 inch (381 mm) depth to accommodate computer printouts.

B. Shelf unit construction: The shelf pan shall be of a metal construction with formed edges. Shelf-supporting end panels shall be constructed of metal, high density particle

board or molded melamine. Supporting end panels shall provide metal to metal connections to the supporting panels. Shelf bottom shall accommodate task lighting. Shelf units shall accommodate relocatable shelf dividers.

C. Flipper door unit construction: Flipper door unit shall be of equal construction to shelf units. Flipper doors shall be constructed of metal with formed edges, wood frame or particle board. Flipper door cabinets shall be provided with locks. Units must remain securely fastened to the panel when in the locked position. Doors shall use either a ball bearing, rack and pinion, or scissor-equalizer suspension system.

D. Lateral file unit construction: Panel hung lateral file bins shall be of a steel construction. File fronts, top and end panels shall be of equal construction to flipper door units. File drawers shall have full extension ball bearing drawer slides or rack and pinion suspension. File drawers shall have hanging folder frames, compressor dividers or rails. All lateral file drawers shall be available with key operated locks.

E. Finish: Shelves and dividers and top dust cover shall have a factory backed enamel finish. Shelf supporting end panels shall have a factory baked enamel. Shelf bottom shall match end panel color. Metal doors shall have an exterior finish of baked enamel or a factory installed fabric covering and an interior finish of factory baked enamel. Finished door color must comply with color scheme. Metal drawers shall have a factory baked enamel finish. Fabric content of flipper doors shall be polyester, nylon, wool, blends, or other fabric compositions as required. Wood workstations shall have wood veneer on exterior of doors and drawers. Flipper doors and lateral files shall have a wood veneer surface.

2.6 ACCESSORIES

A. Coat storage: One panel mounted coat hook per workstation occupant shall be provided at each workstation and a panel mounted storage unit shall be provided as indicated on the drawing.

B. Keyboards: Work surfaces shall be capable of accepting an articulating keyboard shelf or standard keyboard shelf on workstation as shown on the drawings. The articulating keyboard shelf shall have the capability to be fully recessed under the work surface and extend to give the user full access to the keyboard. Side travel rotation shall be a 180 degree swing. The keyboard pad shall have tilting capability and shall contain a wrist support. The standard keyboard shelf shall have the capability to be fully recessed under the work surface and extend to give the user full access to the keyboard.

C. Tackboards:

1. Fabric shall be factory installed and fabric content of tackboards shall be polyester, nylon, wool, blends, or other fabric compositions as required. Location and size shall be as shown on the drawings.
2. Tackboards shall have at least two plies of 3/8 inch (10 mm) thick or more sound absorbent cellulose fiber or similar material. The tackboard shall be warp resistant and shall have a roll-formed or extruded metal hangers that are preassembled to the tackboard for installation to the slotted panel connectors.

D. Wall mounted components: Wall tracks shall be used when components are shown attached directly to wall surfaces. Tracks shall be of a heavy-duty, roll-formed or extruded metal. Finish and color of tracks shall match the panel trim. Vertical aligned tracks shall be slotted on a 1 inch (25.4 mm) centers in heights required. Slot spacing should match slot spacing for wall panels. Horizontal track systems shall have end trims.

E. Erasable marker boards: Erasable marker boards shall have a porcelain or melamine-faced hardboard writing surface, edged with extruded vinyl and contains a storage tray. The erasable marker board shall be warp resistant and shall have roll-formed or extruded metal hangers for installation to the slotted panel connectors. One set of erasable, dry markers and a standard felt eraser shall be provided with each board.

F. Paper management unit: Paper management units shall be provided as indicated on the drawings. These units shall be constructed of coated steel or injection molded plastic and shall accommodate either legal or letter size lengths. Unit shall not be freestanding and shall be provided as shown on the drawings.

2.7 MISCELLANEOUS HARDWARE

Brackets, supports, hangers, clips, panel supported legs, connectors, adjustable feet, cover plates, stabilizers, and other miscellaneous hardware shall be provided.

2.8 LOCKS AND KEYING

Drawers, flipper door cabinets, and lateral files shall have keyed locks, unless otherwise noted. Field changeable lock cylinders shall be provided with minimum of 150 different key options. Each workstation shall be individually keyed and locks within a workstation shall be keyed alike. Drawers within a pedestal shall be lockable either by a central lock that controls all pedestals under one work surface or an individual keyed alike unless otherwise specified. Two keys shall be provided for each lock or two keys per workstation when keyed alike, and three master keys shall be provided per area as shown on the contract drawings. Keys and lock cylinders shall be numbered for ease of replacement. All locks must be clearly labeled with a key number. For those manufacturers who have removal format locks, this is not necessary.

2.9 ELECTRICAL

A. All panels whether powered or non-powered, shall have base raceways capable of distributing power circuits, communication cables and data lines. Non-powered panel bases shall be capable of easy field conversion to powered panel base without requiring the panel to be dismantled or removed from the workstation. The system shall use copper cable assemblies, wiring harnesses or electrified bus and shall meet requirements of UL 1286 and NFPA 70 (Article 605). Conductors shall consist of a minimum 20 amp, 90 degree C, #12 AWG copper wires in the bus configuration protected by a 20 amp breaker. The label or listing of the Underwriters' Laboratories will be accepted as evidence that the material or equipment conforms to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency must be submitted indicating that the items have been tested in accordance with required procedures of UL and that the materials and equipment comply with all contract requirements.

B. Panel bases (Raceways): Panel bases shall have hinged or removable covers which permit easy access to the raceway when required but which are securely mounted and cannot be accidentally dislodged under normal conditions. The panel bases shall not extend past either panel face by more than ¾ inch (19 mm). Metal or plastic end covers which attach securely to the panel base. All bases in full size (over 24 inches) (610 mm) powered panels shall have a minimum of two knockouts ("doors") per side for electrical connections or outlets as indicated elsewhere.

C. Powered panels: Powered panels shall be provided as indicated on Contract Drawings. The panels shall have an internal power and communications raceway and the capability of disconnecting and connecting external circuits to the electrified raceway in the panel. The communications receiving raceway shall have capacity for at least six 25-pair telephone cables. Power and communications wiring raceways shall have a metal divider included to insure electrical isolation. They shall not share a common wireway. Doors or access openings shall be included for entry of communications cable. The electrified power raceway shall have isolated grounds as required and dedicated circuits as required.

D. Receptacles: Power receptacles shall be provided in the bases of the powered panels. Devices shall be placed at the locations indicated on the plans and be connected to the designated circuits. Unless otherwise indicated receptacles shall be 20 amp (NEMA 5-20R) commercial grade conforming to NEMA WD-1 and NEMA WD-6. If receptacles are not interchangeable or will not permit field adjustment of phase and circuit selection, furnish 10 percent spare devices of each type shown on these plans. All or General use receptacles shall be of the duplex configuration; unless otherwise indicated special use receptacles shall be of the simplex configuration with the blade/pin arrangement identified on the plans. The color of receptacle bodies shall be coordinated with the color of the panel base. Isolated ground receptacles (orange preferred). Field applied identification must be permanent. Stick-on or non-setting adhesives are not acceptable. A minimum of five

receptacles removal tools shall be provided for systems that require special tools for proper receptacle removal.

E. Power cabling variations: The above paragraph has identified (a) specific cabling configuration(s). Since universal conventions have not been established, variant configurations available from given manufacturers will be considered. Alternates must allow the same circuiting, device connections, neutral and ground separation, and upstream feeder connections as shown on the plans. Variations must be approved in advance. See paragraph ALTERNATE DESIGNS. Examples of acceptable variations include:

1. Use of one oversized neutral in lieu of two (or three) specified neutrals (neutral must have 150 percent minimum of phase conductor ampacity, i.e. #10 neutral if replacing two #12 phase conductors; 173 percent and #8 if replacing 3 neutrals.) or vice versa and must be of different phases.

2. Providing a 6-wire system in lieu of a 5-wire system shown on plans.

3. Use of a manufacturer's configuration which allocates individual conductors differently, but which has the same quantity of conductors and allows devices to be physically connected in the field as shown on the plans. It is not necessary that the manufacturers labeling codes or terminology match the designations used on project plans or in the specifications, however, neutrals and grounds shall have insulation color coded per NEC. (The reference to "dedicated" conductors in this specification pertains to circuit connections upstream and load connections downstream of prewired panels; it is not necessary that manufacturer's designations correspond.)

F. Electrical Connections

1. Internal connections: Internal panel to panel power connections shall use straight or flexible plug/receptacle connector assemblies and shall be installed to provide the powered panel configurations shown on the contract drawings. Connectors shall be configured so that ground pins will provide "first make, last break" operation.

2. Connections to building services: External power and communications services shall be supplied to the panels via direct-wired top or base entry modules. Hard-wired top or base entry modules. Hard-wired top or base entry junction box assemblies. Wiring from building services shall be extended to the entry modules or panel bases in metal conduit or tubing or in flexible liquid tight conduit (6-foot maximum). Wiring from building services shall be extended to junction box assemblies in metal conduit or tubing. Wiring from junction boxes shall be flexible liquid tight conduit (6-foot (1.8 meter) maximum) or in metal conduit or tubing. Cord and plug assemblies are not acceptable for any portion or external links unless otherwise indicated. Base feed modules shall plug into the end or either side of the raceway at receptacle doors. Top entry modules or junction box assemblies shall extend the power and communications wiring into service entry poles attached to the electrified panels. The government will make final connection

from building power junction box for renovations projects. New facilities may require the contractor to make the connection.

G. Wire Management: Wire management capability shall be provided at all workstations. Actual wire management capacity should accommodate all cable types specified including the applicable manufacturer required bending radius at corners. The capability may be accomplished by cable access cutouts (one minimum per work surface), covered wire management troughs in vertical end panels, horizontal wiring troughs, internal midpanel raceways, or rear gaps (between the back edge of the work surface and the facing support panel). Grommet kits or another suitable finish must be provided for all cable cutouts. Accessories for an externally mounted vertical and horizontal wire management and concealment system shall be provided as indicated on the contract drawings. Horizontal wire managers shall be supplied for mounting under all work surfaces. The wire managers shall be attached either to the underside of the work surface or to the vertical panel without damage to the face of the vertical panel. Exposed or loose wiring will not be acceptable. Wire managers shall be prefinished and shall be secure, concealed, and accommodate outlet cords as well as trim, attach to panel or rail by means of clip on attachment, and shall conceal wires routed vertically. Power wiring must be separated from communication wire by use of separate raceways. Secure (red) power and communication wiring shall be separate from nonsecure (black) power and communication wiring as required and approved by Base Communications squadron.

H. Circuit layout: The circuit layout for workstations shall be as shown on the drawings. Devices shall be connected to the designated circuits in the neutral and ground configurations indicated. Connections shall be made to the building electrical distribution system as shown on the drawings and in accordance with the National Electrical Code.

I. Service poles shall be provided as indicated on the contract drawings and shall be capable of minimally accommodating the power configuration required under paragraph power panels and the equivalent of six 25 pair communication cables. Poles shall have metal barriers or channels to separate power and communications wiring. Pole dimensions shall be equal to the panel thickness. Unless otherwise indicated, the pole finish and color shall match the finish and color of the panel trim. Poles shall be capable of being opened along the vertical access to permit the lay-in of wiring. Each pole shall have a wiring interface, and end cap and a ceiling trim plate which extends a minimum of 1-1/2 inches (38 mm) from all sides of the pole. Unless otherwise indicated, poles for power service shall include a junction box either as part of the pole or in a field installed configuration. Service poles shall be securely attached to the panels and shall be installed plumb. Wiring and interface components shall be provided as required to connect building power supply to power poles.

J Task lighting:

1. General: Task light size and placement shall be provided as indicated in this Specification. Such lights shall be a standard component of the manufacturers prewired work-

station products. Task lights mounted to the underside of overhead shelving shall be the same lengths as the overhead storage unit unless otherwise indicated. The ends of the task light length shall not extend beyond the edges of the overhead unit. Task lights shall have structurally sound mounting devices which will prevent accidental displacement, but which allow easy removal and replacement when necessary. Fixtures shall be UL approved for use in the configurations indicated on the drawings.

2. Luminaire configuration: Luminaires shall be the fluorescent type and shall have prismatic lenses baffles, or reflector systems configured to minimize glare by shielding the lamp from the view of a seated user. Task lights shall provide a minimum of 75 foot candles (807 lx) of light without veiling reflections on the work surface directly below the fixture. All diffusers grilles or other coverings shall be easily removable to permit cleaning and relamping. Unless otherwise indicated fixtures shall be provided with ballasts and lamps as follows. Use F32CW for T-8 in 4 foot units (1.2 m) if the type is not identified on the plans. Each luminaire shall have an easily accessible on-off switch and one rapid-start ballast. A variable intensity control is acceptable if the low setting is equivalent to "off" with zero energy consumption. Multiple switching is also acceptable. Ganged fixtures or shared ballasts shall not be used. Electronic ballasts shall withstand line transients per Category A of IEEE 62.41 and shall not generate input side harmonics exceeding 10 (ten) percent or exceed electromagnetic interference limits of FCC Part 18. Submit supporting data.

a. Lamps: Fluorescent lamps shall be "T8" of the wattage, voltage, and lumen output, with a rated average life as that of lamps manufactured by the General Electric Co. or approved equal, as indicated in the fixture schedule. Lumen output at 33% rated life shall not be less than 80% of initial output. Any lamps failing during the first 80 days at burning shall be considered defective and shall be replaced and installed without cost by the Furniture Contractor.

b. All fluorescent ballasts, as indicated shall be of the highpower factor type with resetting thermal protectors and their design and construction shall conform to the "Certified Ballast Manufacturers Standards", for Class 'P' Sound Rated A. Ballasts shall be electronic type equal to Advance Electronic Ballast #VEL-4P32-RH-TP for 4 lamp; #VEL-3P32-RH-TP for 2 lamp; electronic dimming ballast to be equal to Advance #VDC-3S32-TP for 3 lamp as required to match available voltage.

3. Wiring:

a. Each fixture shall be grounded by a factory-installed, heavy duty electrical cordset with a grounded plug. Direct or hardwire connections are not acceptable. Unless otherwise indicated, cords shall be concealed

b. Provisions shall be built-in within panels or shall utilize field installed, manufacturer approved accessories. Cords may be extended through dedicated channels located at any point within panels or may be placed in vertical slots or in the space between panels

if held in place by retainers and concealed by a cover plate. Vertical wire managers shall be prefinished and cut to size and shall extend from the task light level down to the top of the work surface below the task light. Each manager shall be attached to a panel vertical edge or connector strip without damage to the panel surfaces

4. Communications: Communications wiring shall be extended to, and installed in, the electrified panels as shown on the plans. Communications outlets shall be installed at designated locations. Communications work may be performed in conjunction with the installation of the prewired workstations or may be separately executed at the government's option; however, equipment, materials, and installation must conform to the requirements of base communications standards and all interfaces must be properly coordinated. Designated raceway systems shall provide management for secure and non-secure power, computer, and telecommunications cabling. Secure distribution must be separated from non-secure distribution. Provide 1 (one) telephone outlet with 3-RJ45 connectors in each cubicle as follows:

a. Telephone cable: This cable shall consist of eight (four pair) 24 AWG cat-5 thermoplastic insulated conductors formed into two individually twisted pairs, enclosed by a thermoplastic jacket. This cable shall meet all requirements for plenum rating as required and general inside wiring specifications per ANSI/ICEA Pub. S-80-576-1988 and applicable NEC requirements.

b. Data cable: This cable is a coaxial 50 ohm, RG-58 type plenum rating as required. This cable shall meet all the requirements as specified in IEEE 802.3 (10 base 2) Ref. B1.4 and all other local requirements as prescribed.

c. Local/facility/wide Network Cable: This cable shall consist of eight 24 AWG thermoplastic insulated cat-5 conductors formed into four individually twisted pairs enclosed by a thermoplastic jacket. The pair twist of any pair shall not be exactly the same as that of any other pair. This cable shall meet all requirements for plenum rating and general inside wire specifications per ANSI/ICEA Pub.S-80-576-1988 and other applicable NEC and Local Building Code requirements. This cable shall perform at the minimum of level 4 performances as specified in ICEA S-80-576, EIA/TIA 568, UL 444, NEMA "LOW LOSS", IEEE 802.3 "10 Base T" and all specifications to support 4/16 mbs token ring. The color code shall be as follows:

1) Pair 1 - White Blue/Blue.

2) Pair 2 - White Orange/Orange.

3) Pair 3 - White Green/Green.

4) Pair 4 - White Brown/Brown.

d. Telecommunications outlet: The telecommunication outlet shall consist of a standard electrical box and face plate able to support a combination of 4 different terminations. The outlet shall be stubbed out above the ceiling line with 3/4 inch (19 mm) conduit to the outlet. Open office floor plans shall incorporate a grid system as indicated on the plans. All outlets shall be accessible and not blocked by furniture and other office equipment. No outlet shall be located closer than 40 inches (1,016 mm) to an electrical outlet or 60 inches (1,524 mm) from any EMI sources.

1) Specifications: Termination types or combinations thereof to include:

a) l-RJ-45(Voice)

b) l-BNC(Coax-Data).

c) 2-RJ-45(Lan/Man).

2) All outlets shall be permanently labeled in a sequential manner to reference the building, floor, and outlet number. The numbering scheme shall reflect the same in the horizontal wiring at the telecommunication room.

6.3 PART 3 - EXECUTION

3.1 INSTALLATION:

The prewired workstations shall be installed by certified installers in accordance with manufacturer's recommended installation instructions. All workstation components shall be installed level, plumb, square and with proper alignment with adjoining furniture. The components shall be securely interconnected and securely attached to the building where required. Three sets of special tools and equipment necessary for the relocation of panels and other components shall be furnished to the Contracting Officer. The manufacturer shall provide a full-time project manager on the job site.

