# The General Plan Guide and Template

**U.S. Air Force Comprehensive Planning**

**Prepared for:**

# U.S. Air Force Center for Environmental Excellence

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# APPENDICES

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# PART 1. OVERVIEW

## 1.1 Introduction

The *General Plan Guide and Template* was developed to assist you in preparing a *General Plan*.

**Decision Maker's Document**

In accordance with Air Force Instruction 32-7062, *Air Force Comprehensive Planning*, each Air Force installation is required to prepare a *General Plan*. The *General Plan* is intended to be a "decision makers" document. It should contain sufficient information in a concise format (text, maps, graphics, photographs, etc.) to allow key installation and command personnel to understand the nature of the installation and make knowledgeable and accurate decisions about its development.

The *General Plan Guide* has four major components: *Overview, Planning Primer, Creating a Plan,* and *Template*.

This part, the *Overview*, provides an introduction to the *General Plan Guide* itself.

**Planning Primer**

The *Planning Primer* contains instructional material on the broad subject of *Comprehensive Planning* with specific emphasis on *General Plan* development. The purpose of this part is to point out the key elements that should be considered when developing a plan. Refer to the appropriate *Air Force Planning Bulletins* for additional guidance.

**Creating a Plan**

Part 3, *Creating a Plan*, is a functional guide to assist in the actual process of preparing a *General Plan*. The major topic areas to be addressed in a *General Plan* are listed in this part. A brief description of each topic is presented, followed by recommended *Sources of Data, Helpful Hints Suggested Graphics/Photographs*, and *References*. Use the recommended sources and references to obtain more detailed information about any topic.

**Template**

The fourth major component, the *Template*, contained in Appendix A, explains how to access and use the Microsoft Word 6.0® *General Plan Template* which is on the disk provided with the *Guide*. This disk has been virus checked using The Norton Antivirus Version 3.0®). Follow these instructions to build the *General Plan* using a personal computer.

Appendix B contains a sample Statement of Work to be used if the plan is to be prepared by a contractor. Appendices C and D amplify on information contained in other sections of the *Guide*.

## 1.2 How to use the Guide

**Improve Productivity**

*The General Plan Guide* was developed to meet the needs of Air Force installation community planners with widely varying levels of planning experience. For both the new planner and the experienced one, the *Guide* provides a comprehensive view of the planning process, advice on how to produce a plan, as well as specifics on the contents of a *General Plan*. Overall, the *Guide* is intended to make the job easier and improve productivity.

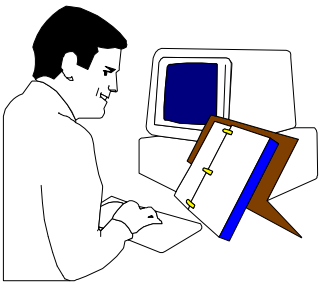
**No Shortcuts**

For new planners, start at the beginning of the *Guide* and review all of the material presented. Understand the entire process before beginning the job of putting a plan together. There are no real short cuts. References to source documents are provided if additional information on a specific area is needed. For an experienced planner, the *Guide* acts as a memory jogger. It provides the essential elements of information needed for your *General Plan*.

Whether you are new to planning or an old hand, the computerized *Template* will be useful. With access to a computer with Windows and Microsoft Word® software, the *Template* provides an automated outline for a *General Plan* and will lead you through the key elements. It will also provide an automated Table of Contents for the document.

## 1.3 Automated Planning Process

The automated *Template* for developing a *General Plan* is only part of an ongoing effort to automate the planning process. Initiatives are underway to develop systems that will automate many of the methods in which planning information is collected, maintained, and disseminated.



It is envisioned that in the not-to-distant future, you will have access, through installation local area networks, to numerous data bases that contain the information you need to do your job. Most prominent among these will be Geographic Information Systems (GISs). Presently, many installations are developing GISs which eventually will contain much of the data needed to assist you. GIS is being designed in accordance with Tri-Service standards which will allow for the transfer of data among the many different types of software and hardware systems in use within DOD today and on those systems yet to be developed.

Keep these technological developments in mind as you prepare or update your plan. Eventually, your *General Plan* will reside primarily on a computer, and you should consider ways to structure the document so as to make information in your plan readily available to other users, such as the Installation Commander.

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# PLANNING PRIMER

## Section A. Introduction

### 2.1 How This Guide Can Help You

**Planning Primer**

- **Introduction**
- **Planning Process**
- **General Plan Document**

This *Planning Primer* is intended to provide you a lead-in to the planning process before you actually begin to prepare a *General Plan*. The *Primer* is divided into three sections, the *Introduction*, the *Planning Process*, and the *General Plan Document*. The *Introduction* gives you a brief background on Air Force comprehensive planning and planning in general. It also provides an introduction to typical funding mechanisms used within the Air Force (and the Department of Defense) and briefly describes the function of the Facilities Board.

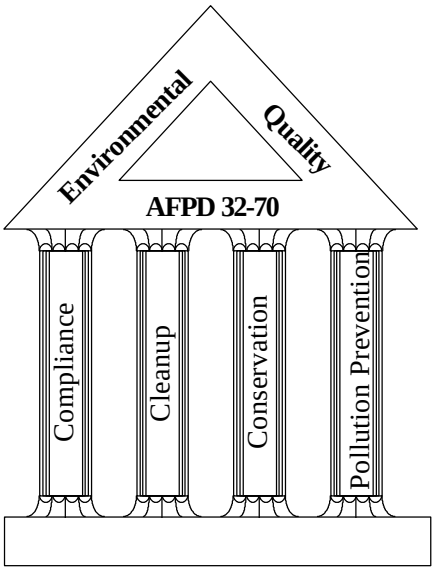
The next section, *The Planning Process*, is an overview of how you should go about identifying the goals of the installation, collecting data, developing and selecting alternatives, implementing your plan, and finally, how to maintain your plan.

The third section, the *General Plan Document*, gives you tips on how to put the *Plan* together. It briefly discusses layout, style and format, graphics and photographs, and printing and binding.

## 2.2 Comprehensive Planning Documents

The basis for Air Force Comprehensive Planning is established in Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*. AFPD 32-70 directs that the Air Force Environmental Quality Program will consist of four pillars:

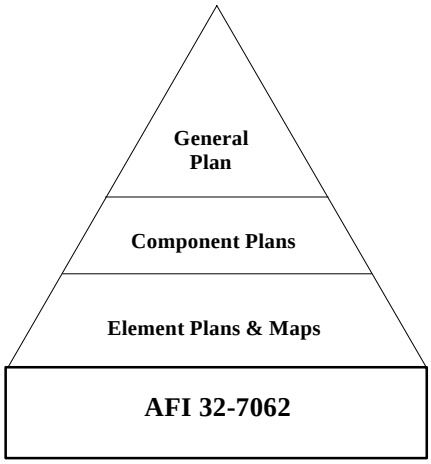
- Compliance
- Cleanup
- Conservation
- Pollution Prevention




The Conservation pillar establishes the requirement for Comprehensive Planning. Air Force Instruction (AFI) 32-7062, *Air Force Comprehensive Planning*, defines a *Comprehensive Plan* as a cumulative body of data, studies, maps, and plans that provides information about your installation, its future development, and the decision-making process. It is composed of all related plans and guidelines, regardless of program, related to the management and development of Air Force lands, facilities, and resources.

AFI 32-7062 further defines the structure of the *Comprehensive Plan* as having four basic parts:

- the General Plan
- component plans
- element plans
- maps




The *General Plan* is the capstone of the *Comprehensive Planning* structure. It compiles the significant aspects of relevant information found in existing *Component Plans, Element Plans*, and *Maps* and presents this synthesized information in a concise, understandable, and readable format. The *General Plan* is not an appropriate vehicle for lengthy treatment or detailed study of installation development issues or concerns, although certainly they must be highlighted. On the other hand, it is an appropriate vehicle to establish and document the need for more detailed study of planning issues or the installation's physical plant.

The next level of planning in the *Comprehensive Planning* structure is made up of the *Component Plans*. The four *Component Plans* identified in AFI 32-7062 are:

- Composite Constraints and Opportunities
- Infrastructure
- Land Use
- Capital Improvements

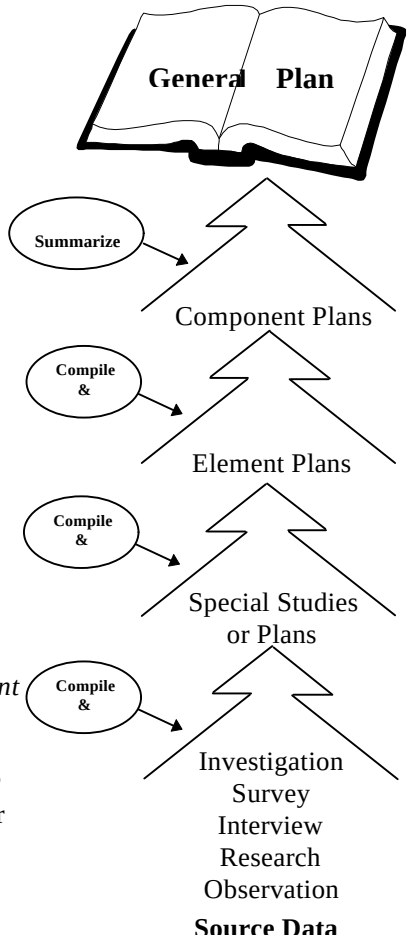
*Component Plans* focus on specific, well-defined aspects of installation development. They contain the detailed data and analyses to support the findings and recommendations presented in the *General Plan.* Each of these plans can be a stand-alone document with its own set of goals and objectives, alternatives, and recommendations. The topical information in this *Guide* will assist you in preparing component plans; however, component plans will require more detailed information than typically found in a *General Plan.*

*Element Plans* are the most basic, narrowly defined, and detailed sources of information, data, documents, and maps that support the comprehensive planning process. These plans and studies are often mandated by other Air Force directives. Examples might include *Cultural Resources Plans, AICUZ Studies, Integrated Natural Resources Management Plans, Land Management Plans, Area Development Plans, etc.*

*Special studies* are those reports and data gathering efforts to identify or better define problems or issues. These studies are often contributing documents for the development of element plans.

Each level of planning builds upon the more detailed information contained in the level below. Thus, source data provides the basis for special studies, special studies are combined into element plans, element plans are consolidated into component plans, and element plans are summarized in the General Plan.