3.2 CLEANING:

Upon completion of installation all products shall be cleaned and polished and the area shall be left in a clean and neat condition. Any defects in material and installation shall be re-paired, and damaged products that cannot be satisfactorily repaired shall be replaced

6.4 PART 4 – FINISHES AND PLANS

4.1 TYPICAL WORKSTATION FINISHES:

A. Workstations: Colors and patterns to be similar to finishes as indicated in Section 3.6 of the guidelines. Colors and patterns listed below are examples only.

1. Panel fabric: Steelcase, Berkley, Verona
2. Flipper Doors: Steelcase, Warm White
3. Work Surface: Steelcase, Warm White
4. Open shelves and panel trim: Steelcase, Cream
5. Drawer fronts: Steelcase, Cream
6. Tackboard fabric: Steelcase, Berkley, Verona

B. Workstation options: Fullcut veneer/solid wood to be similar to Steelcase medium oak or natural walnut.

4.2 WORKSTATION LAYOUTS:

Workstation layouts are indicated in section 3.5 of this document.

4.3 TASK SEATING:

Finishes and fabrics.

1. Chair base, urethane arm caps and shell color to be similar to image category seating colors.

2. Fabrics as similar to image category color/finish guideline sheets.

Appendix B:

FIVE YEAR PLAN

Contents

Section 1:

Introduction

Purpose

In accordance with the Air Force Space Command supplement to Air Force Instruction 32-7062, the Five-Year Plan is "a comprehensive Wing document that aligns programming, budgeting, and execution of facility requirements with long-range goals." The Five-Year Plan accomplishes this by capturing facility construction, renovation, repair and demolition programs in a consolidated, prioritized format.

The following report represents the Malmstrom AFB Five-Year Plan as approved by the installation Facilities Board. Project priorities and budgeting information are maintained by the Civil Engineering Base Development Office. Current status of individual projects in the Five-Year Plan can be obtained from this office, 341 CES/CECP, at phone number (406) 731-6154.

Planning Philosophy and Process Used

The planning philosophy and process used to develop facility requirements for Malmstrom AFB are discussed in Section 1 of the Malmstrom AFB General Plan.

Section 2:

Fiscal Year 1999 Plan

Malmstrom AFB facility requirements programed for the Fiscal Year (FY) 1999 are depicted on the following pages. A table consolidating projects from all funding programs is followed by a graphic which provides locations for those primary projects highlighted in the table.

FY 1999 CONSOLIDATED PROJECTS

FY	PROJECT#	DESCRIPTION	BLDG#	PROGRAM	ESTIMATE
1999	NZAS9390101B	DORMITORY, 96 PERSON	1060	MILCON	$7,900,000
1999	NZAS9390101A	DEMOLISH BLDG 1060	1060	MILCON	$386,000
1999	NZAS86001DQ	REPLACE FAMILY HOUSING (PHASE 4)	M	MFH	$10,000
1999	NZAS980011	DEMOLISH BLDG 1305	1305	O&M	$185,000
1999	N/A	DEMOLISH BLDG 3066	3066	O&M	$0
1999	NZAS9390102	RENOVATE DORM 740	740	O&M	$2,800,000

Section 3:

Fiscal Year 2000 Plan

Malmstrom AFB facility requirements programed for the Fiscal Year (FY) 2000 are depicted on the following pages. A table consolidating projects from all funding programs is followed by a graphic which provides locations for those primary projects highlighted in the table.

FY 2000 CONSOLIDATED PROJECTS

FY	PROJECT#	DESCRIPTION	BLDG#	PROGRAM	ESTIMATE
2000	NZAS9390101C	DORMITORY, 144 PN	M	MILCON	$11,600,000
2000	NZAS001024	DEMOLISH BLDG 230	230	O&M	$100,000
2000	NZAS001002	DEMOLISH BLDG 347	347	O&M	$1
2000	NZAS001024	DEMOLISH BLDG 920	920	O&M	$35,000
2000	NZAS001024	DEMOLISH BLDG 1189	1189	O&M	$40,000
2000	NZAS950113	DEMOLISH BLDG 1210	1210	O&M	$87,000
2000	NZAS950113F2	DEMOLISH BLDG 1212	1212	O&M	$87,000
2000	NZAS950113F3	DEMOLISH BLDG 1214	1214	O&M	$87,000
2000	NZAS950113F4	DEMOLISH BLDG 1216	1216	O&M	$87,000
2000	NZAS950113F5	DEMOLISH BLDG 1218	1218	O&M	$6,000
2000	NZAS950113F6	DEMOLISH BLDG 1220	1220	O&M	$6,000
2000	NZAS9390102A	RENOVATE DORM 764	764	O&M	$2,900,000

Section 4:

Fiscal Year 2001 Plan

Malmstrom AFB facility requirements programed for the Fiscal Year (FY) 2001 are depicted on the following pages. A table consolidating projects from all funding programs is followed by a graphic which provides locations for those primary projects highlighted in the table.

FY 2001 CONSOLIDATED PROJECTS

FY	PROJECT#	DESCRIPTION	BLDG#	PROGRAM	ESTIMATE
2001	NZAS973000	DEMOLISH BLDG 165	165	MILCON	$239,000
2001	NZAS973000B	MMIII MISSILE SERVICE FACILITY	M	MILCON	$5,400,000
2001	NZAS860001DX	REPLACE FAMILY HOUSING (PHASE 5)	M	MFH	$7,570,000
2001	NZAS975100	IMPROVE FAMILY CAMP	1	NAF	$450,000
2001	NZAS920029	LITTLE LEAGUE SUPPORT FACILITY	1	NAF	$430,000
2001	N/A	DEMOLISH BLDG 1085	1085	O&M	$1
2001	NZAS98117	DEMOLISH BLDG 1881	1881	O&M	$2
2001	NZAS939012A	RENOVATE DORM 630	630	O&M	$2,600,000

Section 5:

Fiscal Year 2002 Plan

Malmstrom AFB facility requirements programed for the Fiscal Year (FY) 2002 are depicted on the following pages. A table consolidating projects from all funding programs is followed by a graphic which provides locations for those primary projects highlighted in the table.

FY 2002 CONSOLIDATED PROJECTS

FY	PROJECT#	DESCRIPTION	BLDG#	PROGRAM	ESTIMATE
2002	NZAS983002	HELICOPTER OPERATIONS	1	MILCON	$2,300,000
2002	NZAS985002	ADD/ALTER BASE SWIMMING POOL	1	NAF	$580,000
2002	NZAS991047	AUTOMATED CAR WASH	1	NAF	$290,000
2002	NZAS860001DY	REPLACE FAMILY HOUSING (PHASE 6)	M	MFH	$10,600,000
2002	NZAS939012	RENOVATE DORM 737	737	O&M	$2,500,000

Section 6:

Fiscal Year 2003 Plan

Malmstrom AFB facility requirements programed for the Fiscal Year (FY) 2003 are depicted on the following pages. A table consolidating projects from all funding programs is followed by a graphic which provides locations for those primary projects highlighted in the table.

FY 2003 CONSOLIDATED PROJECTS

FY	PROJECT#	DESCRIPTION	BLDG#	PROGRAM	ESTIMATE
2003	NZAS9390101D	DORMITORY, 144 PERSON	1	MILCON	$11,600,000
2003	NZAS983003	CONVERT COMMERCIAL GATE		MILCON	$2,700,000
2003	NZAS994005B	REPLACE FAMILY HOUSING (PHASE 7)	M	MFH	$11,400,000
2003	NZAS939012C	RENOVATE DORM 735	735	O&M	$3,000,000
2003	NZAS980012	DEMOLISH BLDG 1700	1700	O&M	$300,000
2003	NZAS981147	DEMOLISH BLDG 1705	1705	O&M	$155,000
2003	NZAS980003	DEMOLISH BLDG 1708	1708	O&M	$175,000

Appendix C

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Appendix D

GLOSSARY

AAFES	Army and Air Force Exchange Service
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFI	Air Force Instruction
AFM	Air Force Manual
AFPD	Air Force Policy Directive
AFR	Air Force Regulation
AICUZ	Air Installation Compatible Use Zone
AOC	Areas of Concern
APZ	Accident Potential Zone
AST	Above-Ground Storage Tanks
BASH	Bird Aircraft Strike Hazard
BCE	Base Civil Engineer
BCP	Base Comprehensive Plan
BMP	Best Management Practices
BTU	British Thermal Units
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C&I	Communications and Information
CIP	Capital Improvement Program
CRMP	Cultural Resource Management Plan
dB	decibel
DDESB	Department of Defense Explosives Safety Board
DERA	Defense Environmental Restoration Account
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
DV	Distinguished Visitor
ECAMP	Environmental Compliance Assessment Management Program
EPA	Environmental Protection Agency
ESP	explosives site plan
F	Fahrenheit
FAA	Federal Aviation Administration
FGD	flue gas desulfurization
FY	Fiscal Year
FYDP	Five Year Development Plan
GP	General Plan
GPM	Gallons per minute
HAPS	Hazardous Air Pollutants
HTHW	High temperature hot water
HWAP	hazardous waste accumulation point

IRP	Installation Restoration Program
ITS	Information Transfer System
kV	kilovolt
kVA	kilovolt-ampere
kW	kilowatt
LBP	Lead Based Paint
Ld-n	day-night noise level
MAFB	Malmstrom Air Force Base
MAP	Management Action Plan
MCF	Million Cubic Feet
MFH	Military Family Housing
MGD	Millions Gallons per day
MILCON	Military Construction
MNHP	Montana Natural Heritage Program
MPDES	Montana Pollution Discharge Eliminator System
MVA	Megavolt-amperes
MW	Megawatt
NAF	Non-Appropriated Fund
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O&M	Operation and Maintenance
ODC	ozone depleting chemical
OU	Operable Units
PC	personal computer
PCB	polychlorinated biphenyl
PCC	Portland Cement Concrete
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
Q/D	Safety-Quantity Distance
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Satellite Accumulation Point
SPCC	Spill Prevention Control and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
SY	square yard
T&E	Threatened and Endangered
TCE	trichloroethylene
TPY	Tons per year
TSDF	Treatment, Storage and Disposal Facility
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service

UST	underground storage tank
VOC	volatile organic compound
WSA	Weapons Storage Area

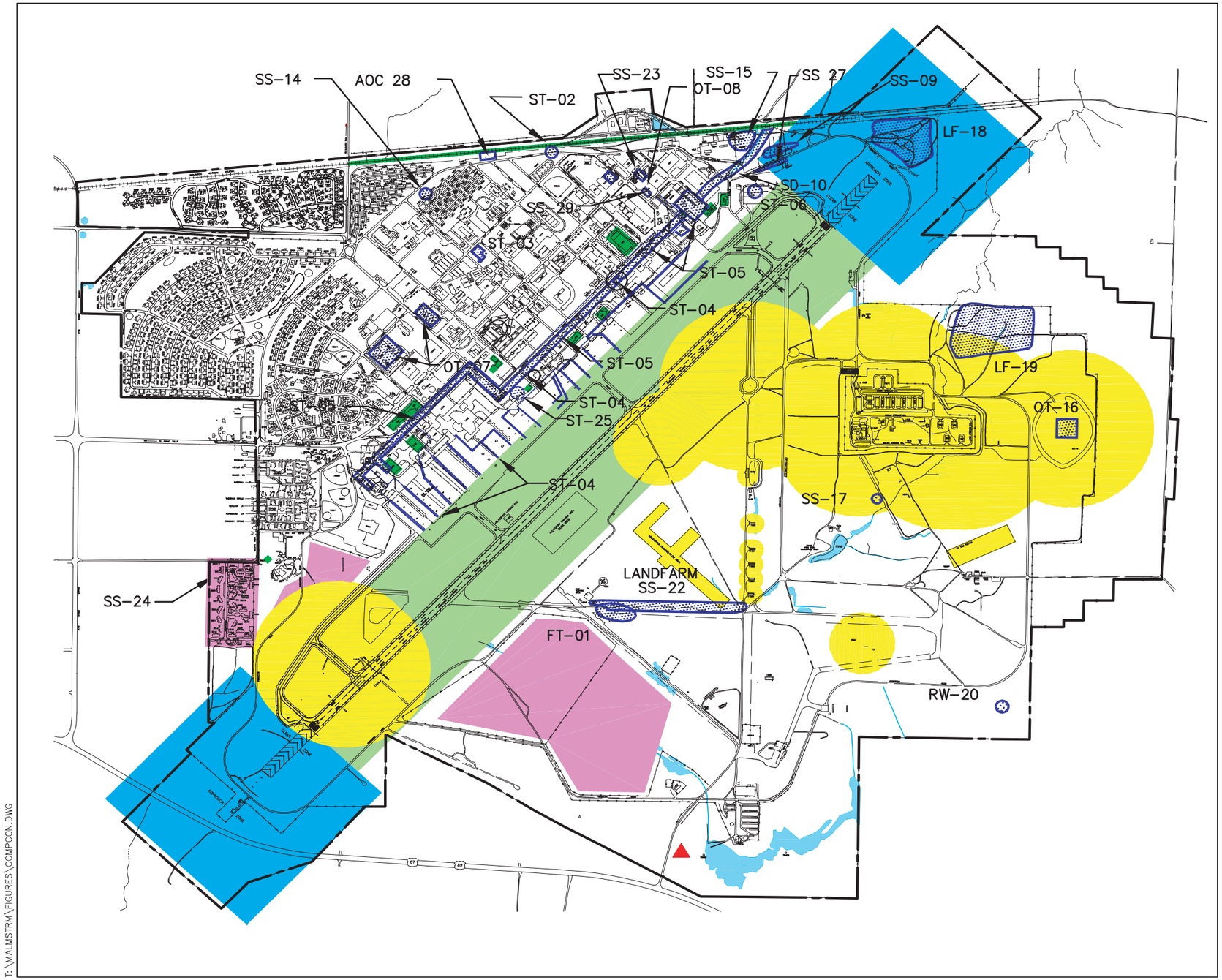

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Figure 4.1 Composite Constraints and Opportunities

- AFB Boundary
- Installation Restoration Program Sites
- Historic Features / Structures Potentially Eligible for NRHP
- Archaeological Site (Lithic Scatter)
- Wetlands
- Clear zone
- Explosive Safety Areas
- Runway Lateral Clear Surface
- Development Opportunity

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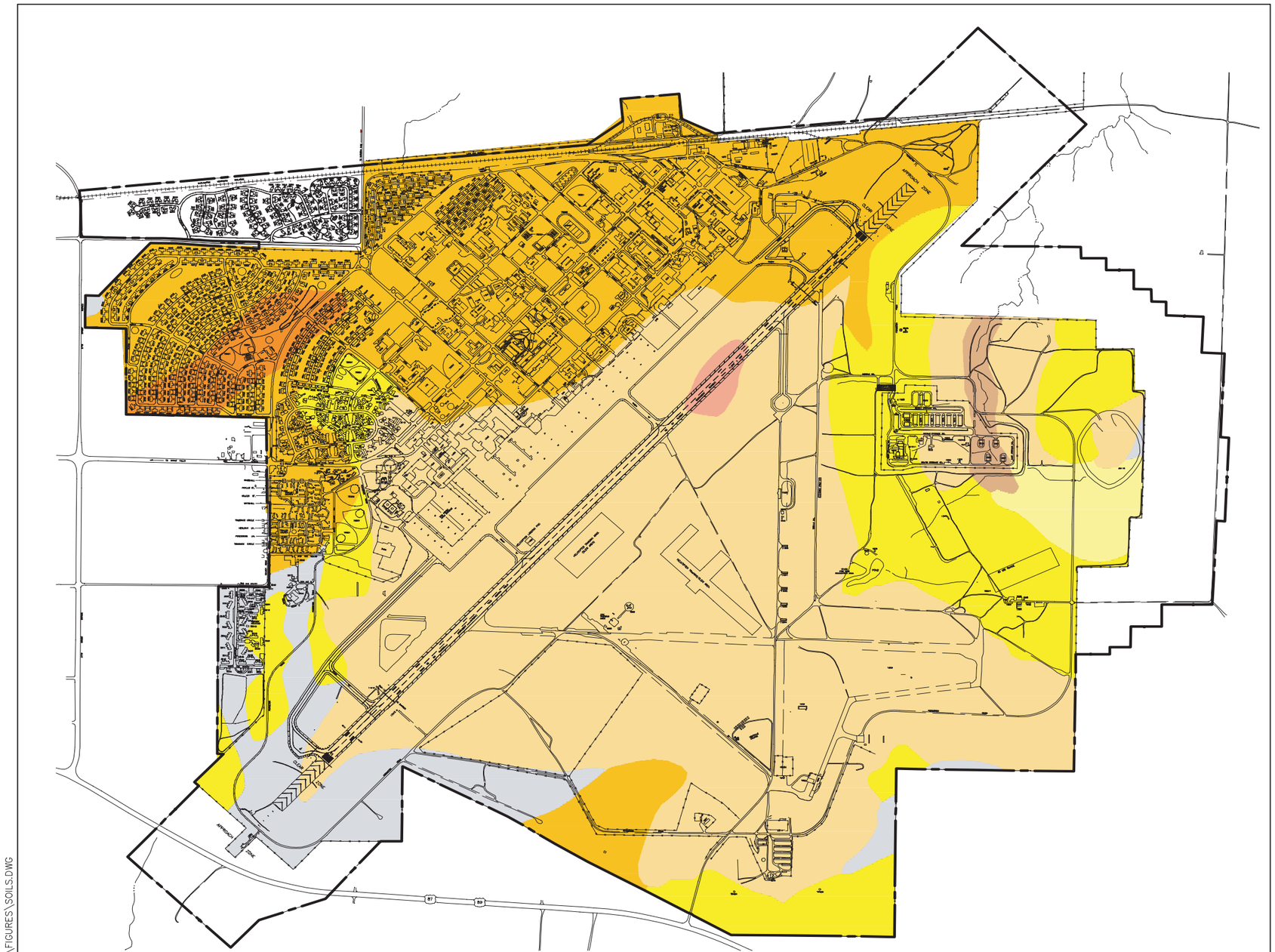

Figure 4.2
Soil Types

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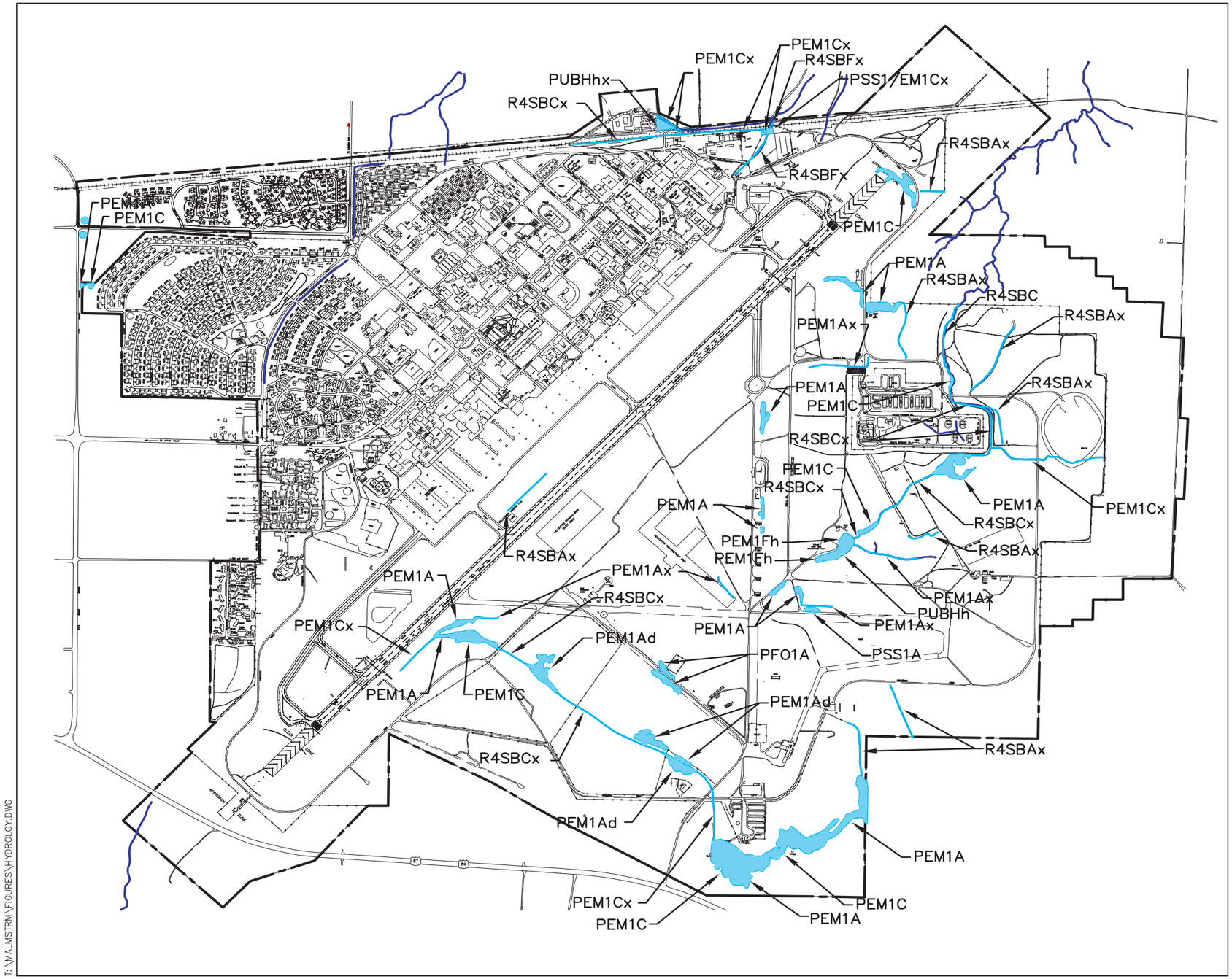

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Figure 4.3
Hydrology

- AFB Boundary
- Bodies of Water
- Wetlands
- Wetland Boundary
- PEM1A — Wetland Type

PEM1A(d)	Palustrine, Persistent Emergent, Temporarily Flooded, (d) Partially Drained/Ditched.
PEM1Ax	Palustrine, Persistent Emergent, Temporarilly Flooded, Excavated.
PEM1C	Palustrine, Persistent Emergent, Seasonally Flooded.
PEM1Cx	Palustrine, Persistent Emergent, Seasonally Flooded, Excavated
PEM1Fh	Palustrine, Persistent Emergent, Semipermanently Flooded, Impounded.
PFO1A	Palustrine, Forested Broad–Leaved Deciduous, Scrub–Scrub Broad–Leaved Deciduous, Temporarily Flooded.
PSS1/ EM1Cx	Palustrine, Broad–Leaved Deciduous Scrub–Scrub, Persistent Emergent, Seasonally Flooded, Excavated.
PSS1A	Palustrine, Broad–Leaved Deciduous Scrub–Scrub, Temporarily Flooded.
PUBHh	Palustrine, Unconsolidated Bottom, Permanently Flooded, Impounded.
PUBHhx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Impounded, Excavated.
R4SBAx	Riverine, Intermittent, Streambed, Temporarilly Flooded, Excavated.
R4SBC	Riverine, Intermittent, Streambed, Seasonally Flooded.
R4SBCx	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated.
R4SBFx	Riverine, Intermittent, Streambed, Semipermanently Flooded, Excavated.

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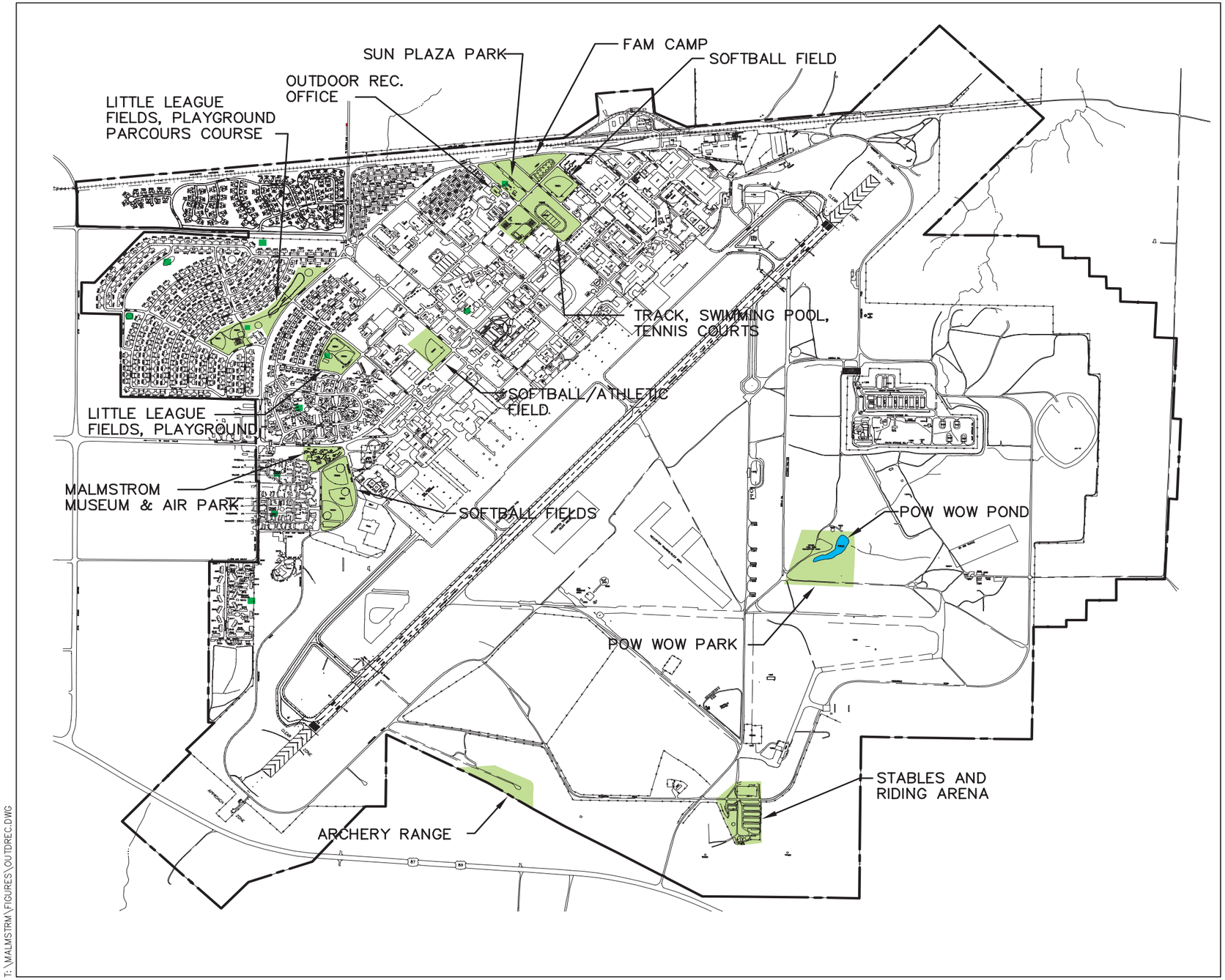

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Figure 4.4 Outdoor Recreation Areas

AFB Boundary
Outdoor Recreation Areas
Fishing Area
Playgrounds

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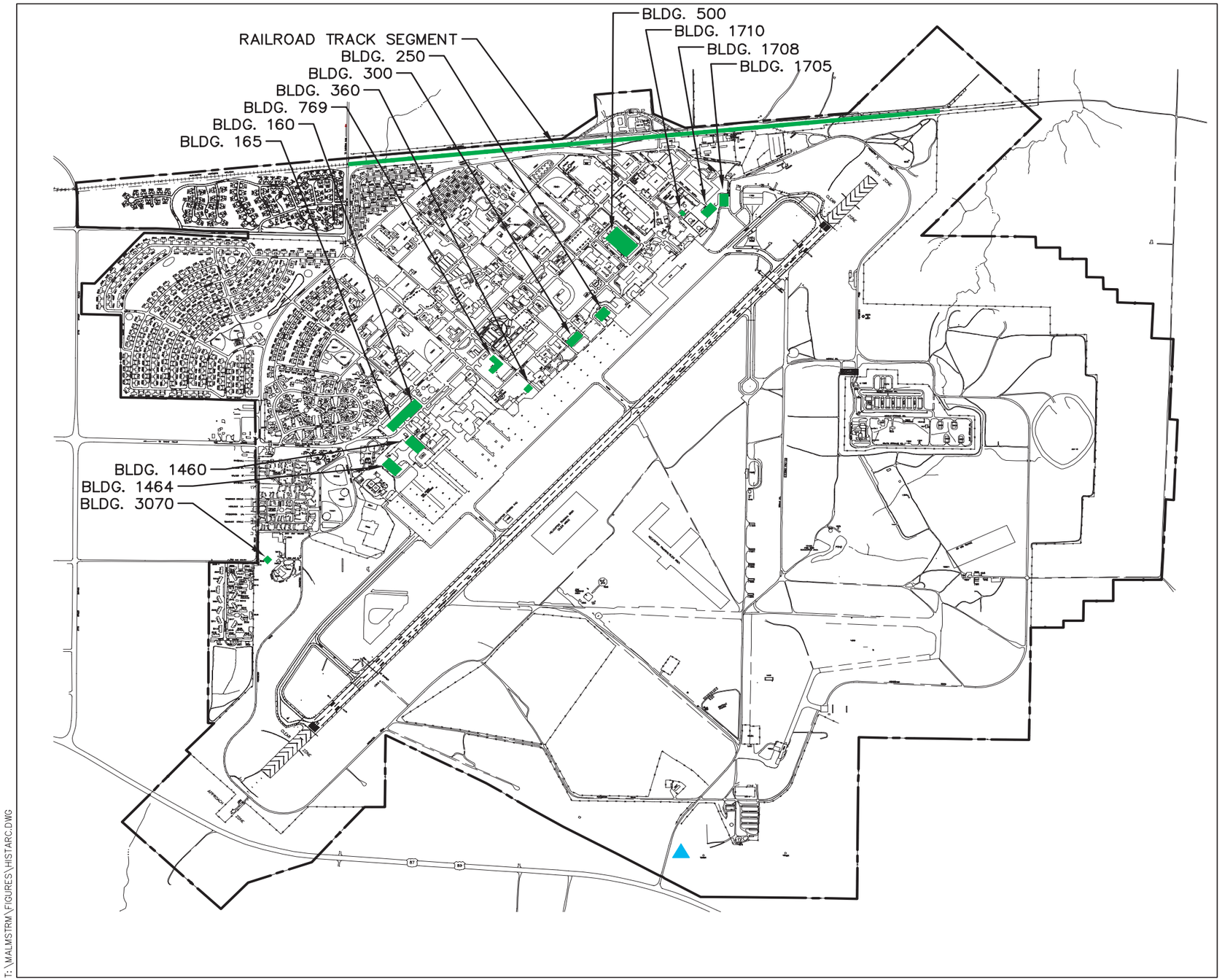

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Figure 4.5 Historic and Archaeological Sites

AFB Boundary

Historic Features / Structures Potentially Eligibile For NRHP

Archaeological Site (Lithic Scatter)

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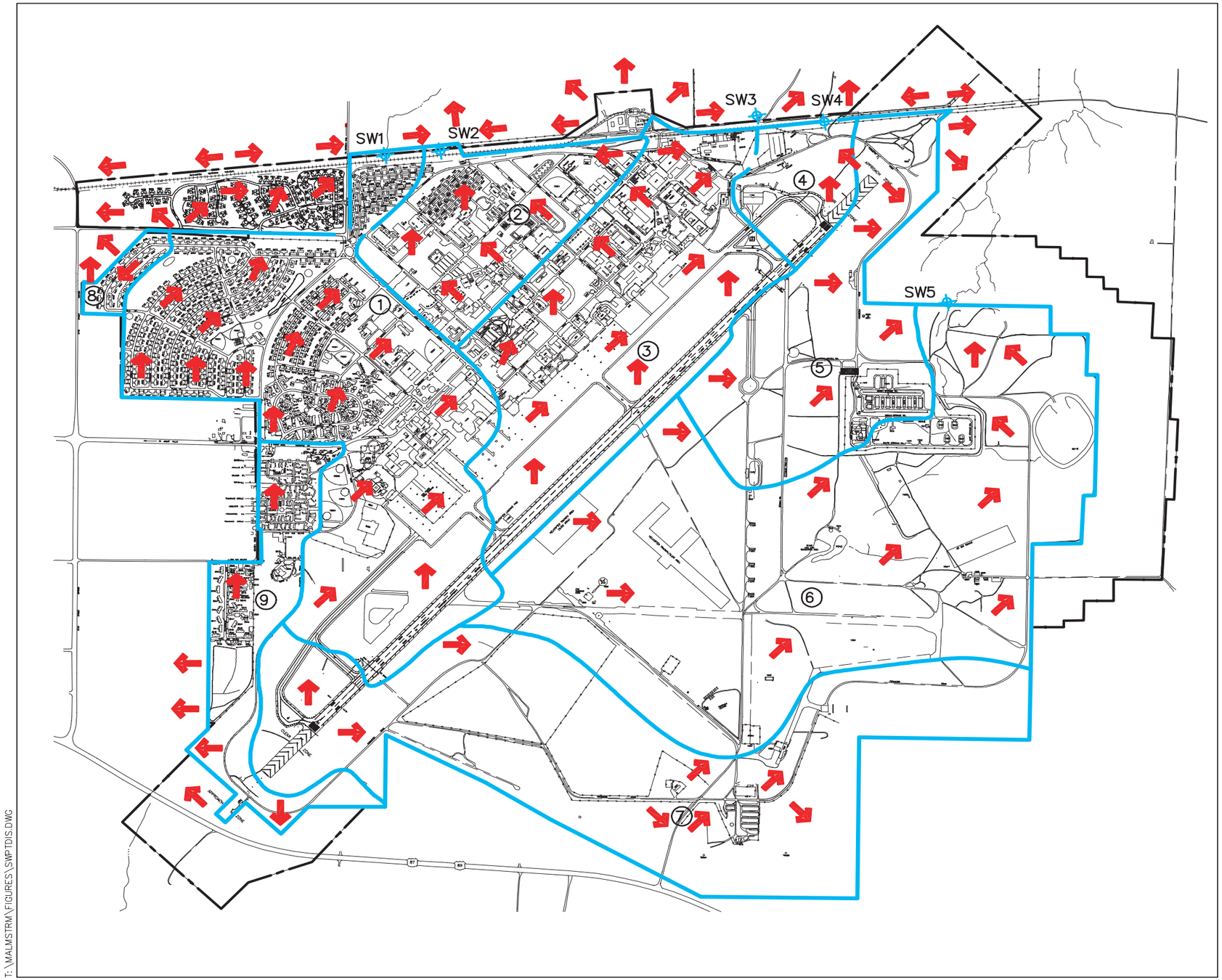

Figure 4.6 Stormwater Point Source Discharge

AFB Boundary
2 Drainage Area
Drainage Basin Boundary
SW1 Discharge Point / Sampling Location
Surface Drainage Trend

Note: See Figure 4.13 for Storm Sewerage.