*Maps* are the graphic representation of information presented in all comprehensive planning documents. They support the narrative information and aid the reader in comprehending the material presented in the component plans, element plans, and special studies. In some cases, a *Map* may actually be a compilation of information presented on distinct layers. *Maps* that you produce in support of the installation's *Comprehensive Plan* should be prepared in accordance with the Tri-Service Spatial Data Standards.



| PLAN RELATIONSHIPS | | |
|---|---|---|
| **Component Plan** | **Examples of Element Plans** | **Examples of Special Plans & Studies** |
| **Composite Constraints & Opportunities** | • Integrated Natural Resources Plan<br>• Cultural Resources Management Plan<br>• Environmental Quality Plan<br>• Noise Abatement Plan | • Forest Management Plan<br>• Archeological Survey<br>• Air Emissions Survey<br>• Wetlands Survey<br>• Explosive Storage Siting Plan<br>• Endangered Species Survey<br>• Historic Preservation Plan |
| **Infrastructure** | • Utility Systems Plan<br>• Communications Plan<br>• NAVAIDS<br>• Fire Protection Plan<br>• Energy Conservation Plan | • Water Distribution System Capacity Analysis<br>• Local Area Network System Architecture<br>• Airfield Pavements Assessment<br>• Electrical Power Distribution System Upgrade Plan |
| **Land Use** | • AICUZ<br>• Transportation Plan<br>• JLUS<br>• Installation Layout | • Noise Study<br>• Traffic Study<br>• Airfield Obstructions Study<br>• Functional Relationships Analysis |
| **Capital Improvements** | • Facility Development Plan<br>• Area Development Plans<br>• Housing Community Plan<br>• Architectural Compatibility Guidelines<br>• Landscape Development Plan<br>• Quality of Life | • Space Use Study<br>• Site Plans<br>• Facilities Excellence Plans<br>• Interior Design Guidelines<br>• Outdoor Recreation Plan |

# 2.3 History of The General Plan

## 2.3.1 American Comprehensive Planning

We owe much of the theory of comprehensive planning to early planning pioneers, such as Frederick Law Olmsted Sr. and Alfred Bettman. These two men established the concept of the *General Plan* as a guide to municipal development in the early 1900s. The characteristics of a traditional *General* or *Comprehensive Plan* as articulated by these men hold true today, and are as follows:

- The *General Plan* is a physical plan. It deals not so much with programs and the provision of services, but rather with the tangible dimensions of the community; i.e., land, buildings, roads, and utilities.

- It is long-range. The *General Plan* should look beyond the Capital Improvements Program, which typically covers five years. It is common in civilian and academic circles to look 10 to 20 years in the future.
- The plan is visionary. It considers creative solutions to present and future problems.
- Because of its long range nature, it must be general. It states policy. Detailed and technical studies and analyses are contained in the supporting elements and other contributing documents.
- The *General Plan* is comprehensive. It is all-inclusive in its consideration of physical elements of the community, both individually and in relation to each other. It also considers the physical aspects of the surrounding environment in which the community is situated.
- It is updatable and must be updated on a continuing basis.
- Perhaps most important, it reflects the future development goals and objectives established by the community itself.

**Traditional General Plan**

- **Physical Plan**
- **Long-Range**
- **Has a Vision**
- **It is a "Statement of Policy"**
- **A Decision Makers Guide**

These concepts were codified by the US Congress in 1928 by the Standard City Planning Enabling Act. This important legislation charged local planning commissions with the responsibilities to prepare, implement, and maintain comprehensive development plans.

## 2.3.2 History of Air Force Comprehensive Planning

**NEPA**

While Air Force Comprehensive Planning has its roots in traditional American planning, it was not until the signing of the National Environmental Policy Act (NEPA) of 1969 that comprehensive planning within the Services gained momentum. Since that time, a series of initiatives have been undertaken to ensure that Air Force installations closely monitor their development and provide proper and adequate stewardship of their natural, cultural, and man-made resources.

**Comprehensive Plans**

Air Force Regulation (AFR) 86-4, *Base Comprehensive Planning* was originally written in 1966. In 1984, it was revised and established the requirement for Base Comprehensive Plans (BCPs) for all Air Force installations. The BCP was a composite of information and plans that addressed in detail all areas affecting development on an installation.

**General Plans**

In 1994, the Air Force issued AFPD 32-70, *Environmental Quality*. It directed that environmental resources under Air Force stewardship be "protected and managed in the public interest." In response to this policy, AFI 32-7062, *Air Force Comprehensive Planning*, which superseded AFR 86-4, established the requirement for a *General Plan*. The *General Plan* summarizes information contained in the BCP and relies primarily on the detailed information contained in component and element plans. The *General Plan* holds equal status with component and element plans in the comprehensive planning family. In accordance with AFI 32-7062, the *General Plan* is the only comprehensive planning document required for Air Force installations.

## 2.4 Project Funding Programs

While most Civil Engineering staffs have an individual whose primary function is to program the funding for installation projects, you must have a basic understanding of how the process works. You must become familiar with the many and varied sources that are available to fund construction, maintenance, and repair projects. You should be especially aware of funding issues that could affect facility requirements or could cause land use changes. The following paragraphs briefly describe the primary sources of funding with which you should be familiar:

**Military Construction**

*Military Construction Program (MILCON)*: Consists of the authorization and appropriation of funds to construct and, in some cases, repair military facilities (Mission, Personnel Support, and Mission Sustaining Recreational Activities) that exceed local approval authority. MILCON requires Congressional authorization and appropriation. Projects should be identified at the installation level, and, through the comprehensive planning process, be reviewed, approved, and prioritized by the installation Facilities Board. These projects are then successively reviewed and ranked by the Major Command (MAJCOM), HQ USAF, Department of Defense, and ultimately at the Congressional committee level.

**Family Housing Investment**

- *Family Housing Investment Program*: Includes construction and improvement programs and is funded by the Family Housing Investment appropriation.

    1. The Construction Program is used to construct or replace family housing units and support facilities, such as the Housing Management Office, Housing Maintenance Facilities, and Furnishing Management Warehouse. Like the MILCON program, new/replacement construction projects require project-specific Congressional authorization and appropriation.

2. The Improvement Program is used to do extensive construction work in existing units and associated maintenance and repair required to extend the life of the units by 25 years. It also includes upgrades to other housing facilities, utilities, and pavements, and construction of non-dwelling units costing less than $10,000. For Improvement projects, authorization authority ranges from MAJCOM to Congress, depending on the type of unit involved, and whether or not statutory limits on unit size and cost of work per unit are exceeded. In most cases, the exception being Minor Improvement Projects (MIP), funding must be appropriated through the Congressional Budget Cycle. MIP funds are also annually appropriated, but are reserved for MAJCOMs to be used at their discretion on projects meeting MIP criteria.

**Operations & Maintenance**

- *Operations and Maintenance (O&M) Program* The O&M Program is a means by which work may be accomplished in most facilities on the installation. This program may fund construction-type work costing less than $300,000, as well as maintenance and repair projects. Exceptions are Family Housing, which has a separate O&M account, and some work in Nonappropriated Fund activities. O&M, as MILCON, will have a significant impact on current and short-range aspects of your planning work. O&M Program funds are appropriated to the services, and eventually to the installations, in lump-sum amounts. Most O&M projects may be authorized by the MAJCOM. This authority may be further delegated to the installation.

**P-341 Minor Construction**

- *P-341 Funding* Occasionally, construction requirements exceed O&M authority but can't wait for the MILCON program. Such requirements, costing less than $1,500,000, may be accomplished through a special program called P-341 Minor Construction. Annually, Congress appropriates a small amount of funding for this program. However, because this funding is extremely limited, installations must be able to justify the urgency of the projects. The Deputy Assistant Secretary of the Air Force (Installations), SAF/MII, authorizes P-341 projects and notifies Congress within 30 days.

- *Family Housing Maintenance and Repair:* Part of the Family Housing operating fund appropriation is used to accomplish major and minor maintenance and repair, as well as some associated construction work (termed Minor Alterations). Like the regular O&M Program, these funds are appropriated to the services, and eventually to the installations in lump-sum amounts. Authorization for these types of projects is normally provided by the MAJCOM; however, it may be delegated to the installation.

**Family Housing Maintenance & Repair**

- *Environmental Restoration and Cleanup Projects:* These projects are funded by other subcategories of the O&M program through the *Defense Environmental Restoration Account (DERA).* DERA funds are dedicated to environmental projects within the Department of Defense O&M budget. These projects require Major Command and HQ USAF approval, and are typically initiated by the installation Environmental Office.

**Environmental Restoration & Cleanup**

- *Nonappropriated Funds (NAF):* NAF funds, those not appropriated annually by Congress, originate from revenue generating sources such as golf courses and bowling alleys. These funds support new construction, and in some cases, maintenance and repair, on revenue generating activities and are managed by three different NAF instrumentalities.

**Nonappropriated Funds**

1. *Services:* These activities include Morale, Welfare, and Recreation (MWR), Lodging, and Food Service facilities. Small NAF Service projects may be funded and approved locally. Larger projects compete for centrally controlled NAF funds. Funding for these larger projects is approved by the Air Force MWR Advisory Board, and authorization ranges from the Deputy Assistant Secretary of the Air Force (Installations), SAF/MII, to Congress.

2. *Army/Air Force Exchange Services (AAFES):* Examples of these are the Base Exchange (BX) and other sales outlets on the installation. Funding for projects is approved by AAFES. Authorization ranges from the MAJCOM (may be delegated to the installation) to Congress.

3. *Privately Owned Activities:* Funding is approved by the activity using the facility (e.g., credit unions or banks). Most of these projects must be authorized at or above the HQ USAF/CE level.

- *Tenant and Associate Funding* Tenant and associate units usually provide the funding for construction or alteration of facilities they use. Although the funding programs are the same as in the host unit, the advocacy for the project and its defense through the approval and appropriation process is accomplished by the tenant's Major Command. It is important that the tenant and associate units be represented on the installation Facilities Board so that tenant projects can be integrated with the installation's General Plan.

**Tenant/Associate Funding**

- *Other Funding Sources* Other funding sources may be available depending on the situation at your installation. Examples of other sources include the North Atlantic Treaty Organization (NATO), Host Nation Programs, Department of Defense Dependent Schools (DODDS), Defense Commissary Agency (DeCA), and Base Realignment and Closure (BRAC) Commission.

**Other Funding Sources**

# 2.5 Boards and Committees

## 2.5.1 Facilities Board

Each installation has a number of boards, committees, and panels which, to varying degrees, can affect facility planning. From a planning perspective, the most significant of these is the Facilities Board (FB). The FB plays a significant role in the planning and programming of facilities on an installation. You will be a key participant of this board and should become intimately familiar with its structure, responsibilities, and operating procedures.

**Facilities Board**

The FB is chaired by the Installation Commander and is composed of both voting and nonvoting members representing each major function and tenant unit on the installation. It provides corporate review and recommendations regarding the use of real property facilities and civil engineering resources in support of the mission. The following actions must be validated, prioritized, and approved by the FB:

- real property maintenance and repair projects above CE approval authority
- minor construction projects above CE approval authority
- the Military Construction Program (MILCON)
- the Military Family Housing (MFH) program for maintenance and repair and post-acquisition construction
- use of existing facilities
- the installation *Comprehensive/General Plan*
- facility sitings
- proposed acquisition or disposal of real property
- annual Real Property Inventory
- all proposed real property use changes
- annual review of airfield obstruction waivers

## 2.5.2 Base Operating System Resource Allocation Team

At the Major Command level, a Base Operating System Resource Allocation Team (BOSRAT) performs essentially the same functions as an installation-level FB. It validates, prioritizes, and approves facility programs submitted by its subordinate installations.

**BOSRAT**

### 2.5.3 Environmental Protection Committee

**Environmental Protection Committee**

Another group that could have a significant impact on installation development plans is the Environmental Protection Committee (EPC). The EPC is charged with achieving and maintaining environmental quality on an installation and oversees installation compliance with local, state, and federal environmental guidelines. It must review and approve environmental impact analyses on proposed actions and make recommendations to decision makers.

### 2.5.4 Other

Other functional agencies which may influence planning, and with whom you should coordinate your plans, include operations, logistics, and communications. Seek other installation and command level boards or committees that could impact planning on your installation. Either volunteer to be member as a CE representative or be placed on the distribution list for meeting minutes. It is important that you develop a feedback system that will provide regular updates on potential projects.

## 2.6 Other Planning Resources

**Planning Assistance Team**

Groups that can provide planning assistance include Planning Assistance Teams (PATs) and the Military Traffic Management Command (MTMC). PATs are ad hoc groups that can be organized to address a variety of planning issues on installations. For example, once a problem has been identified on an installation, the MAJCOM, in coordination with the Air Force Center for Environmental Excellence (AFCEE), may want to assemble a PAT to visit the installation and make recommendations on how to solve the problem. Team members typically consist of representatives from agencies across the Air Force, the Department of Defense (DOD), or others with expertise in the problem area.

**MTMC**

From a planning perspective, MTMC specializes in issues relating to road networks on and off military installations. MTMC validates the requirement for off-base road improvements based on the mission of the installation. In some situations, MTMC also recommends that DOD funds be reprogrammed and/or spent for improvements to roads outside the installation to improve access.

Also, the Air Force Institute of Technology (AFIT) offers a two week course, Management 520, *Comprehensive Planning Development*, which is recommended for all Community Planners.

## 2.7 References


a. U.S. Air Force. HQ AFCESA/DMGM. 1994. *Air Force Instruction 32-1031, Operations Management.*

b. U.S. Air Force. HQ USAF/CEHH. 1994. *Air Force Instruction 32-6002, Family Housing Planning, Programming, Design, and Construction.*

c. U.S. Air Force. HQ AFCEE/DGP. 1994. *Air Force Instruction 32-7062, Air Force Comprehensive Planning*. Contains responsibilities and requirements for comprehensive planning and describes procedures for developing, implementing, and maintaining the *General Plan* within the installation Comprehensive Plan.

d. U.S. Air Force. HQ USAF/CEP. 1994. *Air Force Instruction 32-1021, Planning and Programming of Facility Construction Projects.*

e. U.S. Air Force. HQ USAF/CECP. 1994. *Air Force Instruction 32-1022, Planning and Programming of Non-Appropriated Fund Facility Construction Projects.*

f. U.S. Air Force. HQ USAF/CEP. 1994. *Air Force Instruction 32-1032, Planning and Programming Real Property Maintenance Projects Using Appropriated Funds.*

g. U.S. Air Force. Directorate of Engineering and Services. 1989. *Comprehensive Planning Approach and Process.* Provides an overview of the comprehensive planning process and a general guide to preparation of comprehensive plans for U.S. Air Force installations.

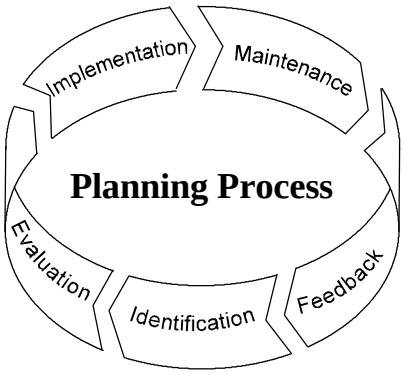
h. Kent, T.J. Jr. 1990. *The Urban General Plan.* Chicago: Planners Press, The American Planning Association. A classic discussion of the issues faced by contemporary planners with regard to the content, organization, specificity, user, and uses of the *General Plan*.

i. So, Frank S., and Judith Getzels. 1988. *The Practice of Local Government Planning.* Washington: International City/County Management Association. Provides an overall introduction to planning and how it is done in local government. Part I discusses the historical development of planning and provides an excellent discussion of General Development Plans.

# Section B. Planning Process

Planning is a process that promotes informed, sound, and coordinated decisions on future installation development. The planning process consists of five major steps:

- *identification* of mission, goals, existing conditions, and requirements;
- *evaluation* of opportunities, constraints, and alternative solutions;
- *implementation* of the preferred alternative;
- *maintenance* of the plan; and
- *feedback.*




## 2.8 Identification

### 2.8.1 Mission

The first step in the planning process is to understand the purpose of the installation and its mission. The mission is the most important element affecting an installation's future development. It dictates the functional requirements and influences the sociocultural character and physical appearance of the installation. You must become familiar with the mission and its effect on land use and the way of life of the installation community.

### 2.8.2 Goals and Objectives

To provide a focus for the planning effort, you must identify the goals and supporting objectives and actions for the installation at the outset of your planning effort. These are usually developed according to the following guidelines:

- A *goal* is a clear statement of a desired end state. It should be
- attainable, yet it is not necessarily quantifiable.
- An *objective* is a component of, and something that leads toward
- the goal. Objectives are usually quantifiable.
- An *action* is a direct and positive step toward accomplishment of objectives.

The Commander's goals for your installation and vision of what the installation should look like in the future may be found in the installation's mission statement, contingency plans, or Strategic Plan. If these are not already stated in existing documentation, you must help develop them. One very effective way of doing this is in a process called "visioning". More on visioning is contained in Appendix D. Briefly, it is a participatory process leading to development of a *vision statement* that articulates the installation's response to current and future mission requirements. It provides a focus for subsequent framing of goals and objectives. Once these have been identified, you should assist in the development of actions and tasks that support them.

**Mission**
⇩
**Vision Statement**
⇩
**Goals**
⇩
**Objectives**
⇩
**Actions**
⇩
**Tasks**

As you proceed through the planning process, always keep the purpose for the *General Plan* at the forefront of your thinking. The plan is for decision-makers. It provides minimum detail in a concise format so they can understand the character and structure of the installation. It is a flexible document that can change easily with changes in mission, goals, and priorities. It contains realistic and practical recommendations for development of the installation.

## 2.8.3 Social and Economic Factors

Many people will be affected by the actions resulting from the recommendations in the General Plan and its supporting components, elements, and special studies. If correctly executed, the impacts will be positive. By nature, the comprehensive planning process is concerned with the human aspect of land uses and development proposals. There are significant demographic, economic, and social equity factors that should be researched and analyzed as a basis for any comprehensive plan. As community planners, we must provide land uses that respect the individual quality of life for those people on and around the installation.

The Air Force installation does not exist as an isolated activity. It is an integral part of the ecological, economic, social, and political systems within the geographical area in which it is located. The installation generates various effects on the community. In turn, the community affects the installation. These effects cover the spectrum of human and natural relationships. Ignoring such relationships can adversely affect the off-base population, and sometimes those with the least ability to respond.

There are several special studies or element plans that provide you guidance and information in determining the social and economic impacts of installation actions and operations. They are the range of NEPA studies (EA, EIS, PEIS, etc), Air Installation Compatible Use Zone (AICUZ) Studies, Noise Studies, and the Socioeconomic Impact Analysis Study (SIAS). The AICUZ and SIAS are the most focused studies in this subject area.

## 2.8.4 Data Gathering

Your next step in the planning process is the collection of data to assess the existing conditions of the installation. Data collection gives you an insight into the installation's environment and operation, as well as a view of the opportunities for and constraints to development.

**Data Categories**

- **Natural Environment**
- **Built Environment**
- **Sociocultural Environment**

### 2.8.4.1 Types of Data Required

Data needs can be grouped into the following three broad categories;

- *The natural environment*: Comprised of air, water, wildlife, and land resources. Wetlands, threatened and endangered species, topographical features, and geological features are examples of the natural environment that may exist on or around your installation.
- *The built environment:* Consists of man-made structures such as buildings, roads, and utility systems.
- *The sociocultural environment:* Comprised of those institutions, systems, activities, and relationships that affect and characterize the day-to-day lives of the members of the community. Your discussion will include data regarding the social and economic relationship of your installation with the local community.

**Questions to ask**

Preparing a *General Plan* for an installation requires that you collect significant amounts of accurate information. One of your major challenges will be identifying the reasonable limits of data collection. The data you collect should answer the following questions:

- What are the current problems that may affect development on the installation and that require solutions in the plan?
- What are the controversial issues requiring resolution before the plan can address the problems?
- What resources does the installation now have? (e.g. natural, built, sociocultural)
- What are the requirements as perceived by command, staff, and other users?

### 2.8.4.2 Documents Required

Reviewing existing documents will familiarize you with current plans and policies. Some of the documents and plans maintained by either the installation civil engineering staff or Environmental Office are:

- utility studies
- natural and cultural resource studies
- environmental studies
- AICUZ study
- airfield waivers

Examples of other documents that are available from other organizations on the installation include:

- Communications Blueprint (Communications Squadron)
- operational plans (Wing Plans)
- explosive safety site plans (Weapons Safety Office)

In a similar manner, an inventory of the "planning framework" for the local community, as it affects installation actions, is necessary. Visit the local planning agencies and establish a working relationship with the key personnel. Questions you might ask them are:

- Is there a city/county master plan?
- What is the organization of local planning agencies?
- How do their planning policies interact with the installation?
- What are their resources and needs?
- What development is planned that may affect the installation and its operations?
- What is the zoning of the property surrounding the installation?

Documentation from local agencies that you should collect and analyze includes:

- master plans
- development plans
- land use plans
- zoning maps and ordinances
- transportation plans

### 2.8.4.3 Personal Observation

**Physical Inventory**

Periodically you should take a physical inventory of the installation and surrounding local communities. Pay attention to those sites which directly impact on or are impacted by installation operations, particularly those areas within AICUZ noise contours and Accident Potential Zones (APZs). Items to note on this “windshield survey” include current land uses, potentially developable lands, condition of facilities, historically and culturally sensitive areas, heavily traveled routes, traffic congestion points, and any area or facility that you feel could have an impact on the installation.

Before going into the field, make a list of conditions that need to be checked or observed. Take notes -- what seems obvious in the field will not be as obvious two weeks later in the office. Also, take a camera. Photos are very useful in documenting existing conditions and as memory joggers. Video with voice comments are invaluable. A note of caution! You may need permission to take photographs in some areas on and off the installation.

### 2.8.4.4 Interviews

Interviews of key personnel on and off the installation are essential to determining the current issues affecting the installation. Your first interviews should include the Installation Commander, the Commander’s staff, the Base Civil Engineer (BCE), and members of the Facilities Board.

**Interview The Commander**

Your interview with the Commander will be key to the eventual success of your plan. Be thoroughly prepared. Take a tape recorder with you, but ask permission to use it. Have a list of questions and take good notes on the responses you received. Your questions might include:

- Do you expect changes to the current mission? If so, what will they be?
- Do we expect new missions? If so, what will they be?
- What are the major problem areas relating to facilities and development on the installation?
- What do you see as future issues?
- Will we have new tenants on the installation? If so, who?, etc.

**Commander Involvement**

In addition to getting a vision of the future of the installation, you should take advantage of this opportunity to discuss the Commander's involvement in the preparation of the *General Plan.* Invite the Commander to the initial planning (kick-off) meeting and schedule a pre-meeting to explain the process and get his/her support beforehand. Remember, nothing fertilizes like the footsteps of the commander. You may want to ask the Commander at this time to sign a letter, which you prepared and have with you, to introduce you to individuals on and off the installation.

The interview phase of the planning process can be arduous, but is necessary and will pay dividends as you begin to put the *General Plan* together.

# 2.9 Evaluation

Once you have gathered the background data for your *General plan* your next step is to evaluate this information and develop alternative courses of action.

## 2.9.1 Opportunities and Constraints

**Constraint Categories**

- **Sociopolitical**
- **Technical**
- **Environmental**
- **Historical and Cultural**
- **Economic**
- **Physical**

Your first step in the evaluation process is to determine the opportunities for and constraints to development on the installation. Opportunities for new development may exist in unused or under-utilized portions of your installation. These might occur when your installation's mission is being scaled back. A change in mission may result in reduced space requirements and offer an opportunity for reuse
of certain existing facilities.

Be cognizant of opportunities that may exist off the installation. For example, vacant land adjacent to the installation could be available for expansion or there may be facilities in the local community that would satisfy an installation's need for additional storage. Opportunities such as these should be investigated as part of your evaluation of alternatives.
Natural and man-made constraints can have a major affect on proposed development on your installation. Constraints are usually more quantifiable than opportunities and fall into areas of:

- *sociopolitical:* What is the realistic level of support to be expected? This can apply to the installation command structure or to civilian community political leadership.
- *technical:* What are the regulations and other technical criteria that govern

development at the installation? Examples include explosive quantity distances and noise exposure.