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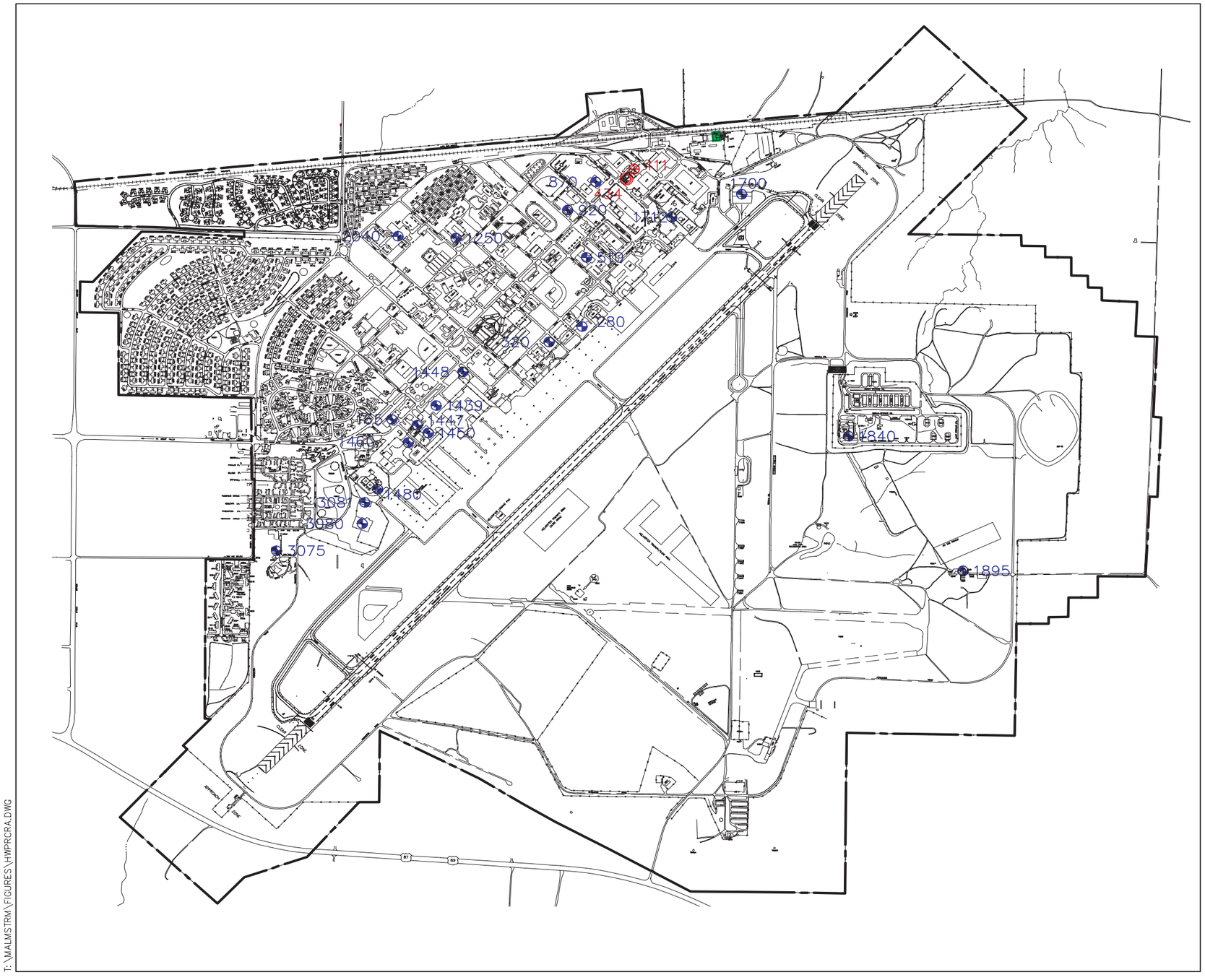

Figure 4.7
Hazardous Waste Generation & Accumulation Points, Permitted Hazardous Waste Storage

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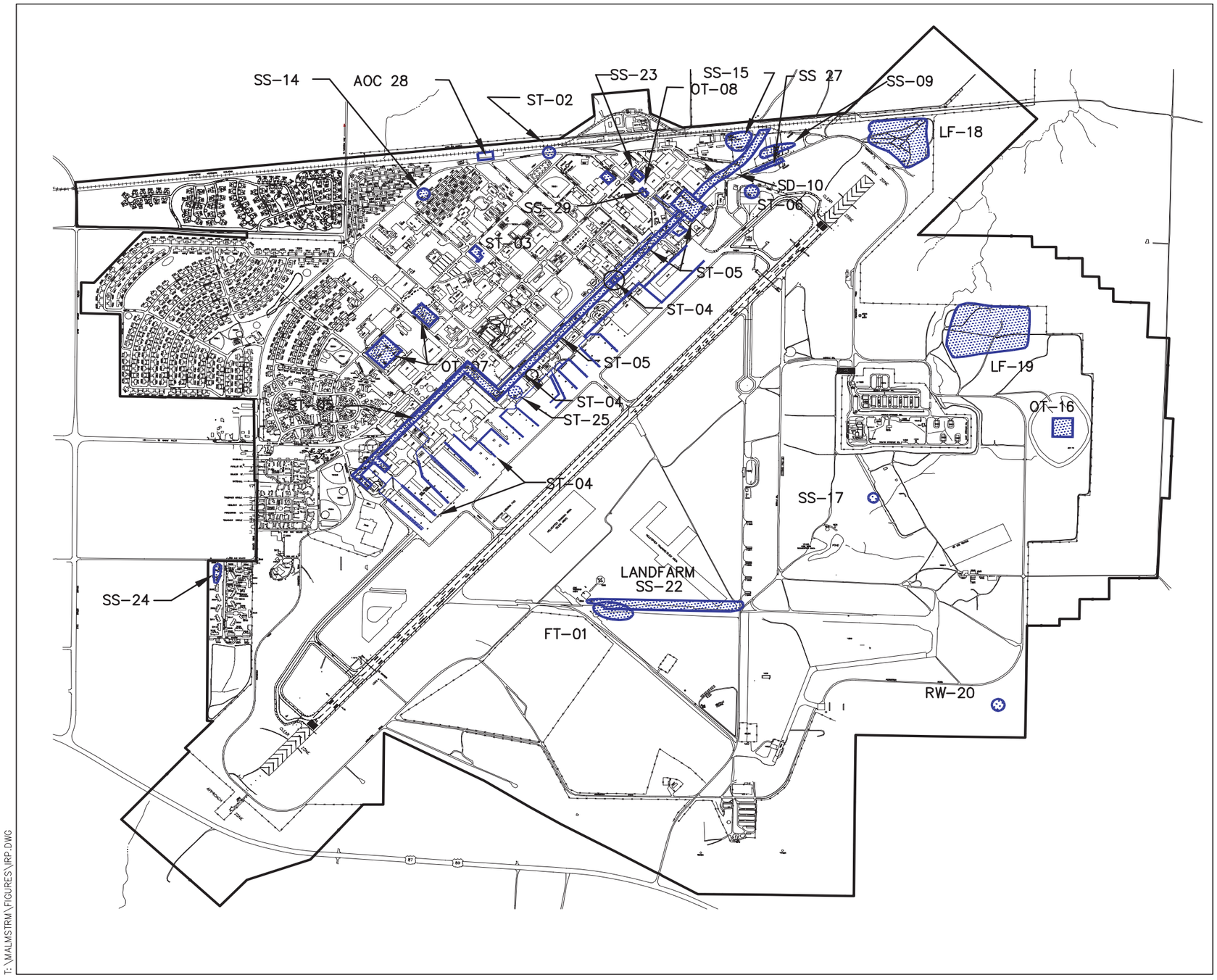

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Figure 4.8 Installation Restoration Program Sites

AFB Boundary

Installation Restoration Program Sites

SITE	STATUS	DESCRIPTION
FT-01	**	FIRE TRAINING AREA
ST-02	**	YELLOWSTONE PIPELINE
ST-03	**	MILITARY GAS STATION
ST-04		PUMP HOUSES 2 & 3, AND HYDRANT REFUELING SYSTEM
ST-05		BULK POL, FUEL SUPPLY & RETURN LINES
ST-06	**	ARRS HANGAR
OT-07	**	VISITING OFFICERS QUARTERS/CHAPEL SITE
OT-08	**	BUILDING 439 RFI OVENS
SS-09	**	POLE YARD STORAGE AREA
SD-10	**	OPEN STORM DITCH
SS-11	#	LAUNCH FACILITY P-10*
SS-12	#	LAUNCH CONTROL FACILITY S-0*
SS-13	***	KALISPELL AFS HOUSING AREA FUEL SPILL*
SS-14	#	ACORN/CHESTNUT STREETS PCB INCIDENT
SS-15	**	DRUM DISPOSAL SITE EAST OF DRMO
OT-16	***	CONVENTIONAL MUNITIONS DISPOSAL
SS-17	**	DRUM DISPOSAL SITE SOUTH OF WSA
LF-18	**	FLIGHTLINE LANDFILL
LF-19	**	LANDFILL NORTHEAST OF WSA
RW-20	**	RADIOLOGICAL DISPOSAL SITE
ST-21		HAVRE UNDERGROUND STORAGE TANKS*
SS-22	**	OLD TAXIWAY LAND FARM
SS-23	**	BUILDING 435 AERATION SLAB
SS-24	**	WHERRY HOUSING PESTICIDES
ST-25		USTs NORTH OF BUILDING 370
AOC-26	***	CONTAMINATION NORTH OF BLDG. 870
SS-27		CONTRACTOR STORAGE AREA
AOC-28		PERIMETER ROAD OUTFALL DITCH
AOC-29		79th ST. PETROLEUM CONTAMINATION

\# SITE CLOSED
* OFF-BASE SITE
** SITE FINISHED
*** SITE TO BE FINISHED 1999

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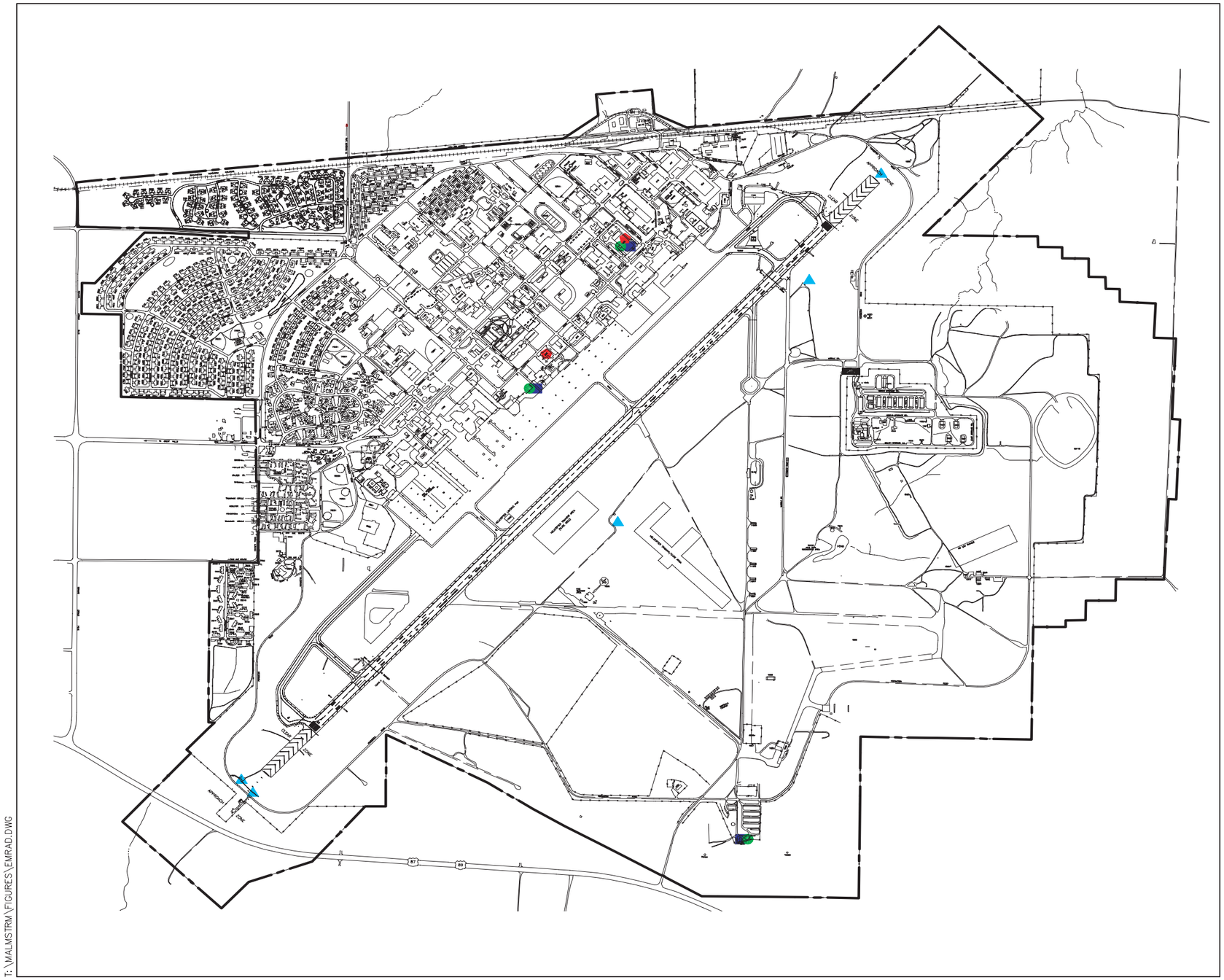

Figure 4.9 Electromagnetic Radiation Sources

- AFB Boundary
- Hazardous Levels Possible, but Transmission Time is too Short for Overexposure
- Hazardous Levels Possible, but in Normally Inaccessible Areas
- No Levels Generated in Excess of the PEL
- Transmitter Dummy Load

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Figure 4.10
Safety Criteria Areas

- AFB Boundary
- Explosive Safety Areas
- Clear Zone
- Accident Potential Zone 1 (APZ 1)
- Runway Lateral Clear Surface

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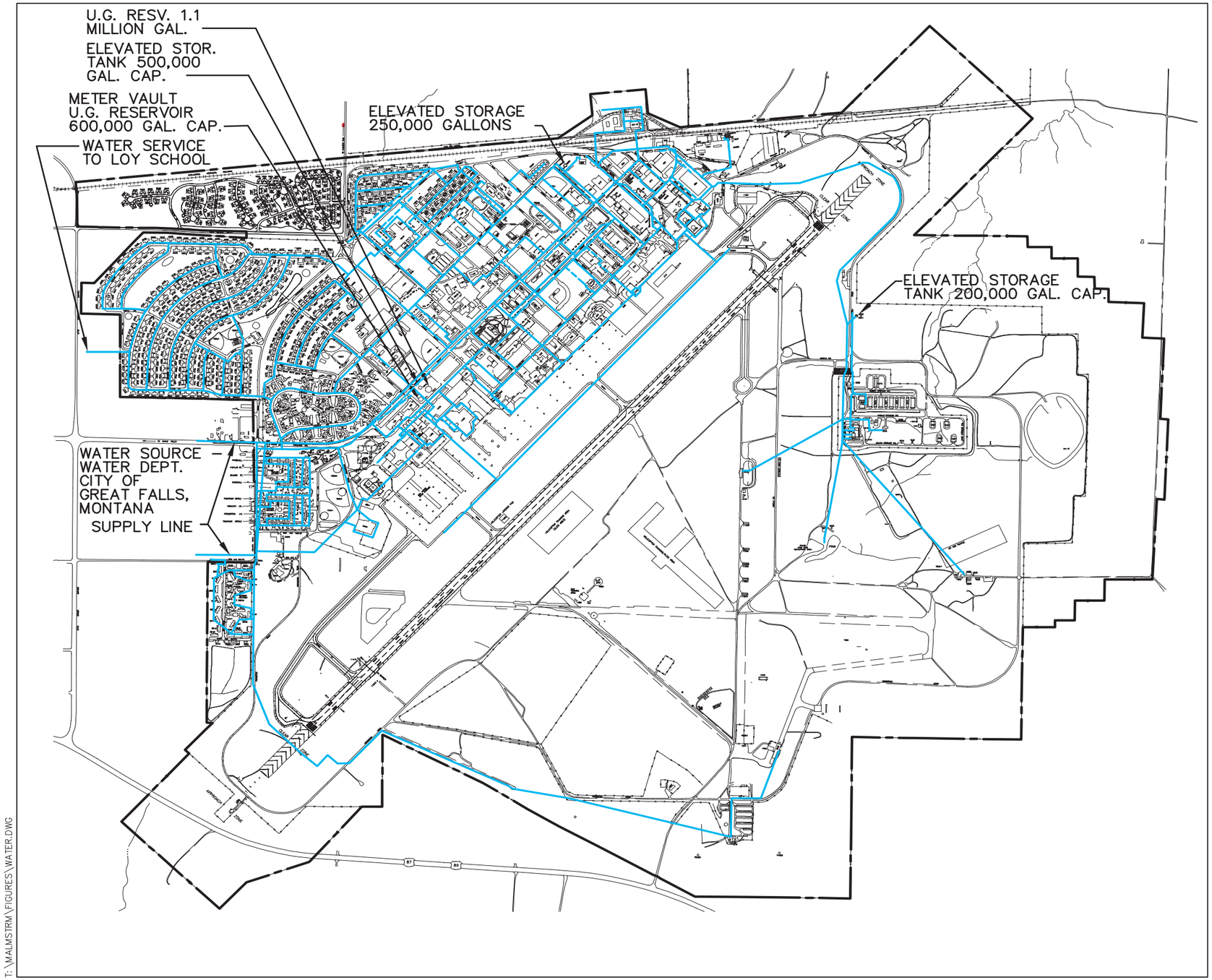

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Figure 4.11
Water Distribution System