- *environmental:* What are the environmental constraints to development? Examples include flood plains and endangered species habitats and contaminated sites.
- *historical and cultural*: Are there sensitive sites on or around the installation that could impact development?
- *economic:* What are the most economical development options, in terms of life-cycle costs?
- *physical:* Can the installation's infrastructure support growth? Are existing facilities and systems adequate?

The thrust of your planning should be to minimize the impacts of constraints through careful and judicious land use and site planning. This will enable you to formulate and evaluate alternative concepts for development.

Opportunities and constraints can be displayed in a standard overlay composite technique to illustrate areas that are suitable and unsuitable for development. This is a useful tool for developing and evaluating alternative concept plans.

## 2.9.2 Alternatives

Now that you have identified the installation's goals as well as potential opportunities and constraints, you are ready to formulate alternative courses of action.

**Alternatives**

- **Develop**
- **Evaluate**
- **Select**

The process for arriving at a preferred course of action is as follows:

- develop alternatives to study in detail;
- evaluate each alternative against known opportunities and constraints; and
- select an alternative that can be adapted to unforeseen mission changes and best supports the goals and objectives of the installation.

### Developing Alternatives

Be as innovative and creative as possible in developing alternative plans. One method is to use brainstorming techniques with a select group of knowledgeable people. Once all possibilities have been presented and discussed, the truly impractical ones can be discarded and others logically combined into alternative concepts that suggest different approaches for future development. To keep the process manageable, you should attempt to keep the number of alternative concepts to approximately three.

### 2.9.2.2 Evaluating Alternatives

**Quantify Evaluation Process**

Once alternative concepts are determined, evaluate them against the previously developed opportunities and constraints and the installation's goals and objectives. Quantify the evaluation process as much as possible. For example, one alternative may cost more because of a lack of infrastructure in the vicinity. Another may require the purchase of additional property. Another may cost the least dollars yet have a significant impact on the adjoining community and raise objections from those living close to your installation. Your evaluation must seek a solution

that balances these various issues and concerns.

The evaluation and selection process should involve representatives from the functions and organizations that will be affected. It is through their continued involvement that the plan gains "ownership." The goal in working with these other organizations is to determine the pros and cons of each alternative plan, and to reach a consensus on a preferred concept for development.

### 2.9.2.3 Selecting an Alternative

**Flexible**

The preferred alternative you eventually select must be adaptable and be the best fit for your installation's situation. It may not satisfy all of your objectives, and it may not be completely free of constraints; but it should meet your priority requirements, the ones that mean the most to mission accomplishment.

Not every need or problem can or should be remedied with a new facility. Programmatic solutions (that is, those not requiring new facilities) to problems should be considered whenever possible and feasible. In most case, they are less costly and can usually be implemented more quickly.

The Installation Commander should approve the preferred alternative, once you have coordinated it with the Facilities Board members. The preferred alternative should then be conveyed in the *General Plan.*

## 2.9.3 Participatory Process

**Ownership**

Participation of key installation personnel is essential to the success of the *General Plan.* As discussed earlier, you should interview the personnel on the installation who are not only important in accomplishing the installation's mission, but who also will be the ones to influence the implementation of the *General Plan.* Keep them involved through periodic working sessions and informal meetings. Their sense of "ownership" of the plan and its recommendations will dictate their level of support for the plan and determine its success.

Key personnel should be involved from the beginning. A kick-off meeting of all concerned installation personnel, including the Installation Commander, can be quite important to the success of this planning effort. Here, you can explain the scope of the effort and what purpose the end product will serve. You also should highlight the fact that this document will primarily be used by the Installation Commander to assist in making decisions regarding future development on the installation. Make every effort to get the Commander to attend the kick-off meeting to put emphasis on the importance of the *General Plan* to the installation.

**Community Involvement**

You might invite your counterpart(s) from the local community(ies) to get involved with the development of your plan. It is important that you seek their input at some point in the process; however, exactly when to invite them will depend on the timing and sensitivity of the issues being discussed. You need to understand and consider their concerns, as much as they need to understand the mission of the installation and the impacts community actions may have on the installation.

Another benefit of this initial meeting and future meetings and reviews is the exchange of information among the agencies represented. A mutual, comprehensive understanding of the installation's future directions and requirements will improve the planning efforts of all organizations.

## 2.9.4 Reviews and Presentations

As discussed above, the participation of key personnel and agencies in the development of the plan is important to the success of the plan. In this vein, it is essential that these same people and agencies have an opportunity to review and comment on the document at critical points in its production.


Reviews should be scheduled at important junctures of the *General Plan*'s development. The following is an example of the types of meetings and reviews typically held during this process:

- *Kick-off Meeting:* Described above in Paragraph 2.9.3.
- *35% Review*: Review of rough draft of narrative, graphics, and proposed photographs. Emphasis is on ensuring the document is addressing proper areas in sufficient detail. Significant problems are identified and alternative solutions proposed.
- *65% Review*: Document is close to final form. Changes from 35% Review have been incorporated. Preferred alternative is identified and presented. A presentation to the Installation Commander would be appropriate at this point. In some cases, MAJCOM review and approval may be required before proceeding further. This will be the last review in which substantive changes will be made. Subsequent reviews will focus on editorial comments.
- *90% Review:* Review prior to final printing. Comments from Commander and MAJCOM have been incorporated.

A slide or video briefing on the final *General Plan* is a useful tool for you in presenting highlights to commanders (especially new ones!), community leaders, and other interested parties.

# 2.10 Implementation of the Plan

**Education Is Key**

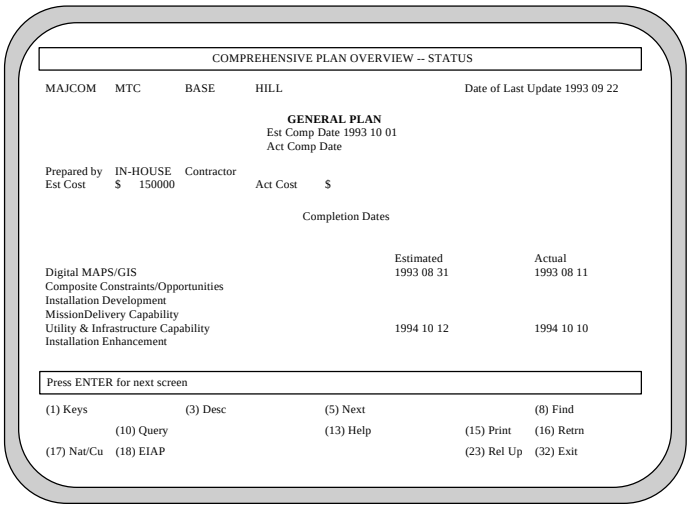
Implementation of the *General Plan* should occur following approval of both the Installation Commander and MAJCOM. The success of the implementation will depend largely on the Installation Commander's continued involvement and support. Education is key to sustaining this support. You will need to continually update the Commander and the rest of the installation leadership on the status of the plan and ensure that they concur with proposed changes. Any major deviation from the plan should be coordinated with your MAJCOM.

Although it is the Installation Commander's plan, you are responsible for playing an advisory role. Stay abreast of events on and off the installation that potentially impact the *General Plan* and advise the Commander as appropriate.

Maintenance of the Plan
Review the *General Plan* at least annually or as directed by your MAJCOM. An update of the Plan is usually warranted when significant changes occur to any of the following:

- mission
- strategic plan or contingency plans
- element plans and component plans

To ensure a thorough review of the document, it may be useful to establish an annual review process that includes all the key participants of the Facilities Board.




*WIMS - ES screen for tracking Comprehensive Plan Status*

# 2.12 References


a. U.S. Air Force. HQ AF/CEV. 1994. *AFI 32-7002, Environmental Information Management System*. Provides guidance and procedures to standardize use of the *Work Information Management System-Environmental Subsystem (WIMS-ES).*

b. U.S. Air Force. HQ AFCEE/DGP. 1994. *AFI 32-7062, Air Force Comprehensive Planning*, Apr 94. Contains responsibilities and requirements for comprehensive planning and describes procedures for developing, implementing, and maintaining the *General Plan* within the installation Comprehensive Plan.

c. U.S. Air Force. Directorate of Engineering and Services. 1989. *Comprehensive Planning Approach and Process.* Provides an overview of the comprehensive planning process and a general guide to the preparation of comprehensive plans. It is intended to be used in concert with appropriate regulations as well as additional bulletins/manuals covering specific component plans.

d. U.S. Air Force. Directorate of Engineering and Services. 1989. C*omprehensive Planning Data Sources and Application.* Provides planners with a useful guide for data collection activities. Describes types of data which can be collected, potential sources for these data, their potential application and options for use of computers in data collection, application, and display.

# Section C General Plan Document

The presentation of the *General Plan* is an important consideration. A plan may be well conceived, fully researched, and sound in its conclusions and recommendations. However, if it is poorly organized, too detailed, or lacks visual interest, it probably will be seldom used. In this section of the *Guide*, we will address the content, format, and physical appearance of the *General Plan* document.

## 2.13 The Contents of the General Plan

The minimum essential contents of a *General Plan* are described in *AFI 32-7062, Air Force Comprehensive Planning* and are listed below:

I. Commander's Cover Letter
II. Table of Contents
III. Introduction
IV. Plan Findings and Recommendations
V. Installation and Vicinity Profile
VI. *General Plan*-- Component Plan Overview
    A. Composite Constraints and Opportunities
    B. Infrastructure
    C. Land Use
    D. Capital Improvements Program
VII. Plan Maintenance and Revision
VIII. Acknowledgments

The content of each part of the plan is discussed in detail in Part 3 of this *Guide*. If one or more of the critical element plans does not exist, then, depending on the technical nature of the missing documents, you may have to develop interim documentation. Make a reasonable attempt to obtain as much information as possible from research of existing documentation and interviews with knowledgeable personnel. Include a recommendation in the plan that a more detailed study/plan is needed and should be accomplished.

While the *General Plan* must address each of the component plans, the elements of those component plans will vary by installation. *Element Plans* and supporting studies should be accomplished to meet the individual, specific needs and concerns of each installation.

The list of items in Part 3 to be considered for inclusion in your *General Plan* is quite extensive, but still may not be all-encompassing. It is only a tool, or checklist, for you to ensure most of the pieces of a *General Plan* have been considered. For example, you can quickly dismiss the requirement to discuss State Coastal Zones if there's no designated coastal area on or near your installation. On the other hand, your installation may have some significant development constraints as a result of unique operational requirements (e.g., Blast and Launch Danger Areas near missile launch complexes), which are not specifically contained in the Part 3 outline and which you must add.

## 2.14 Composition

Although the field of planning can be very specialized, the *General Plan* is of interest to non-planners both on and off the installation. The following subsections will guide you through the composition of your plan to help keep it clear and concise.