AFB Boundary
Water Line
Abandoned Water Line

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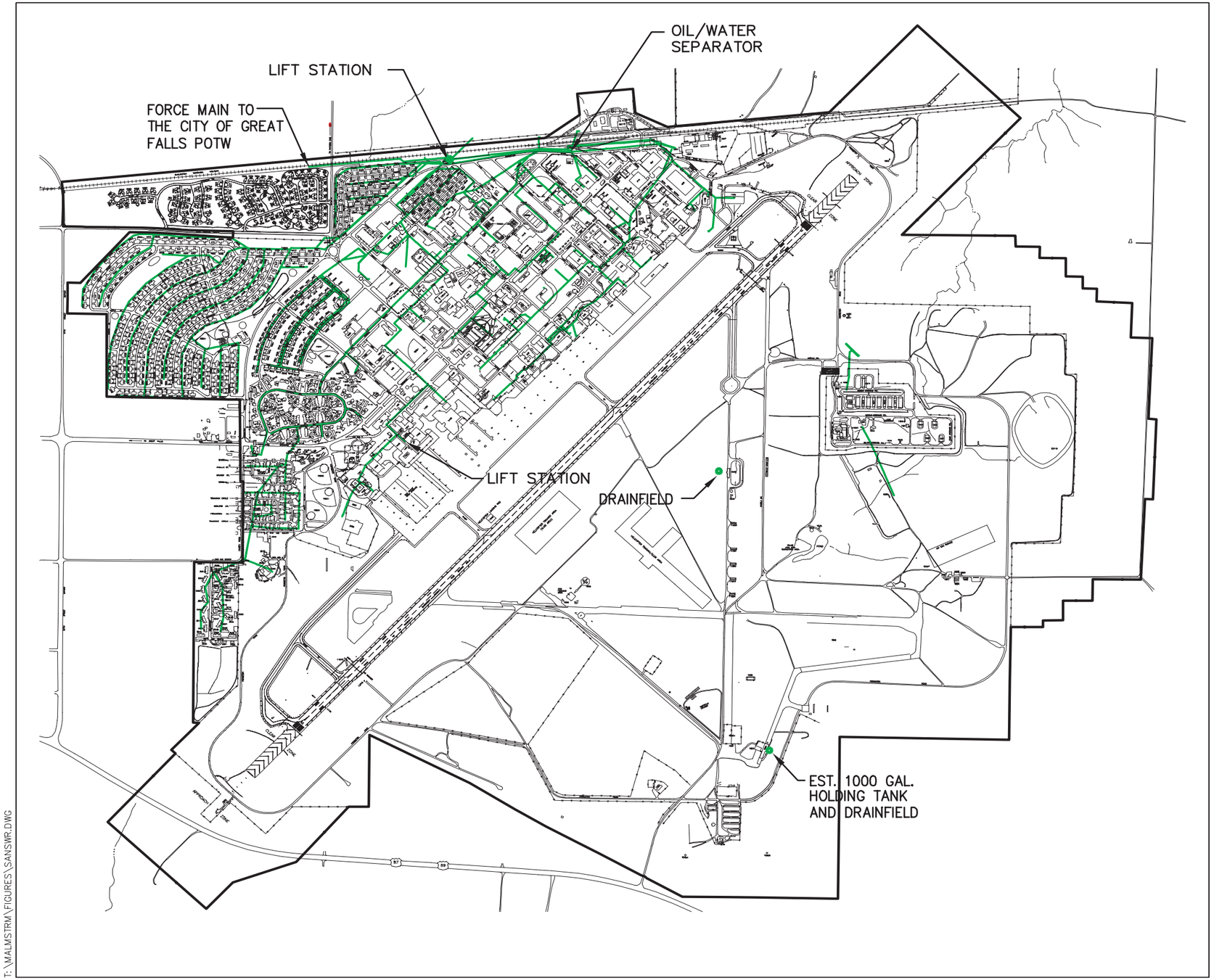

Figure 4.12 Sanitary Sewer System

AFB Boundary

Sanitary Sewer Line

Individual Sanitary Sewer Facilities

NORTH

0 800 1600 3200

SCALE IN FEET

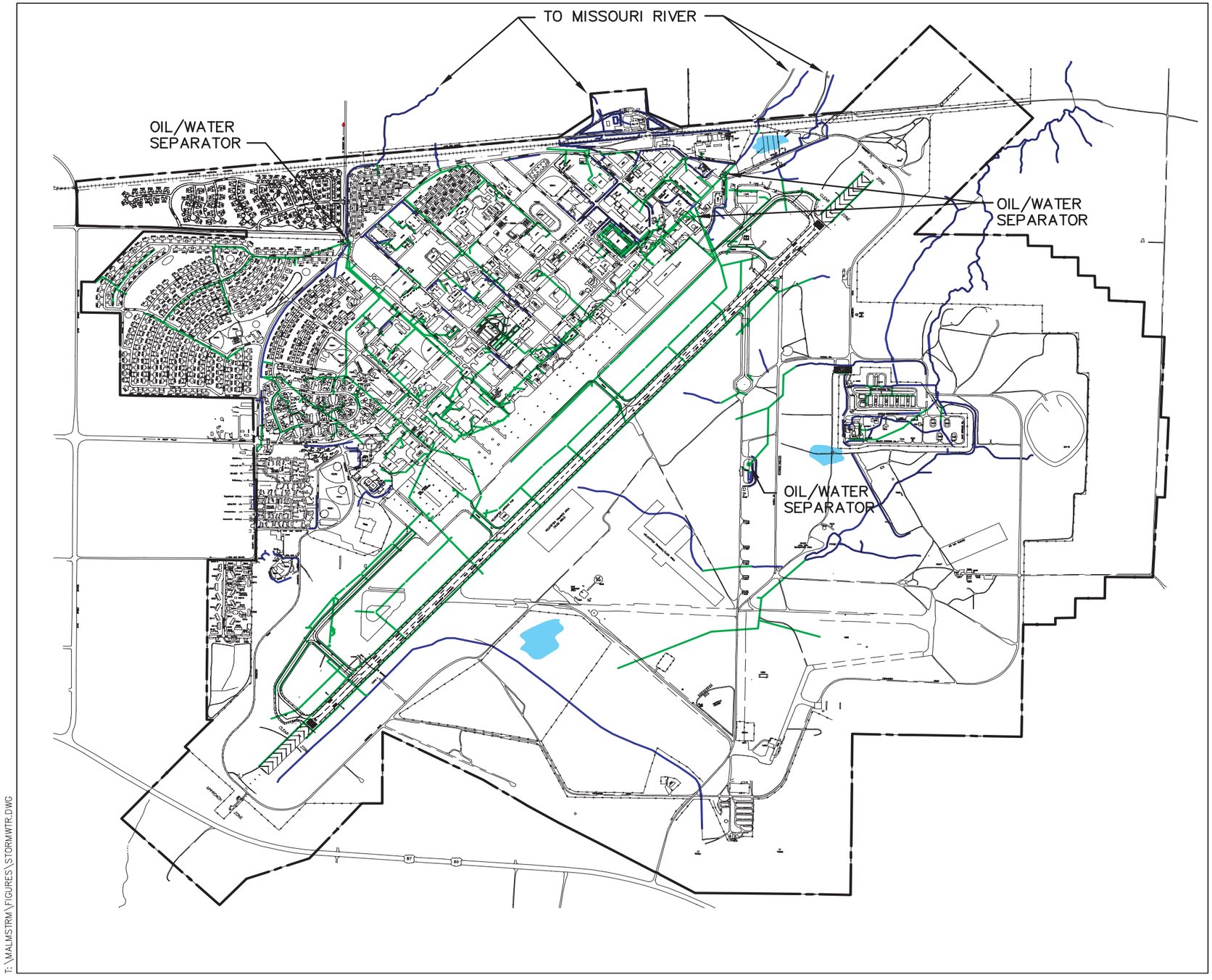

Figure 4.13 Storm Drainage System

AFB Boundary
Constructed Drainage Lines
Open Drainage Channels
Snow Disposal Area

NORTH

0 800 1600 3200

SCALE IN FEET

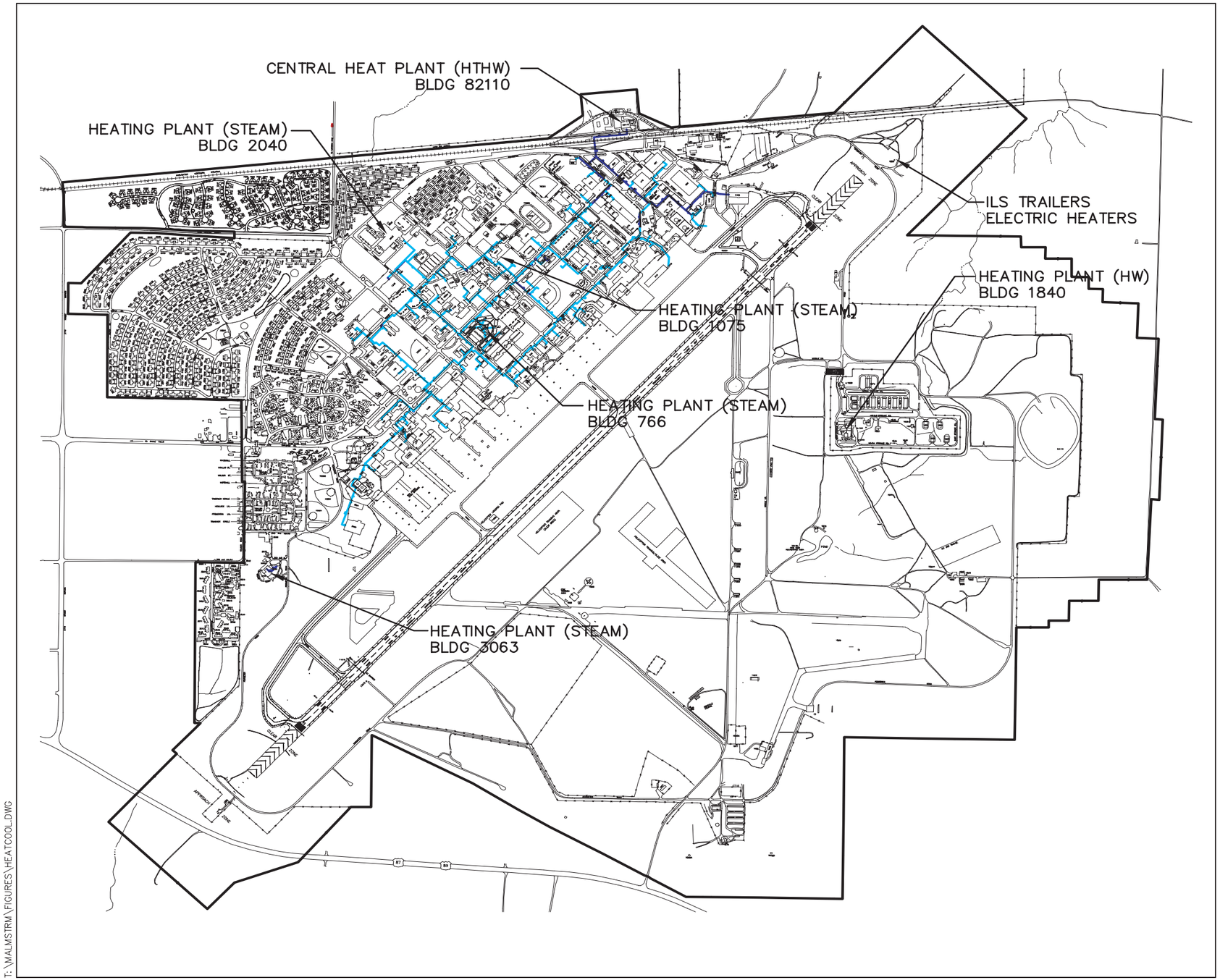

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Figure 4.14
Central Heating System

AFB Boundary
Aboveground Lines
Underground Lines

NORTH

0 800 1600 3200

SCALE IN FEET

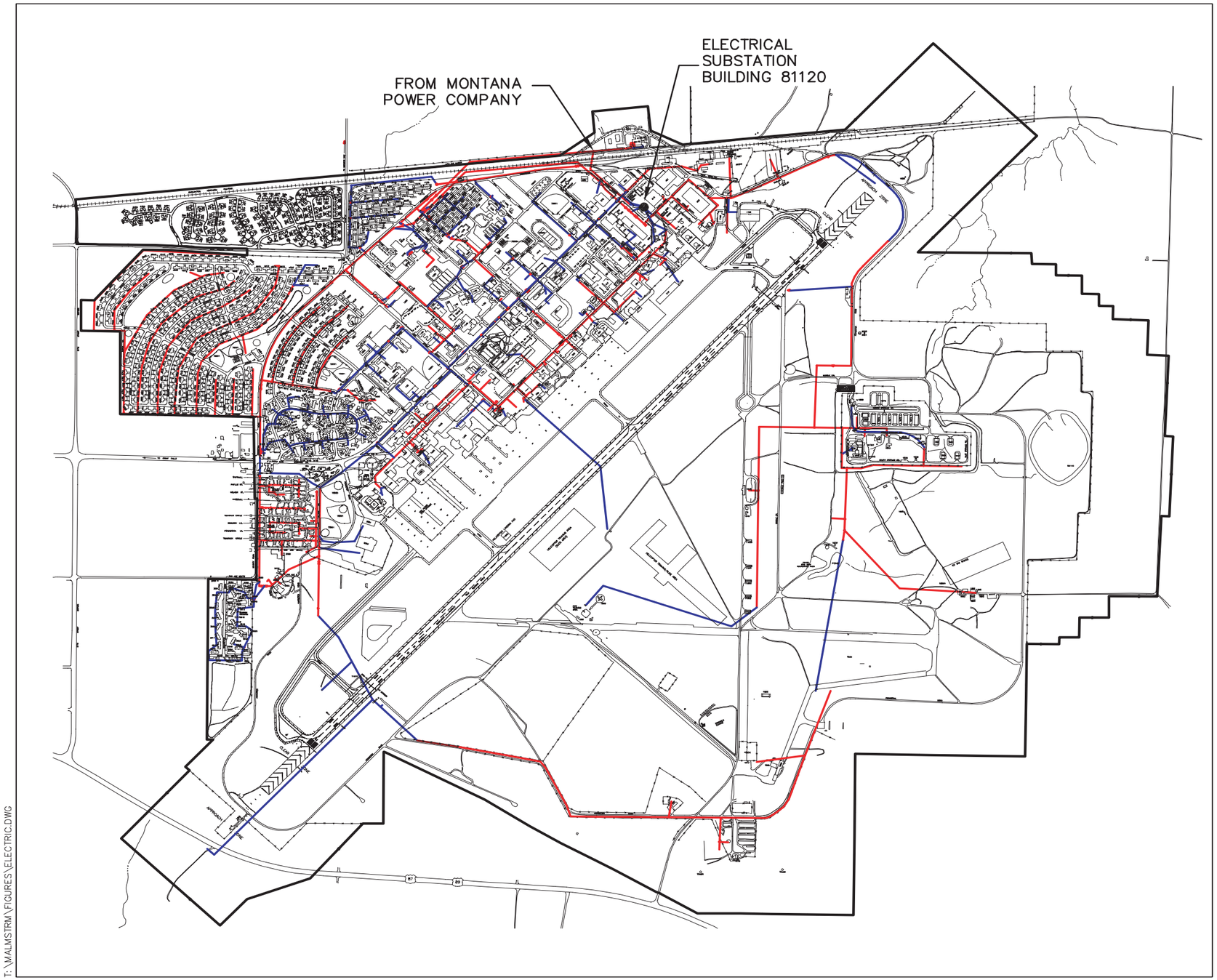

Figure 4.15
Electrical Distribution System

AFB Boundary

Overhead Electric Distribution Lines

Underground Electric Distribution Lines

NORTH

0 800 1600 3200

SCALE IN FEET

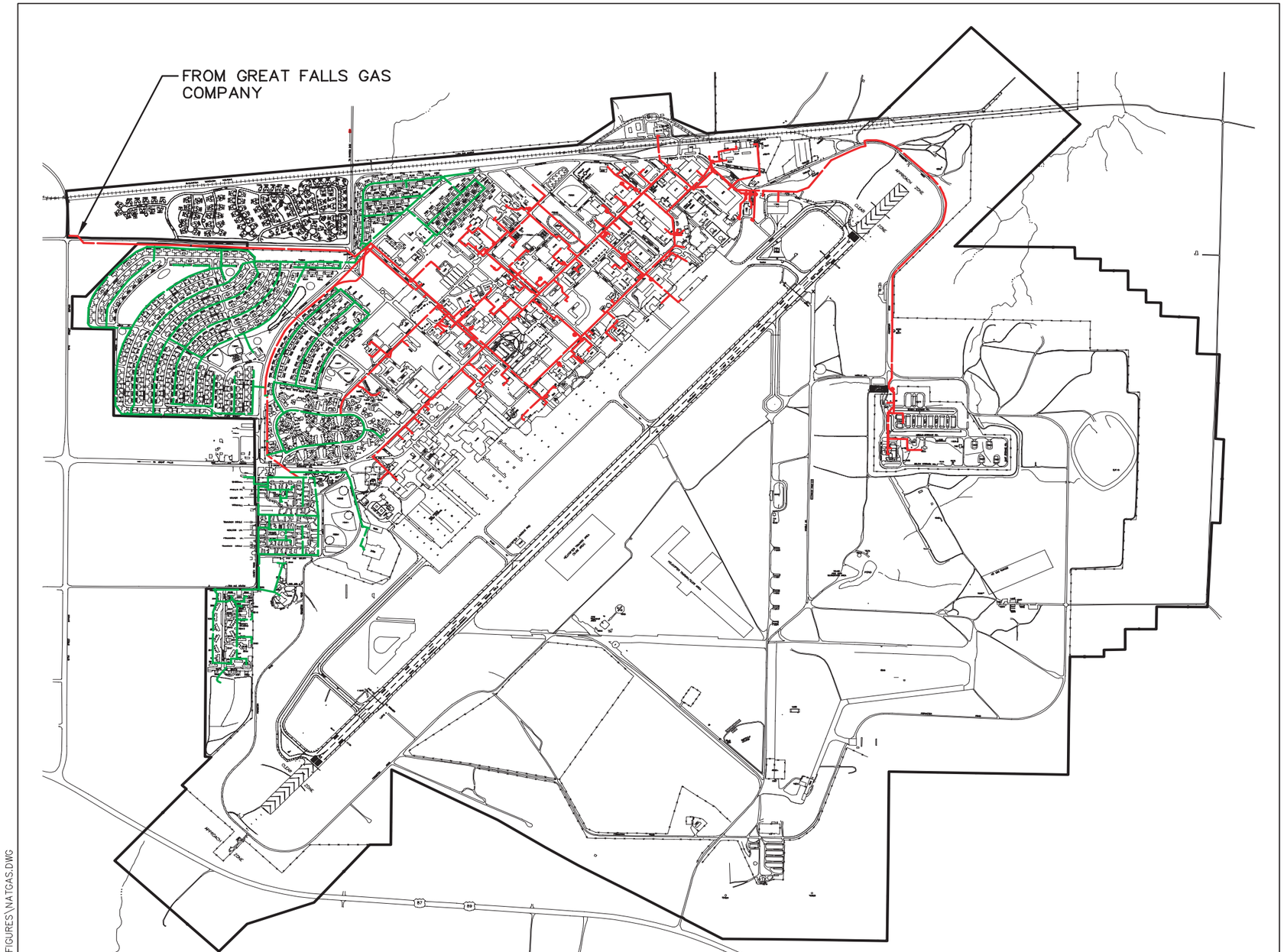

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Figure 4.16
Natural Gas Distribution