### 2.14.1 Style

The *General Plan* is intended to be a concise, readable document. It will be used by Commanders, functional managers, and other non-technical personnel at installation level and higher headquarters for information and decision-making. Therefore, you must work at keeping the plan concise and easily understood. The following are a few suggestions:

- *writing style:* The writing style should be businesslike and matter-of-fact. Avoid overly formal language and passive voice. You're trying to present information objectively to the reader, so write as if you were talking directly with the person who will be using the document.
- *sentence length:* Average sentence length is an indicator of readability. Try to achieve an average sentence length of between 12 and 20 words. Some will be shorter, some will be longer, but that's okay. Variety helps keep the reader interested, and some things just can't be said in a short sentence.
- *acronyms and jargon:* Acronyms are acceptable but be sure to spell out their full meaning the first time you use them. Avoid using jargon and bureaucratic language. Because the *General Plan* will contain some technical information, technical terms cannot be avoided. If possible, try to explain them in non-technical language the first time they are used.
- *multiple authors:* Edit other inputs to achieve a consistent writing style throughout the plan. As the plan is updated, ensure the style remains consistent.

**"Avoid overly formal language and passive voice."**

**"Avoid using jargon and bureaucratic language."**

Refer to some of the many excellent textbooks and guides to better writing to assist you in developing an acceptable style. One of the best ways to check your writing is to have someone else read it and give you their objective comments.

### 2.14.2 Appearance

The appearance of a document is dictated to a great degree by the variety of fonts used in the text. Many fonts are available in commonly used word processing or desktop publishing software. The font you see here is called Times New Roman. It is a *serif* font that is characterized by small strokes at the ends of each letterform. *Serif* fonts tend to guide the reader's eye from letter to letter and are a good choice for the text of your *General Plan*.

**Fonts**

You should use *sans-serif* fonts (type without serifs) for paragraph and section or chapter headings. In this document we've used a *sans-serif* font called Arial. Again, other font packages might call a similar font Helvetica or Swiss. There are no hard and fast rules here. Just avoid using fancy or fanciful fonts in a formal document like the *General Plan*.

You can achieve additional variety through techniques such as *italicizing*, **bolding**, or underlining text using the same font set. Note, too, that we have reinforced the hierarchy of paragraphs by varying the size of the typefaces in the paragraph headings. We've used 18-point for the main section heading and successively smaller typefaces for paragraph and subparagraph headings. Depending on the font that is used, you should use 10- to 12-point typeface for normal text. Smaller typefaces are used for headers, footers, and captions. In this *Guide*, the text fonts are 12 point and the headers and footers are 10 point. In the computer template that accompanies this document, the fonts and typeface sizes are already set up. You can change them to suit your own style and taste.

## 2.15 Graphics and Photographs

Graphics and photographs are effective visual references which ultimately lead to a better understanding of concepts and ideas presented in your *General Plan*. In addition to manually pasting in pictures, there is a variety of computer software that can generate drawings or convert photographs into computer formats. Microsoft Word 6.0® can import and convert drawings from many other programs into Word-friendly objects.

### 2.15.1 Graphics

Graphics should be used liberally in the *General Plan*. Graphics aid in reader comprehension by providing a visual reference for what is being discussed in the text. Maps are the most common graphic used in a *General Plan*, although sketches and diagrams can also be helpful and add visual interest.

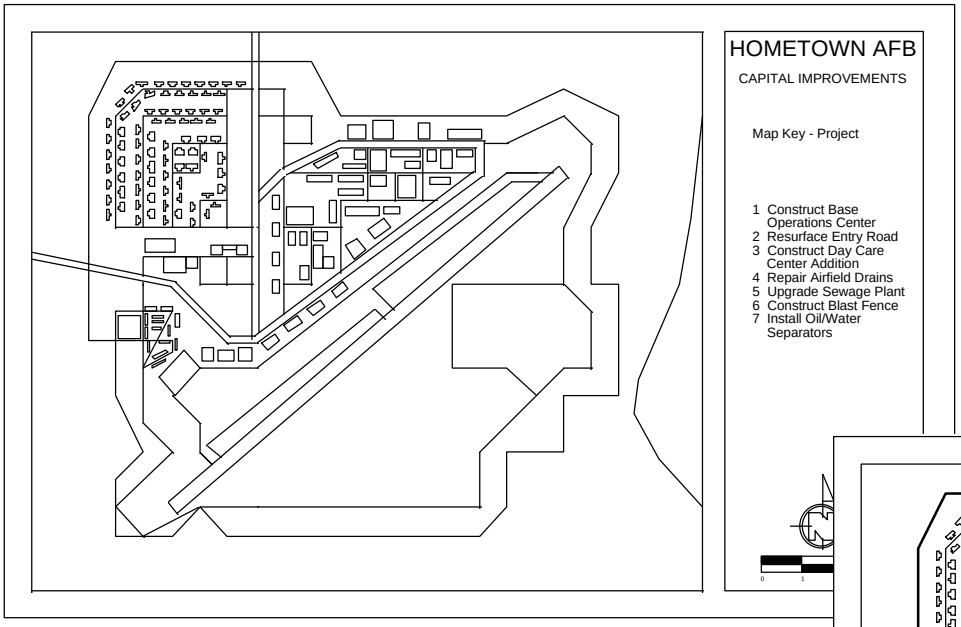
**Maps**

Maps, formerly referred to as Tabs, should be at a scale appropriate to the subject matter being illustrated. In a *General Plan*, using a map of the entire installation is generally appropriate for the following:

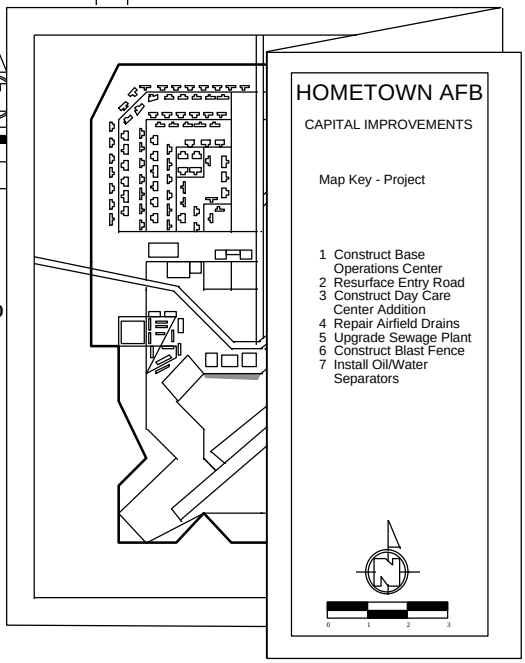
- composite constraints and opportunities
- existing and future land use
- installation road network
- future transportation plan
- utilities systems (may require several maps)
- communications
- short-range and long-range development plans

Maps should always contain a legend, a scale, and a north arrow that points to the top of the page. Maps or portions thereof that have been greatly reduced or enlarged to fit on a page generally have either no useable scale or an approximate scale. A bar scale generally retains its relative size after being reduced or enlarged; however, distortions in the scale can occur due to the reproduction. A graphic that has been reduced or enlarged should not be used for exact measurements.

Those with no useable scale should be labeled "Not to Scale." and those with an approximate scale should be labeled, for example, 1" = approx. 1000'. Also for added clarity, consider removing some of the detailed features from maps used as report graphics. Contour lines, for example, are usually not required for a Land Use Map.




In a typical 8½ x 11 inch *General Plan* document, a graphic map of the entire installation can't show a lot of detail. It is sometimes more effective to use an 11 x 17 inch fold-out page to display a graphic of this type. These graphics depict an installation map on an 11" x 17" fold-out.

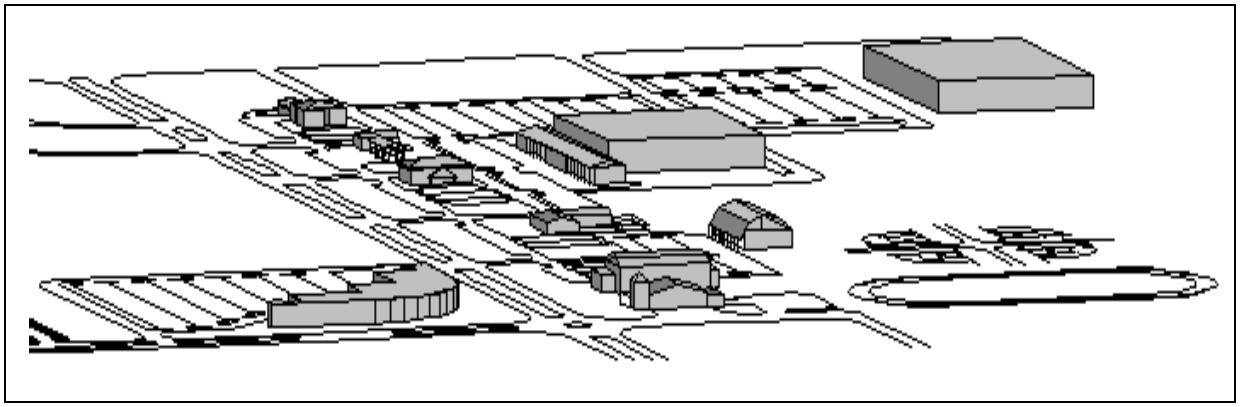



*Folded size is 8½" x 11"*

It isn't necessary to use a map of the entire installation to show the location of one underground storage tank (UST). A better approach would be to "zoom" in on the tank location and show enough of the surrounding features to provide a visual reference to its location.

When possible, highlight with color the information to be presented on a graphic map. For example, the *Composite Constraints and Opportunities* graphic lends itself well to the use of multiple colors to reflect various kinds of constraints and land areas where development opportunities exist. However, color reproduction and printing are expensive. As an alternative, shading and patterns can be used to present the same information in a black and white format.

Other types of graphics could include drawings, renderings, and computer generated three dimensional drawings. The latter are useful in presenting a true representation of how a new facility might look before it is actually constructed. The following graphic is a computer generated 3-dimensional view of a proposed development plan.



## 2.15.2 Photographs

| Typical Computer Memory Requirements | |
|---|---|
| General Plan Text | 2 to 3 MEG, with imbedded charts and graphs (110 pgs) |
| Photos | From 0.75 to over 4 MEG each, depending on format (resolution) |
| Maps and complex graphics | From 0.5 to over 6 MEG each, depending on format and complexity |

Photographs are an excellent way to illustrate existing conditions. Carefully selected, high quality photographs will enhance the understanding and visual appeal of your *General Plan*. Whether in color or black and white, photographs should be in focus, well-composed and uncluttered, and should have sufficient contrast to distinguish the features of the subject being photographed. Use a variety of photographs throughout the plan so that the reader will have seen most of the key facilities and features of the installation after having read the document.

Color photographs, though expensive to print, are especially appropriate to illustrate visual points of interest such as installation entry points, museums, monuments, and recreation areas. Aerial oblique photography is useful in providing a perspective of the installation in relation to the surrounding area.

In most cases, you should not use photographs that unintentionally show unsightly vehicles, trash containers, unkempt or trashy areas, people out of uniform, etc. Spend a few moments preparing the location. Also take extra shots from varying positions to increase your chances of a good photograph. In some cases, detractors can be cropped out of an otherwise good photograph. Also, photographs can be retouched, although this is an expensive process. On occasion, you may want to use a photograph to show a poor situation on your installation that needs improvement. In this case, you should ensure the Commander has an opportunity to review and approve the photograph before you go final with the document.

Both photographs and graphics should be placed within or adjacent to the text in which they're described. Full-page or fold out graphics should be placed on the following page.

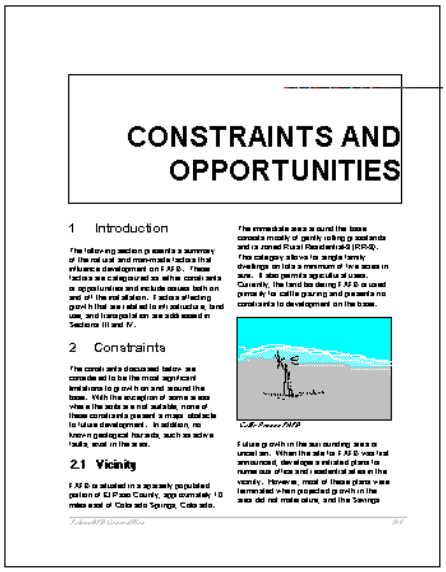
Reproduction of photographs is important to the overall appearance and effectiveness of your document. While state-of-the-art photocopying can reproduce color as well as black and white photographs quite well, the best reproduction is through offset printing.

Finally, you should consider digitizing all graphics and photos and having them imbedded in the document computer files. Be aware, graphics and photographs can occupy a considerable amount of memory.

# 2.16 Format, Layout, and Cover

Decide on the *General Plan* format and layout at the beginning of your planning process. Work on details as soon as possible to avoid delays later when you are ready to print a final document.

## 2.16.1 Format


CONSTRAINTS AND OPPORTUNITIES

1 Introduction

2 Constraints

2.1 Vicinity

*General Plan*s have been done successfully in a number of formats. Most have used a simple 8½" x 11" portrait (vertical) orientation. This size fits a common 3-ring binder, normal bookshelves, all printers and copy machines, and is easily handled. Optionally, the *General Plan* can be the same size but in a landscape (horizontal) orientation. This is slightly less convenient for 3-ring binding and normal storage and handling, but sometimes is more accommodating for graphic presentation due to the geometry of the installation. Other sizes become unwieldy and require special printing, storage and handling. The word processing template that accompanies this *Guide* is set up for 8½" x 11" paper in a portrait orientation.

*General Plan*s, with a combination of text, photos, and graphics, lend themselves to a two-column format. This results in two 3-inch columns with 1-inch margins and a half-inch binding edge. There are several advantages to this format. First, the relatively narrow columns improve readability, especially for the more technical content of a *General Plan*. Second, it permits the integration of 35mm photographs in a natural proportion, roughly 3" wide by 2" high. Third, it makes maximum and efficient use of the space available on an 8½" x 11" sheet, while preserving the readability of short lines of text.

The format used in this document is another option. It has a single 4-inch column of text, with about 2 inches in the right margin for notes, graphics, or photos. This format is preferred for instructional documents such as the *General Plan Guide*. However, for the reasons mentioned above, the two-column format is set up in the word processing template accompanying this *Guide*.

The text above is left justified. In other words, the word-processor automatically aligns the left margin of the text and maintains constant spacing between letters and words. Fully justified text adjusts the spacing between words so that the last letter in the line of text always falls at the right margin (as with this paragraph) and results in a well-defined edge to the text area. The word processing template is set up for two-column, left justified text.

## 2.16.2 Layout

The *General Plan* is designed for use as a quick-reference document. Therefore, you should try to make it as "user-friendly" as possible. One of the best ways to do this is to use tabs (dividers) between the major sections of the document. Sub-tabs can also be used within the Component Plan Overview section to quickly identify and turn to any of the individual component plans.

## 2.16.3 Cover

The cover is an important part of your *General Plan* document. It must contain a title, the name and location of your installation, and any administrative restrictions. But, it also should be attractive, colorful if possible, and convey the message that what is contained inside is professional and high-quality work.

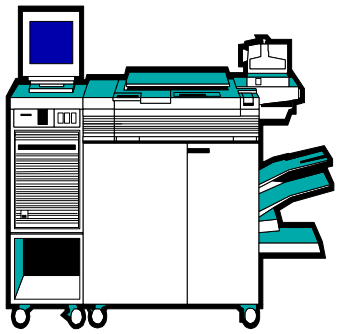
In designing the cover, try to incorporate a graphic or photograph that is representative of the installation. That immediately stimulates a sense of ownership and association with the *General Plan*. You'll get a lot of help and guidance on the cover design as the *General Plan* works its way through the approval process.

If the *General Plan* is being done under contract with an A-E, credits, logos, or acknowledgments are not appropriate on the cover. However, at your iscretion, they may be included on an interior page.

# 2.17 Printing and Binding

There are many options for printing and binding your final *General Plan* document. Each has its advantages and disadvantages with regard to appearance, durability, and ease of updating.

## 2.17.1 Printing



The least expensive printing option is simple photocopying. It requires only that you have a clean copy of your text, preferably printed from a laser printer, black and white graphics, and good quality black and white photographs. With appropriate software, text, graphics, and scanned black and white photographs can be incorporated into the document.

Selective use of color, particularly in graphics, adds much to the visual interest and understanding of graphic presentations. Fortunately, color photocopy machines are now available. The cost per copy is significantly higher than black and white reproduction but is still reasonable for selective use in small quantities. You may consider using color photocopies for certain graphics, such as Land Use or Composite Constraints and Opportunities, where a large variety of information must be overlaid on a single installation map. The fidelity of color copiers is less than perfect, but is generally satisfactory for color graphics. However, expect some color variations if you reproduce color photographs.

If your *General Plan* contains a lot of color photographs and graphics and you need a large number of copies, four-color offset printing is generally more cost effective. The cost of four-color offset printing is, in general, directly proportional to the number and size of pages in your document, he number of separations required for color photographs and camera ready graphics, and the number of mechanical separations required. These printing costs can easily reach tens of thousands of dollars, and you should carefully consider which process best suits your needs.

The number of copies does not affect cost significantly. In color offset printing, the first copy is the high-cost item. The cost will be nearly the same whether you order one copy or 500 copies.

**Desktop Publishing**

Commercially available desktop publishing software offers many capabilities for electronic pre-press work on your document. Much of the formatting, layout, composition, and other preparation for printing is greatly simplified. Also, many printing firms can create printing media directly from digital desktop publishing files and may offer discounts if used.

The wide range of printing inks, finishes, papers, and textures offer attractive options for printing the *General Plan*. However, if you want to keep the same level of offset printing when you update the document, keep in mind that it will be expensive because of the high set-up costs.

### 2.17.2 Binding

The method you choose for binding the *General Plan* document also has some practical considerations. If you want to be able to update and replace pages easily, then a three-ring notebook binder is the answer. The type with clear plastic pockets on the cover and spine allow you to enhance the appearance of the plan with colorful and attractive inserts.

Less expensive, but also less convenient for page replacements, is plastic comb binding. It comes in a variety of colors and sizes, but requires a special machine to punch the document and insert the binding.

Other options are perfect binding, in which the document is glued together at the spine (like books), and saddle stitching, commonly used for brochures and pamphlets. Neither of these options permit page removal and replacement, and, therefore, they are not recommended.

## 2.18 References

a. U.S. Air Force. HQ AFCEE/DGP. 1994. *Air Force Instruction 32-7062, Air Force Comprehensive Planning.* Contains descriptions of *General Plan*, Component Plans, and Elements. Prescribes outline and content of *General Plan*.

b. U.S. Air Force. HQ AFCEE/DGP. 1993. *Master Statement of Work for Preparation of Installation Comprehensive Plans for Air Force Installations.* Contains detailed guidance for preparation of comprehensive plans, to include elements and maps.

c. Freeman, Lawrence H., and Terry R. Bacon. 1990. *Style Guide, Revised Edition* Bountiful: Shipley Associates. A comprehensive guide to punctuation, format, grammar, and styles of writing and written communications.

d. Strunk, William Jr., and E.B. White. 1979. *The Elements of Style*. New York: Macmillan Publishing Co., Inc. A concise reference for writers. Addresses composition, usage, and style.

# PART 3. CREATING A PLAN

This section of the Guide contains detailed instructions and helpful hints for preparing each section of a *General Plan*. It follows the *General Plan* outline, as specified in *AFI 32-7062*, and therefore contains some sections that may not apply to your installation. You should simply skip over any non-applicable sections and delete them from the word processing computer template. The computer program, Microsoft Word 6.0®, will automatically renumber subsequent paragraphs.

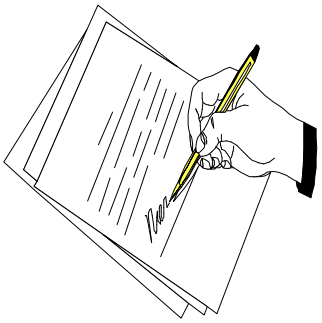
In those situations where the installation has been given authority to deviate from a directive, cite the authorizing letter, document, or verbal communication in the plan.

## 3.1 Commander's Cover Letter

The Commander's cover letter is the first page of the *General Plan*. It expresses the Commander's approval of and support for the plan. It gives the *General Plan* official status and makes it an instrument of policy.

The cover letter typically contains these main points:

- Our installation is a valuable public resource.
- It is our responsibility to manage resources wisely.
- The *General Plan* is a tool for managing resources effectively.
- I support the *General Plan* as a framework for decisions affecting the future development of this installation.



*Helpful Hint*

In most cases, you will be expected to draft a cover letter for the Commander's signature. Every commander has a unique writing style, so you'll probably go through several iterations of the draft letter as it works its way through the staffing and coordination process. Having attended Facilities Board meetings, you should have a feel for how your Commander would express his support for the plan. Sample paragraphs you may want to include in the letter are at Appendix C.

## 3.2 Table Of Contents

The Table of Contents serves two useful purposes. First, it enables the reader to find specific sections of the *General Plan* report. It also contains an outline of the plan and thus reflects its organization.

As a rule, you should show paragraph subordination down to the third level. Use the same paragraph numbering scheme you use in the body of the plan. Indenting subordinate paragraph headings also helps to visualize the plan's organization. For ease of reference, you should use leaders to connect the headings to the page numbers. The Table of Contents for this Guide provides an example.

# Section A. Introduction

## 3.3 Introduction

The Introduction to the *General Plan* sets the tone and direction of the document. Here the Goals and Objectives that drive the plan are stated. Also, this section describes the process you used in developing the plan. These two discussions, by establishing the planning goals and the means employed to achieve them, set the stage for the remainder of the *General Plan*.

## 3.4 Goals and Objectives

**Goals**

- **Attainable**
- **Realistic**

Goals are the reason we have plans. The goals for the *General Plan* must be firmly established and well coordinated before you start planning. They should be established through a visioning process to reflect the installation's response to existing and future mission requirements. Goals are usually not measurable and often are more conceptual than tangible. However, they must be realistic and attainable or they have little value. Objectives are the steps to achieving a goal. They are the means to the desired end. Objectives usually are measurable; they should be specific and quantifiable.

For example, a goal of the *General Plan* might be, *"Achieve a high-quality living environment by establishing efficient, effective, and compatible land use patterns."* Supporting objectives could be:

- Ensure that functionally related land use classifications and facilities are located near each other.
- Integrate land use and transportation planning to ensure they are coordinated and mutually supportive.
- Establish land use areas that respond to the requirements of existing and future missions.

The *Comprehensive Plan* establishes policies, programs, actions, and specific projects that lead to the accomplishment of objectives and thus to the achievement of goals. The goals and objectives should reflect the needs, concerns, and vision of the installation community.

*Sources of Data*

The *Comprehensive Plan*, if one exists, is the best place to find the Goals and Objectives for the *General Plan*. If there is no Comprehensive Plan, Interim Planning Framework, Strategic Plan, or similar document, that states the installation's goals, then you may have to draft some. Because the Installation Commander is the final approval authority for these goals, you must staff them through the Facilities Board and the Commander. Appendix D contains information on a visioning process that will help define the installation's goals and objectives. Also, refer to the Air Force Planning Bulletin, *Comprehensive Planning Approach and Process*, which contains examples of goals and objectives.