AFB Boundary
HP Gas (54 psi)
LP Gas (12 psi)

NORTH

0 800 1600 3200

SCALE IN FEET

Figure 4.19
Existing Land Use

- AFB Boundary
- Airfield
- Runway/Taxiway/Apron
- Aircraft Operations and Maintenance
- Industrial
- Administrative
- Community (Commercial)
- Community (Service)
- Medical
- Housing (Family)
- Housing (Unaccompanied)
- Outdoor Recreation
- Open Space
- Water

NORTH

0 800 1600 3200

SCALE IN FEET

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Figure 4.20
Future Land Use

- AFB Boundary
- Airfield
- Runway/Taxiway/Apron
- Aircraft Operations and Maintenance
- Industrial
- Administrative
- Community (Commercial)
- Community (Service)
- Medical
- Housing (Family)
- Housing (Unaccompanied)
- Outdoor Recreation
- Open Space
- Water

NORTH

0 800 1600 3200

SCALE IN FEET

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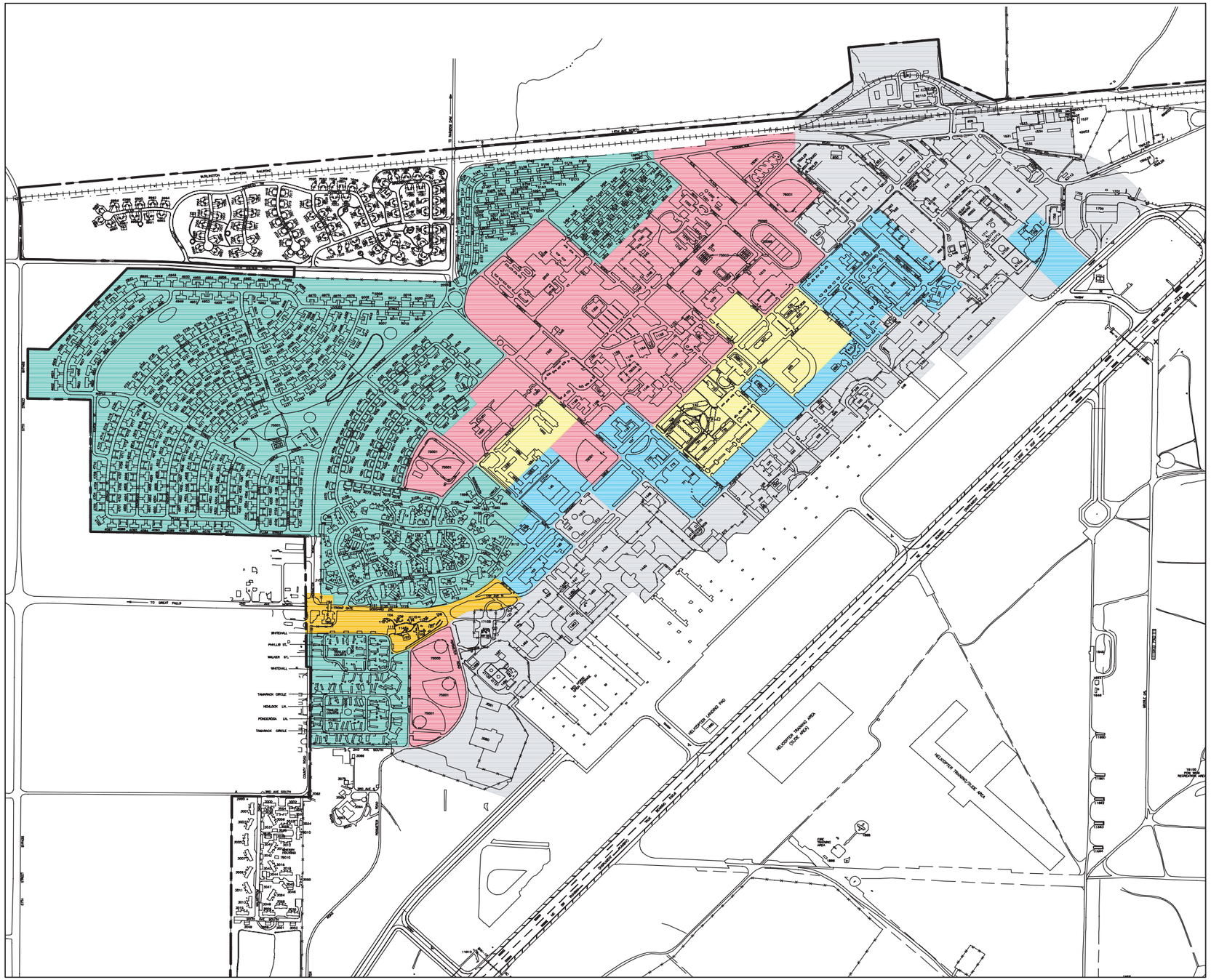
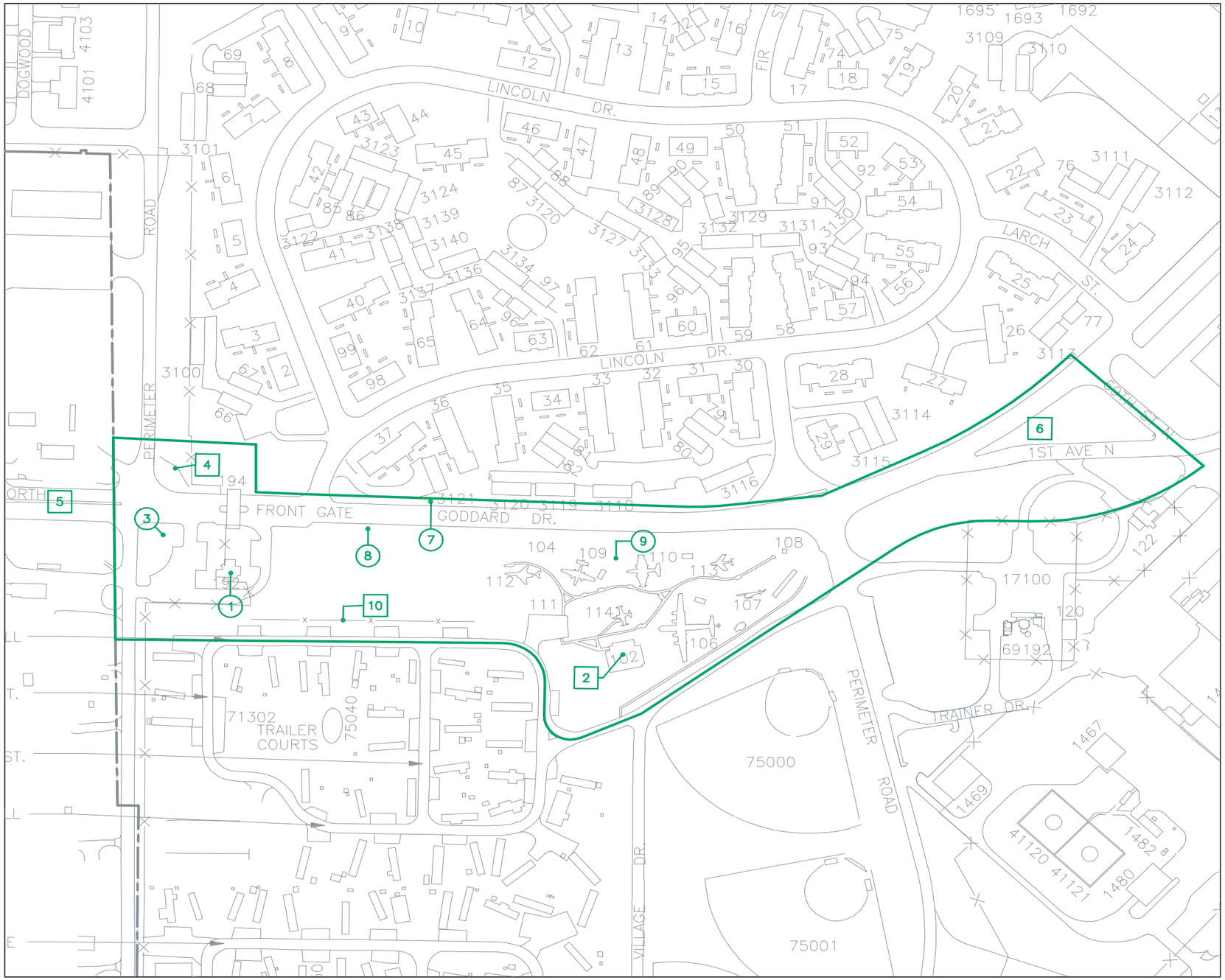


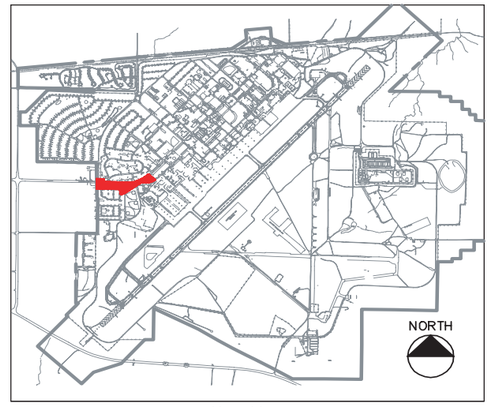
Figure A.1
Visual District Map

Legend

- AFB Boundary
- Administrative
- Community
- Dormitory
- Family Housing
- Industrial / Operations
- South Gate

Figure A.2
South Gate Visual District Assets & Liabilities Key Map





Key Map

Legend

- AFB Boundary
- Asset
- Liability

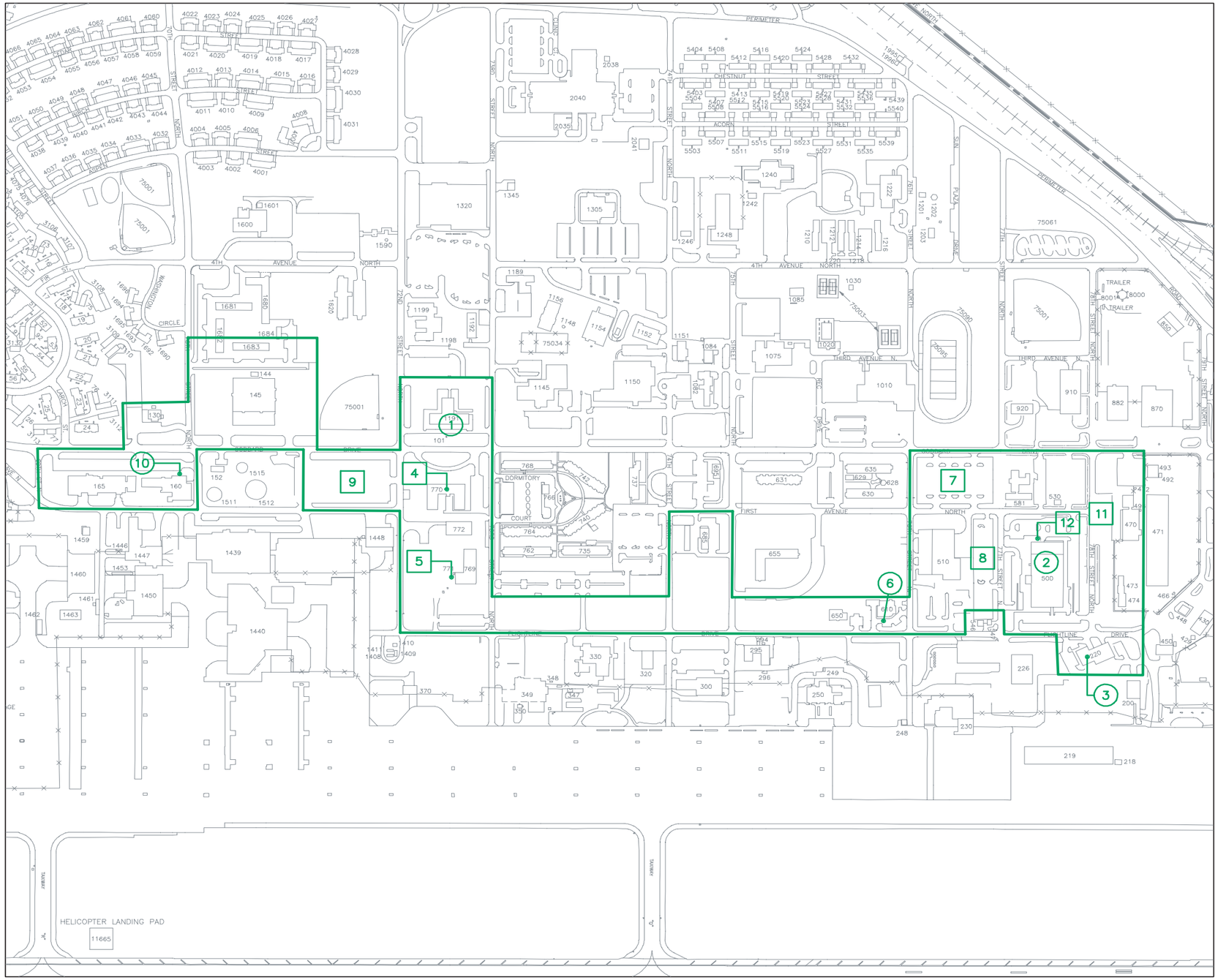
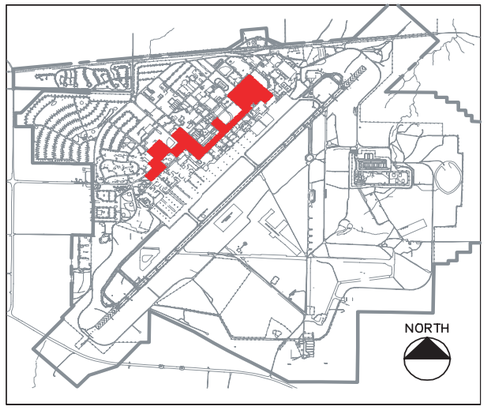


Figure A.3 Administration Visual District Assets & Liabilities Key Map



Key Map

Legend

- AFB Boundary
- Asset
- Liability

NORTH

0 250 500 1000

SCALE IN FEET

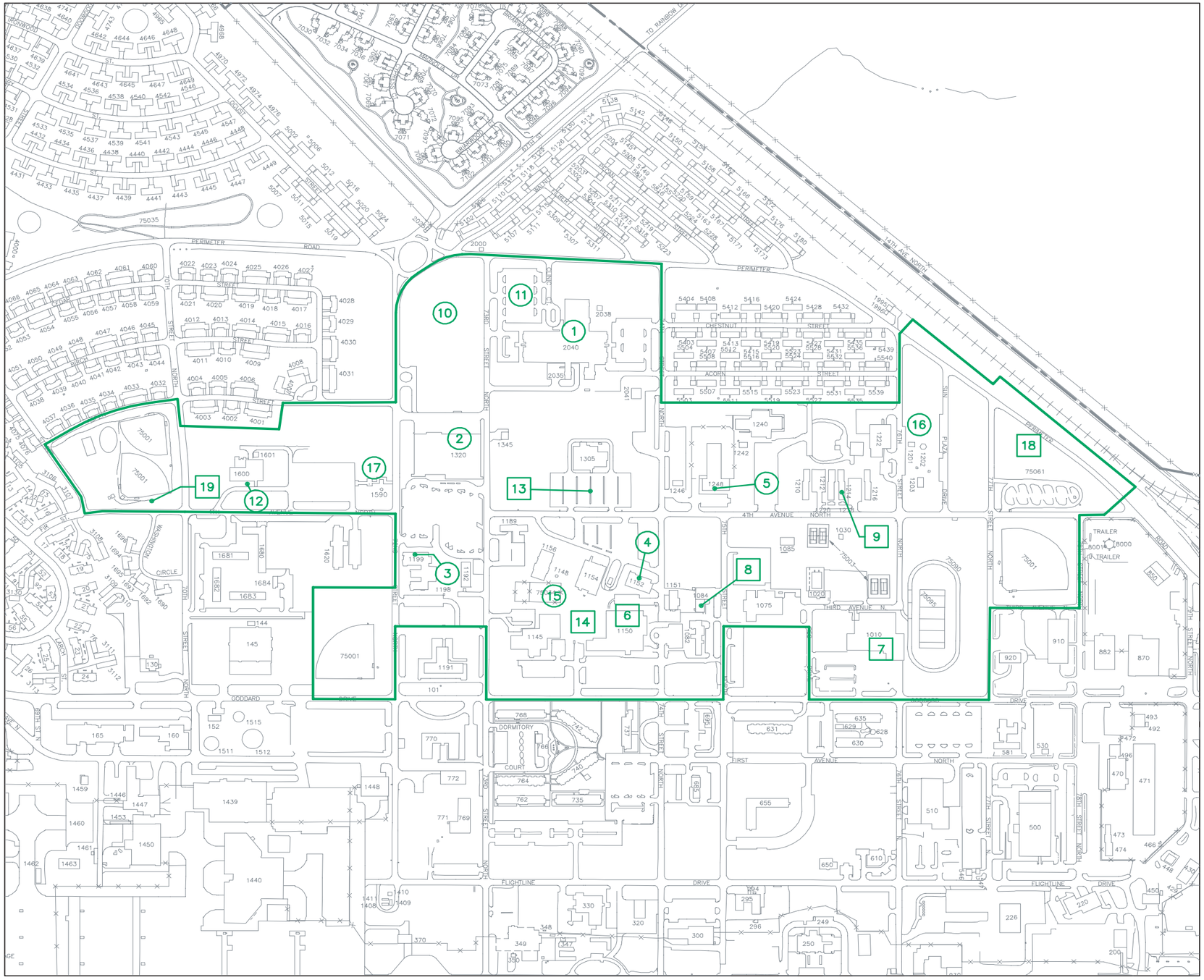
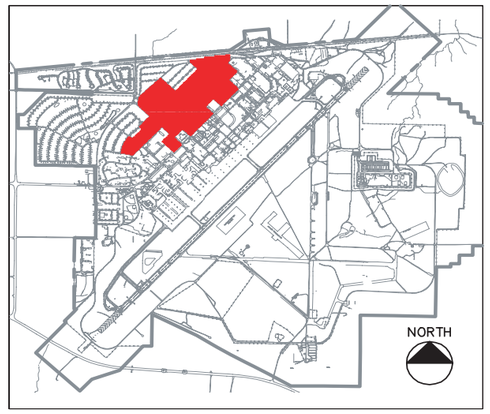