## 3.5 Description of the Planning Process

Provide the reader a brief overview of the process you used to produce the *General Plan*. You should clearly indicate how much of the *General Plan* you summarized from existing documents and how much is original work. Identify the sources of information on which the plan is based. Identify significant data gaps in the installation's documentation. Finally, provide recommendations for accomplishing any needed detailed studies or component plans.

## 3.6 References

a. U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Comprehensive Planning Approach and Process*. See Chapter 3 for a discussion on the Planning Process. It also contains examples of Goals and Objectives to help in the process of goal-setting to meet specific installation needs.

b. Goodwin, William I., and Eric C.Freund. 1968. *Principles and Practice of Urban Planning*. Washington: International City Managers Association. Chapter 12 contains a detailed discussion on the definition of goals and objectives.

# Section B. Plan Findings and Recommendations

## 3.7 Introduction

This is really the "executive summary" of the *General Plan*. It highlights specific issues addressed during the planning process and recommends corrective actions. If a substantial part of the *General Plan* is, for the most part, based on existing plans and studies, the recommendations have already been determined and documented. However, when documentation either does not exist or is dated, you, in consultation with the appropriate agencies, will have to consider the situation, policy guidelines, and cost effectiveness, and make a recommendation. You may recommend that additional study is required as evidenced by the lack of information.

Put more detail of the facts leading to your *Findings and Recommendations* in the appropriate sections of the *General Plan*.

*Helpful Hints*
As the plan is drafted, revised, and finalized, include any significant issues in the *Findings and Recommendations*. You should complete this part after the Component Plans have been finished.

*Suggested Graphic*
The following table is one method of consolidating, collating, and displaying the *Findings and Recommendations*

# Findings and Recommendations

| Finding | Recommendation |
|---|---|
| **Constraints and Opportunities** | |
| Two facilities have been identified as possibly being eligible for inclusion on the National Register of Historical Places. | Conduct the appropriate surveys to make a final determination. In the interim, protect the facilities as if they were already on the Register. |
| **Infrastructure** | |
| Electrical substation requires the use of both of its two transformers during peak demand periods. No backup available. | Install at least one more transformer capable of providing adequate backup electrical power. |
| Wastewater treatment plant appears to be approaching capacity. Unable to verify due to inoperative flow meters. | Replace flow meters and evaluate actual flow through plant. |
| **Land Use** | |
| **Intersection of Main Street and 20th Ave. is congested during morning and evening peak traffic periods.** | Install traffic control signal and synchronize timing to accommodate both morning and evening traffic. |
| **Capital Improvements** | |
| **The Skills Development Center is heavily used and is need of renovation to comply with safety requirements.** | MWR should aggressively pursue funding to complete Project No. 930001 which would fix the problems. |

# Section C. Installation and Vicinity Profiles

## 3.8 Introduction

In this section, you will describe the installation and its surrounding environs. You should put the installation in context by providing the reader the scale, dimensions, and characteristics of the installation and its regional setting.

## 3.9 Installation Profile

Begin with a short one or two paragraph description of the installation. Include the location of the installation in relation to an easily identifiable landmark, its population, size, and any other distinct features.

**Installation Profile**

- **Location**
- **Population**
- **Economics**
- **History**
- **Mission**
- **Distinctive Features**

A brief history of the installation is appropriate here. The installation's history is reflected in its existing layout and architectural character. Historical buildings or districts will have a significant impact on future development. And, in some cases, the primary mission has strong historical ties to the installation itself (for example, Cape Canaveral AS, FL).

The final and most important part of this section are the impacts arising from General Plan recommendations. It is important that the impacts, negative and positive, be carefully conveyed. This is a graphic and textual discussion, in summary form, based on the analysis of the changes among missions and organizations of the host unit and major tenants. The current mission, as well as those in the future, will drive the future development and land uses of the installation. A good understanding of these is essential to the planning process.

*Sources of Data*

**Public Affairs Office**

You should contact the installation Public Affairs Office (PAO) and History Officer for general information about the installation. Your PAO usually has Fact Sheets and brochures on a wealth of subjects, including installation and unit history, missions, and functions. Your Civil Engineering Squadron Real Property section can give you the size of the installation in acres. Up-to-date population data should be available from Military and Civilian Personnel offices. Consult with the Wing Plans office (XP) regarding future mission and strength changes that are unclassified and that you can use in the *General Plan*. And, most important will be any NEPA, AICUZ or Noise Studies. These offer valuable ready-to-use analyses of mission changes. Finally, you should interview the Installation Commander and commanders of major tenant units to obtain information on prospective changes.

*Suggested Graphics/Photos*

You can visually enhance this part by several methods:

- tables to present population data
- inserts to depict small locations, such as a military installation, within a larger region
- photographs to show installation landmarks, such as the Main Gate, the Headquarters building, etc.
- photographs to illustrate the history of the installation
- photographs of the installation's mission equipment such as aircraft, missiles, and satellite tracking antennas

## 3.10 Vicinity Profile

**Describe local community**

In this section, discuss characteristics of the local area (urban, rural) including population, demographics, and growth trends, primary economic base, and major transportation linkages. Also, illustrate how the local community supports the installation with population workforce, educational, cultural, and recreational facilities. Describe any other military installations in the vicinity and any unilateral or reciprocal support relationships that exist. Also, include a short discussion and tabular data on the installation's economic impact on the local area.

Summarize how installation operations and activities affect the local community. Describe any actions or cooperative efforts to harmonize the coexistence of the installation and the community, such as in the areas of planning, development, mutual support, and improved quality of life.

*Sources of Data*

Your primary source of population data will be the U.S. Bureau of Census. Census data can be found in your local library, university library, and is available in a GIS format (TIGER). Additional information is available from several local community agencies. However, be cautious when using this data. It is often more promotional in nature, and may not stand the test of decision making analysis. Most common among these sources are the local Chamber of Commerce, Visitors Bureau, Council of Governments, and City/County/Regional economic development and tourism agencies.

Welcome packets for newly assigned personnel are usually available from Family Services and contain information on the local area. You can obtain economic impact data from the Financial Analysis people in the Comptroller's office or through the Public Affairs Office. They compile this data annually.

Air Installation Compatible Use Zone (AICUZ) studies are accomplished for installations with flying missions. The AICUZ studies should provide socioeconomic impact analyses based on overflight, noise, and accident potential impacts on populations in areas near or adjacent to the installation.

The Socioeconomic Impact Analysis Study (SIAS) focuses on the socioeconomic effects of closure, realignment, or other significant Air Force actions. These are usually done in conjunction with an Environmental Impact Statement (EIS). The SIAS is not a document required by the National Environment Policy Act (NEPA); however, the Air Force includes it with allEISs to provide information on economic activity, population, housing, and other major issues of local concern, such as public finance, transportation, utilities, and airspace. Air Force actions substantially influence the character of nearby communities and are important to local residents. The analysis of these issues is intended to provide local planning officials with the information necessary to plan for the impacts of Air Force decisions.

*Suggested Graphics/Photos*

- A map showing the vicinity within a 20-mile radius of the installation. Show the surrounding communities, major transportation facilities and installation access routes, and any nearby military installations.
- Photographs of local landmarks and places of interest.

*Helpful Hints*

**Accurate use of statistics**

Be consistent and accurate with the use of statistics describing your community. The only officially recognized statistical source is the U.S. Bureau of Census. In some states, there are agencies, universities, and other independent groups that generate statistical data. Always use official census data if available. In certain cases, where census data do not exist, you may have to use other sources, but clearly note the source. For example: "The U.S. Bureau of Census does not address this subject area in detail. However, the State of Georgia Bureau of Census reports...". Your community may be sensitive to how it is described with regard to quality of life, growth, unemployment, schools, etc. This may be a difficult area, as the General Plan must be factual and accurate. It is not a public relations document but a decision makers tool. Be extra careful to report the facts, but carefully frame any negative comments or impressions.

*References*

a. U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Comprehensive Planning Approach and Process Planning Bulletin.*

b. U.S. Air Force. HQ USAF/Directorate of Engineering and Services.1989. *Comprehensive Planning Data Sources and Application Planning Bulletin.*

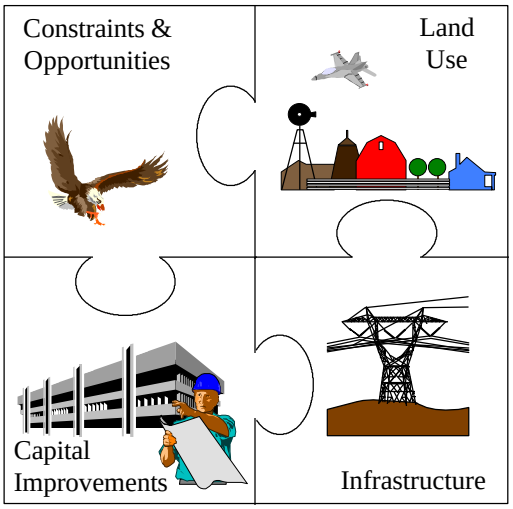
c. U.S. Department ofCommerce. 1990. *Census '90 Basics*. Washington: Bureau of Census.

# Section D. Component Plan Overview

## 3.11 Introduction

This section synthesizes the contents of the component plans and is the heart of the *General Plan*. It provides, in summary form, the analyses, major findings, and recommendations included in the component plans.

In this section, the contents of the four component plans required by AFI 32-7062, *Composite Constraints and Opportunities*, *Land Use*, *Infrastructure*, and *Capital Improvements Plan* are described. Under most circumstances, all topics pertinent to planning will fit into one of these four component plans.




In discussing these component plans in the *General Plan*, the challenge is to sift through all the detail contained in them, along with the element plans, and extract the main thoughts. The discussion in the *General Plan* should lead the reader through the analytical process that resulted in the findings and recommendations that eventually evolved.

As mentioned previously, you could also use this section of the *General Plan Guide* to produce a stand-alone *Component Plan*. Such a *Component Plan* would have its own goals and objectives and would treat the subject matter in much greater detail. Additionally, in some cases, you may have to do the original work on an *Element Plan* or study needed to support the *Component Plan*.

# 3.12 Composite Constraints and Opportunities

## 3.12.1 Introduction

In this part of the *General Plan*, you will analyze all conditions and factors that could affect development on your installation. A great number of natural and built conditions can limit or expand the potential uses of real property. A major factor in assessing these conditions will be the environment. Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*, encourages environmental protection programs throughout the Air Force in which clean-up, compliance, conservation, and pollution prevention are the main goals.

## 3.12.2 Natural, Cultural, and Environmental Constraints

**Constraints to Development**

Here, you will address the most significant natural, cultural, and environmental conditions that exist on the installation and in the surrounding community. In most cases, existing Air Force natural and cultural resources and environmental programs provide information that is easy to define graphically.

However, the social and economic aspects of planning are not as easily defined. Social issues can present restrictive situations in response to the needs of children, elderly, handicapped, and minorities. Economic issues associated with changes in land uses may present other considerations. Understanding these constraints is important to planning for support of future missions of the installation. Information from the local planning departments and social planning agencies should be included in your analysis.

### 3.12.2.1 Natural and Cultural Resources

**Responsible steward of public land**

Department of Defense (DOD) policy is to protect and conserve natural and cultural resources for which it is responsible. In support of this policy, each Air Force installation is required to develop natural and cultural resources plans to meet its obligation as a responsible steward of public land. These plans are your primary sources of data concerning natural and cultural resources on your installation. You should extract pertinent information from all of the installation's various plans and summarize the elements that would affect installation development.

The presence of regulated natural and cultural resources may significantly constrain development on the installation, yet at the same time, add to its quality of life. Future development plans must be guided by the constraints and opportunities presented by the Natural and Cultural Resources and Environmental Quality Protection Programs.