Figure A.4 Community Visual District Assets & Liabilities Key Map



Key Map

Legend

- AFB Boundary
- Asset
- Liability

NORTH

0 250 500 1000

SCALE IN FEET

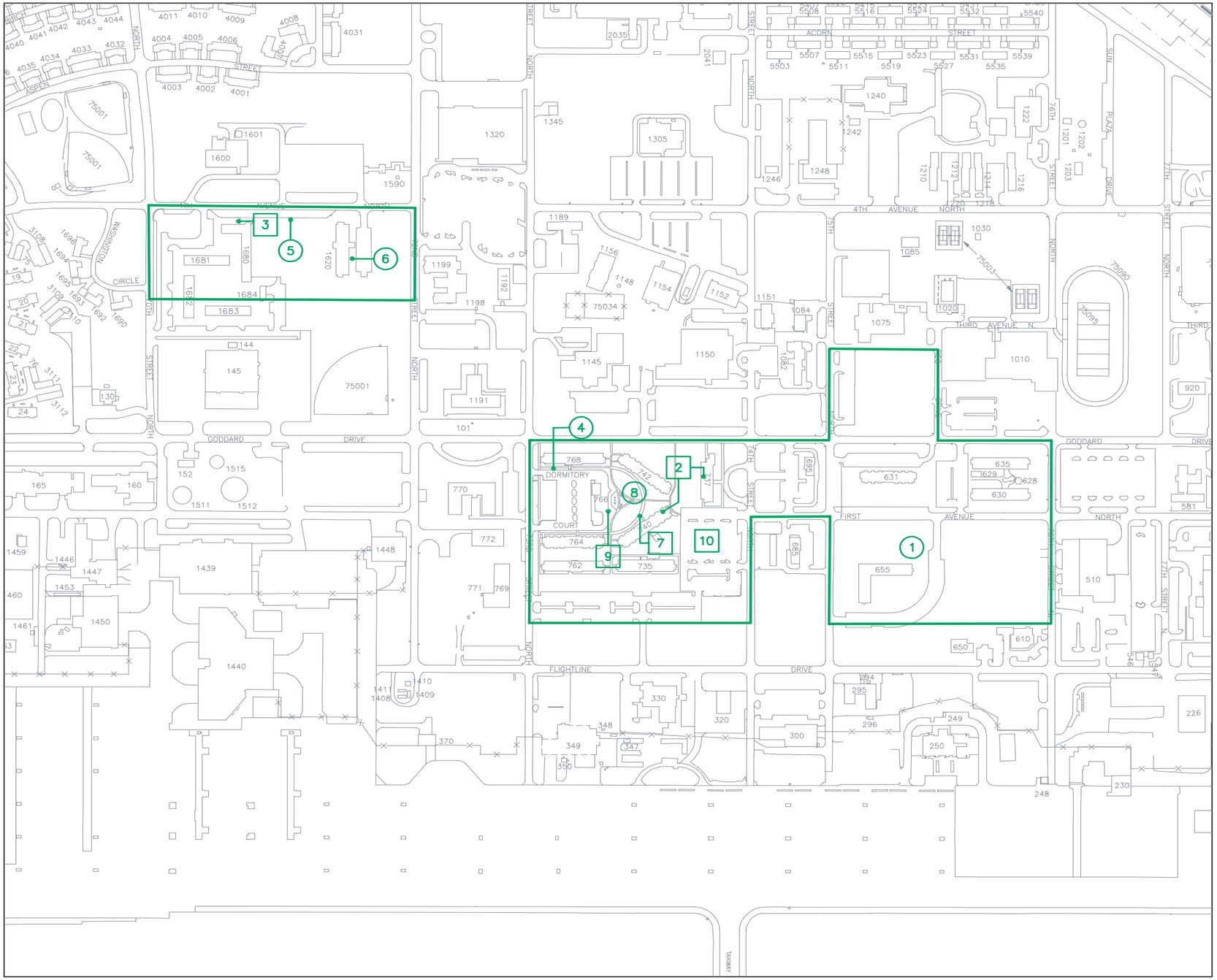
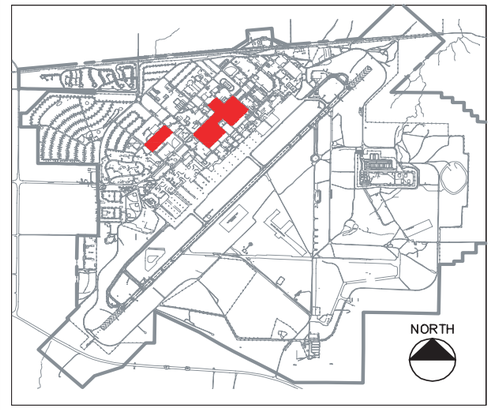


Figure A.5 Dormitory/Quarters Visual District Assets & Liabilities Key Map



Key Map

Legend

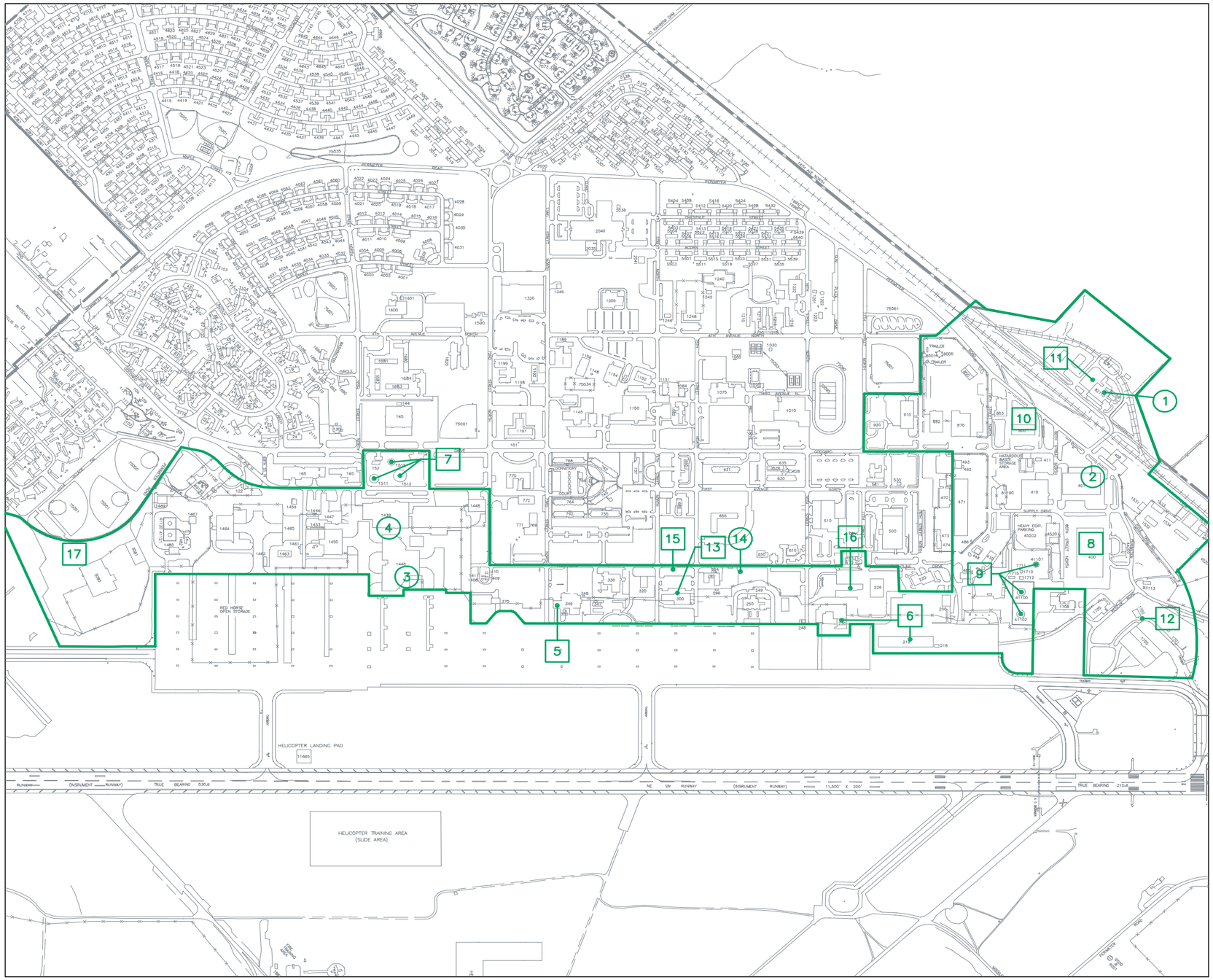
- AFB Boundary
- Asset
- Liability

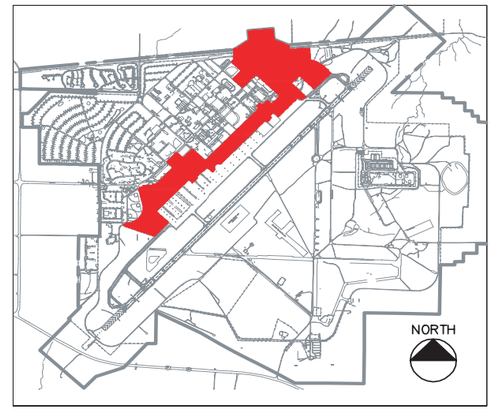
NORTH

0 200 400 800

SCALE IN FEET

Figure A.6 Industrial / Operations Visual District Assets & Liabilities Key Map





Key Map

Legend

- AFB Boundary
- Asset
- Liability

NORTH

0 400 800 1600

SCALE IN FEET

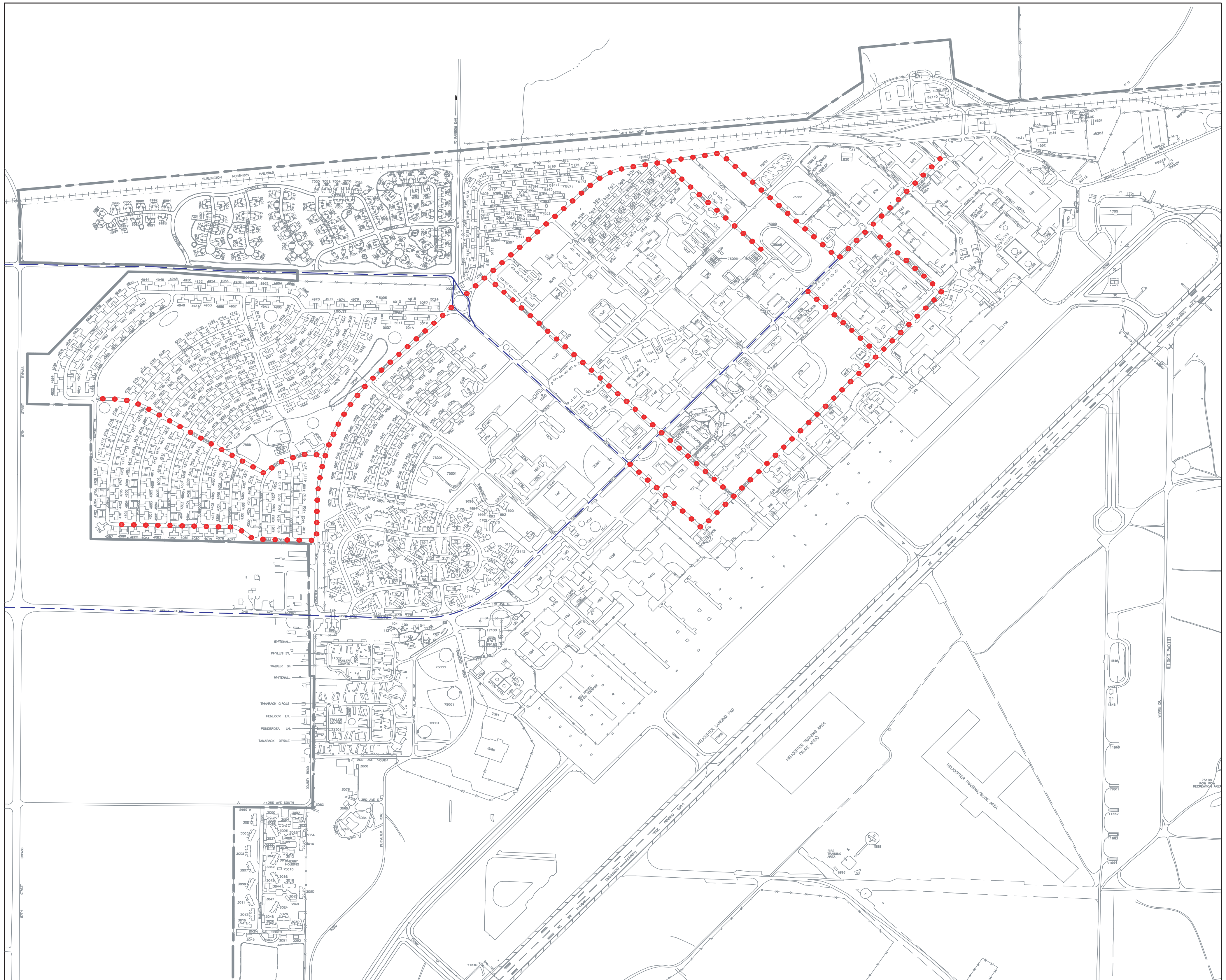
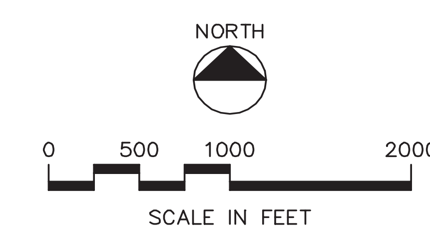


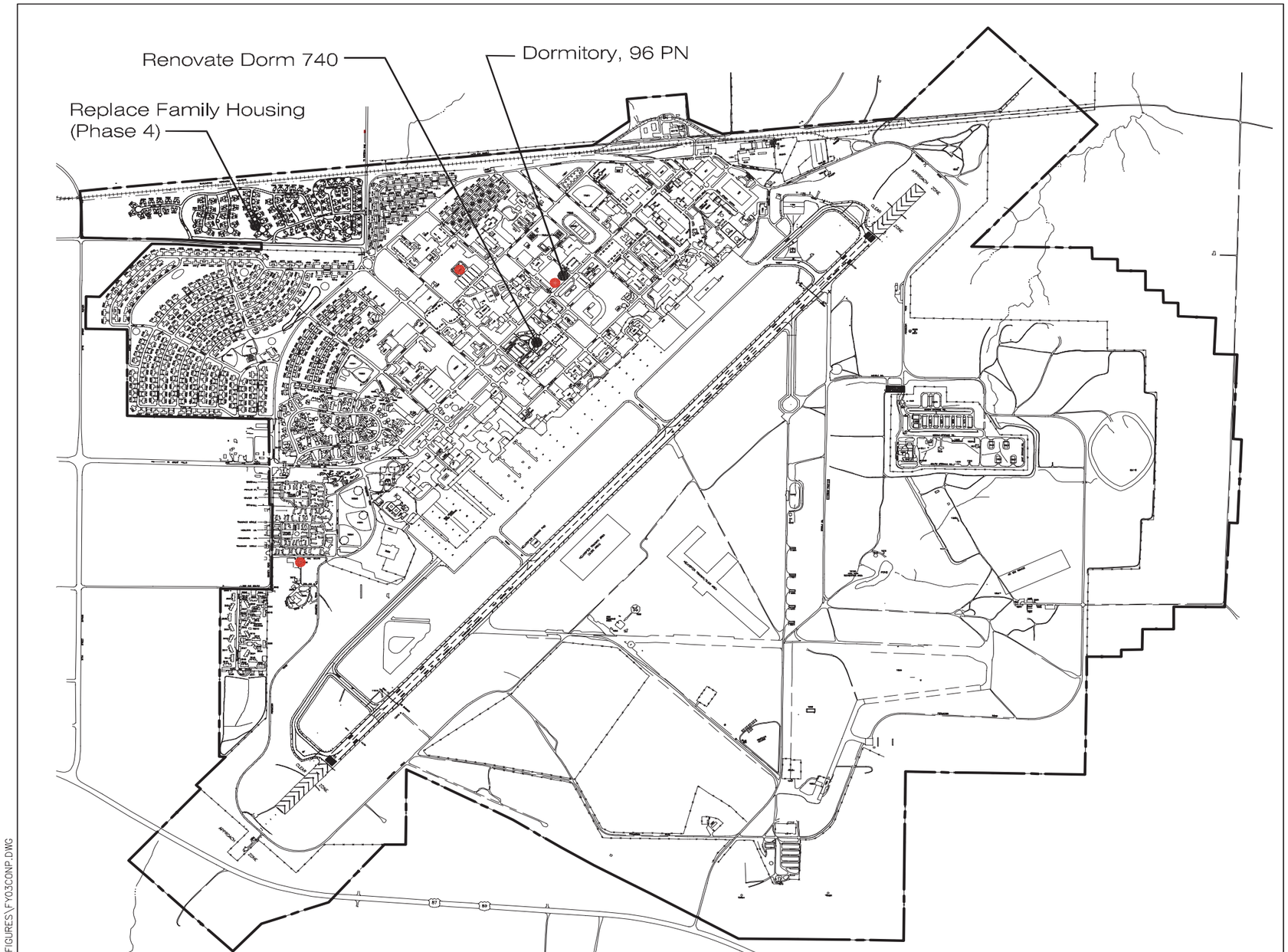
Figure A.7 Roadway Hierarchy Map

Legend

- AFB Boundary
- Primary Roadway
- Secondary Roadway

Note: All roadways not included as either Primary or Secondary are Tertiary Roadways.





Fiscal Year 1999 Consolidated Projects

Reservation Boundary

Demolition Location

NORTH

0 800 1600 3200

SCALE IN FEET

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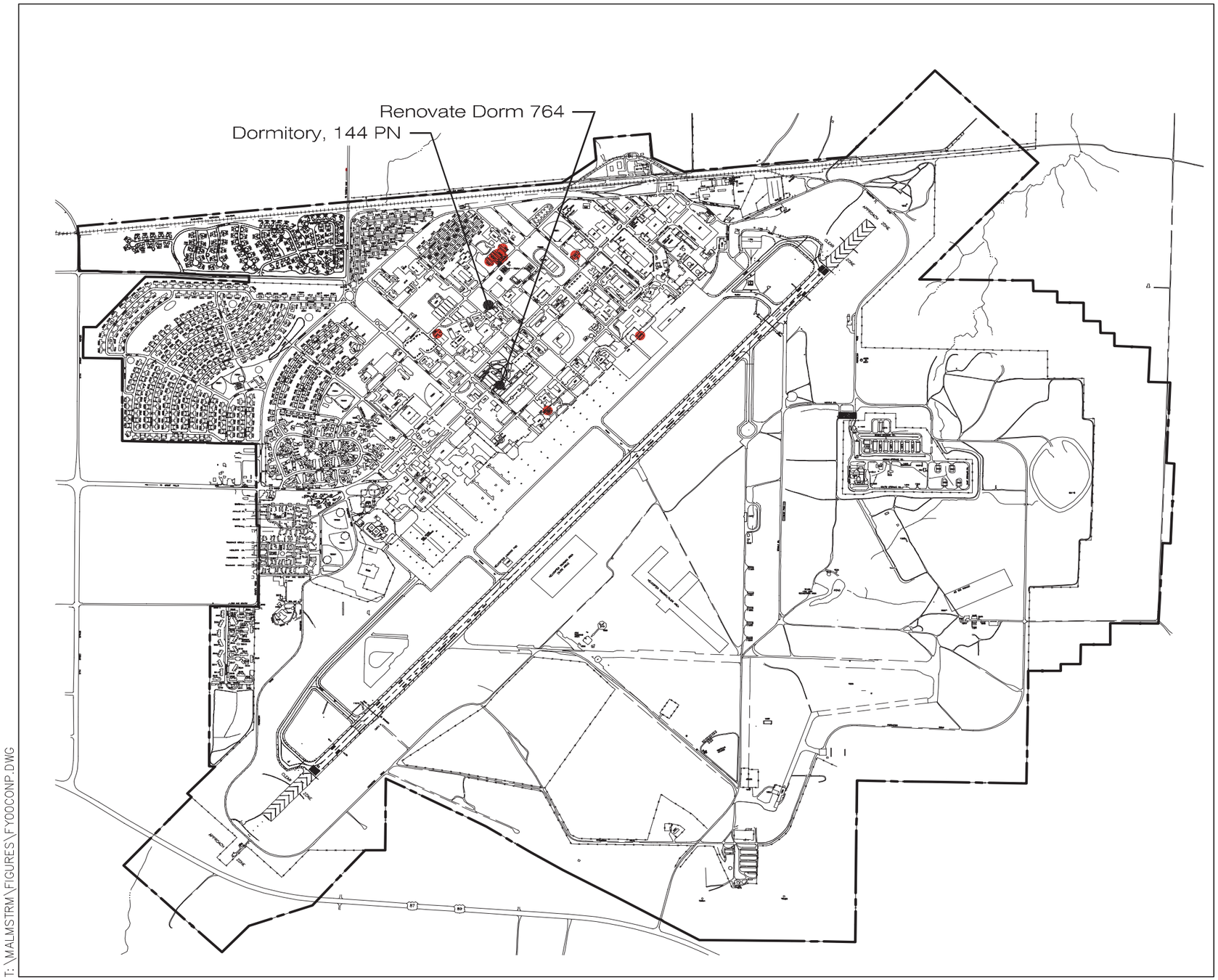

Fiscal Year 2000 Consolidated Projects

Reservation Boundary

Demolition Location

NORTH

0 800 1600 3200

SCALE IN FEET

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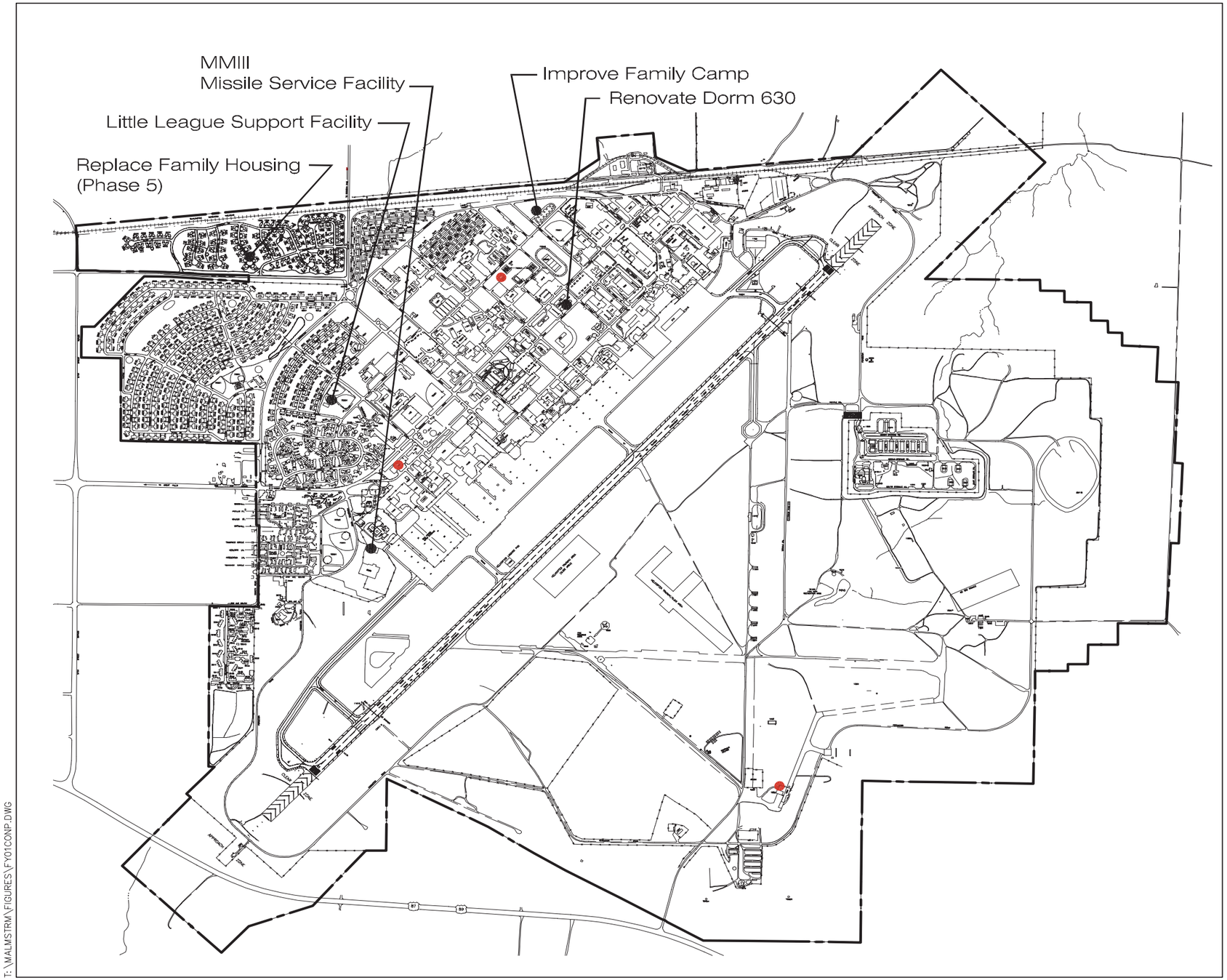

Fiscal Year 2001 Consolidated Projects

Reservation Boundary

Demolition Location

NORTH

0 800 1600 3200

SCALE IN FEET

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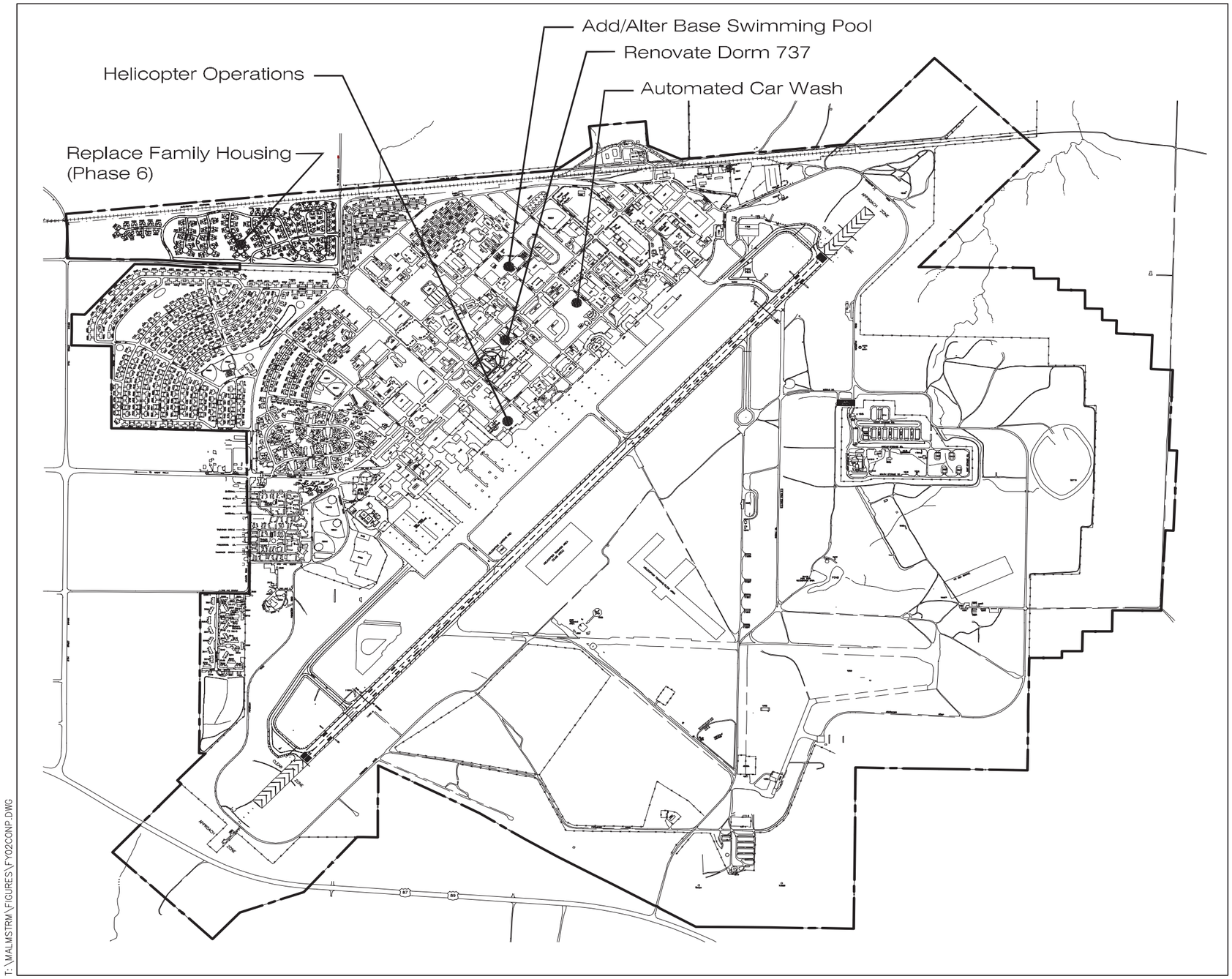

Fiscal Year 2002 Consolidated Projects

Reservation Boundary

Demolition Location

NORTH

0 800 1600 3200

SCALE IN FEET

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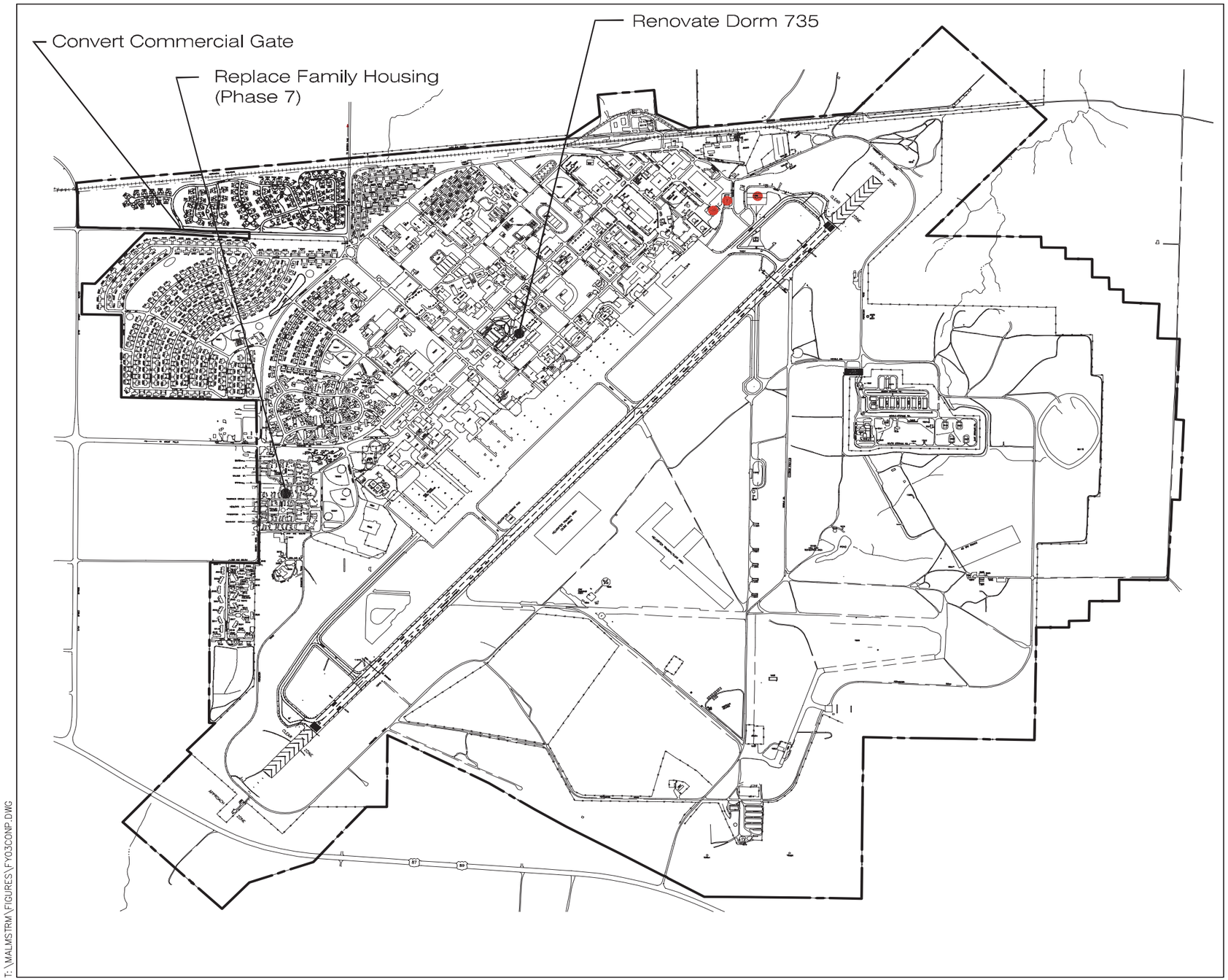

Fiscal Year 2003 Consolidated Projects

Reservation Boundary

Demolition Location

NORTH

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SCALE IN FEET

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