#### 3.12.2.1.1 Historic and Archaeological Sites

**National Register Of Historic Places**

Historical property includes physical remains of any prehistoric or historic district, site, building, structure, or object significant in American history, architecture, archaeology, engineering, or culture. These sites are properties on the installation that are in or eligible for inclusion in the National

Register of Historic Places. As facilities age to 50 years (e.g., World War II buildings), they may meet eligibility requirements. Some structures less than 50 years old, such as certain Cold War facilities, may also be of historical significance. Therefore, you must address preservation and/or demolition requirements for these properties in the *General Plan*. You should also include an analysis of structures approaching the 50-year criterion. You may want to identify buildings aged 35 years or older so that commanders can decide whether or not the structures should be preserved or demolished.

**Locations sensitive**

Cultural resources include historical, archaeological and Native American artifacts or properties of interest. The exact locations of such resources are particularly sensitive and usually require some degree of protection. When addressing these in the plan, you should do the following:

- Describe historical and cultural sites.
- Specify the regulatory requirements for their protection.
- Explain how they might constrain land use.
- Highlight opportunities that these sites may offer.

*Sources of Data*

Your first point of contact should be the installation Environmental Office or equivalent organization. This office should have access to the most current Historic and Cultural surveys that would be your primary sources of data. Other informative agencies include the:

- Advisory Council on Historic Preservation
- Department of the Interior/National Park Service
- U.S. Army Corps of Engineers
- State Historic Preservation Office (SHPO)
- state Department of Cultural Resources
- university departments of Archaeology or Anthropology
- Native American governments
- local/state historical societies
- local/regional planning agencies

*Helpful Hints*

Because of the sensitive nature of historical and archeological sites, you should work closely with the installation Environmental Office to ensure that you follow local, state, and federal survey and disclosure guidelines.

*Suggested Graphics/Photographs*

- Installation map with, if allowed, approximate historic and archaeological sites highlighted
- Photographs of selected sites for visual emphasis and interest

*References*

a. U.S. Air Force. HQ USAF/CEVC 1994. *AFI 32-7006, Environmental Program in Foreign Countries*. Provides the guidance for protecting and managing cultural resources at overseas installations.

b. U.S. Air Force. HQ USAF/CEVP. 1994. *AFI 32-7065, Cultural Resources Management.* Contains guidelines for protecting and managing cultural resources in the U.S., its territories and possessions.

c. U.S. Congress. 1966. *National Historic Preservation Act* (16 USC 470 et seq.).

The U.S. law concerning the protection and management of cultural resources within the U.S., its territories and possessions.

### 3.12.2.1.2 Threatened and Endangered Species

The *Endangered Species Act* (Public Law 93-205) requires that we protect and conserve federally listed threatened or endangered plants and animals and their habitats. All federal agencies are also required to protect state listed threatened, endangered, or rare species, when possible. Because of their protected status, either a protected species or its habitat may impose constraints to installation development. Generally, endangered species habitats are "off-limits" for new development. However, they may be suitable for open space buffers and certain recreational land uses.

*Sources of Data*

The best source of information on threatened and endangered species should be your installation's Environmental Office which is normally responsible for the installation's *Integrated Natural Resources Plan.* Other sources include the:

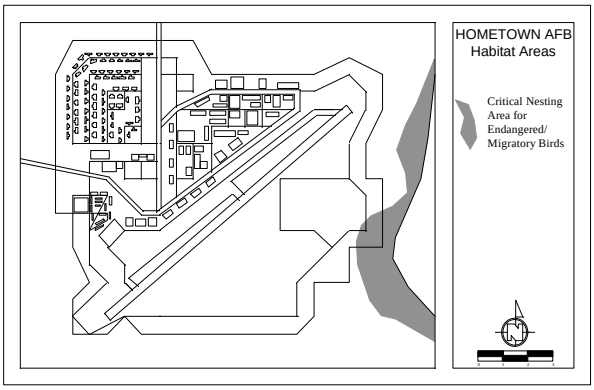
- Fish and Wildlife Service
- National Marine Fisheries Service
- Natural Resources Conservation Service (formerly Soil Conservation Service)
- Geological Survey for Federal Threatened and Endangered Species
- state Game and Fish Commission
- state Department of Natural Resources
- regional and local planning departments

*Helpful Hints*

Because federal and state lists of threatened and endangered species are so dynamic, the installation must continually update its plans. Ensure that the information you are using is the most current.

*Suggested Graphics/Photographs*

- A map of the habitat areas on the installation
- Photographs of the threatened and endangered species which are endemic to the installation and surrounding area




*References*

a. U.S. Air Force. HQ USAF/CEVC. 1993. *AFPD 32-70, Environmental Quality.* Implements the *Endangered Species Act.*

b. U.S. Air Force. HQ USAF/CEVP. 1994. *AFI 32-7064, Integrated Natural Resources Management* Implements AFPD 32-70 and tells how to manage natural resources on Air Force property to comply with federal, state, and local standards. Chapter 7 specifically addresses Threatened and Endangered Species Management.

c. U.S. Air Force. Directorate of Engineering and Services. 1989. Air Force Bulletin, *Comprehensive Planning Data Sources and Application.* Provides guidance concerning data needs and collection applications for planning purposes.

d. U.S. Air Force. Directorate of Engineering and Services. 1989. *Environmental Quality Protection Planning Bulletin/ Manual.* Provides information about the unique requirements of environmental protection planning.

e. U.S. Congress. 1973. *Endangered Species Act* (PL 93-205). Provides for the protection and recovery of endangered and threatened species of fish, wildlife, and plants.

### 3.12.2.1.3 Wetlands and Floodplains

**Wetland Determination Corps of Engineers**

Federal and Air Force policies require installations to avoid or minimize harm to wetlands and floodplain areas. Wetlands, including manmade lakes, are important as breeding grounds for fish and shellfish, habitats for many species of waterfowl and mammals, recharge of underground water sources, and natural drainage control. The U.S. Army Corps of Engineers is responsible for determining whether or not an area is a wetland. Avoid planning new construction in these areas unless all of the following conditions exist:

- there are no practical alternatives,
- all practicable measures have been taken to minimize harm, and
- potential impacts have been analyzed through the environmental impact analysis and permitting processes.

**Clean Water Act Section 404**

If all of the above conditions exist, you must apply to the Corps of Engineers for a permit in accordance with Section 404 of the Clean Water Act, as amended. This application, Form 4345, will initiate a review process that will end in a determination as to whether or not the installation will be able to develop the wetland.

**Floodplain Delineation FEMA**

The Federal Emergency Management Agency (FEMA) delineates floodplains. Avoid these areas to minimize the impacts of potential floods on facilities and personnel. If, however, the installation is contemplating the construction of facilities within a floodplain, refer to AFI 32-7064, *Integrated Natural Resources Management,* for guidance on how to proceed.

To ensure you are in compliance with these policies, you must request the assistance of the Corps and FEMA to locate, inventory, and delineate all wetlands and floodplains on the installation. These include, but are not limited to, tidewaters, marshes, swamps, bogs, and man-made bodies of water. Identify the importance of the wetlands and develop alternatives for decision-makers.

*Sources of Data*

**Integrated Natural Resources Management Plan**

Your primary information sources for this part of the *General Plan* are the installation's *Integrated Natural Resources Management Plan* and the installation Environmental Office.

Federal sources for data and maps include the:

- Water Resources Division of the U.S. Geological Survey
- Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- Federal Emergency Management Agency (FEMA)

State sources include the:

- Department of Natural Resources
- Department of Environmental Regulation
- Water Survey Division or Water Control Board

Local and regional data sources include:

- regional planning agencies
- county/city/local planning departments
- municipal utilities departments

*Helpful Hints*

Allow enough time to complete this portion of the *General Plan*, particularly if wetlands and floodplains have not been surveyed. Wetlands delineation can be a lengthy process.

*Suggested Graphics/Photographs*

- Maps showing the delineated wetlands and floodplains
- Photographs of selected wetlands

*References*

a. U.S. Air Force. HQ USAF/CEVP. 1994. *AFI 32-7064, Integrated Natural Resources Management.* Chapters 3 and 4 discuss wetlands and floodplains.

b. U.S. Congress. 1977. *Clean Water Act (CWA).* As amended by the *Water Quality Act of 1987,* establishes the major programs for controlling water pollution within the U.S., its territories and possessions.

c. U.S. Congress. 1969. *National Environmental Policy Act(NEPA*). Establishes the federal policies and goals for protection of the environment.

d. The White House. 1977. *Executive Order 11990, Wetlands Management.* Requires all federal agencies to provide leadership in the protection of wetlands.

e. The White House. 1977. *Executive Order 11988, Floodplain Management.* Requires federal agencies to evaluate effects of actions they take on floodplains.

### 3.12.2.1.4 State Coastal Zones

If your installation has a coastline or is within a coastal zone management area, you must consider information, policies, and land use controls that have been implemented to protect coastal zones. Actual control of coastal zone management areas and the primary source of guidelines designed to protect these areas will vary among the states. In many cases, local governments will have primary responsibility for managing this program. The Air Force preserves coastal resources as part of the overall Integrated Natural Resource Management Program.

*Sources of Data*
If applicable, your installation's *Integrated Natural Resources Management Plan* should establish guidance for preserving coastal and marine resources. Other sources include the:

- Department of Commerce
- Department of the Interior/U.S. Fish and Wildlife Service
- Environmental Protection Agency
- U.S. Geological Survey
- National Oceanic and Atmospheric Administration
- Coastal America National Implementation Team
- regional planning agencies

*Helpful Hints*
Because state and local agencies play a major role in this area, be sure to research local and state guidelines as well as federal laws and regulations.

*Suggested Graphics/Photographs*

- A map depicting installation areas affected by coastal zone protection laws
- Photographs of the coast, and/or coastal marine resources

*References*
a. U.S. Air Force. HQ USAF/CEVP. 1994. *AFI 32-7064, Integrated Natural Resources Management.* Chapter 5 provides guidance on preserving Air Force coastal and marine resources.

b. U.S. Congress. 1982. *Coastal Zone Management Act* (16 USC 1451 et seq.). Requires coordinating proposed development in a coastal zone with the state coastal program.

c. U.S. Congress. 1972. *Marine Protection, Research and Sanctuaries Act* (33 USC 1401). As amended by the *Ocean Dumping Act of 1988*, regulates dumping into U.S. ocean waters.

### 3.12.2.1.5 Lakes, Rivers, and Streams

**Lakes**

**Rivers**

**Streams**

The conservation of water resources on Air Force installations not only affects mission accomplishment but also plays a large part in quality of life activities. You should inventory the lakes, rivers, streams and other surface bodies that contain standing or flowing water for more than 50 percent of the year. Include recommendations for managing and controlling use of these resources.

*Sources of Data*
Your primary source for this information will be the installation Environmental Office or equivalent organization. Federal level agencies include the:

- Water Resources Division of the U.S. Geological Survey
- Federal Emergency Management Administration (FEMA)
- Natural Resources Conservation Service
- U.S. Army Corps of Engineers

State agencies you can contact are the:

- Department of Natural Resources
- Department of Environmental Regulation
- Water Survey Division or Water Control Board

Local and regional data sources include:

- regional planning agencies
- city/local planning departments
- municipal water supply utilities

*Helpful Hints*

While lakes, rivers, and streams may constrain development, you should consider them positive assets when evaluating and planning for agricultural outlease, fish and wildlife management, and habitat management for threatened and endangered species. They also contribute to the installation's quality of life program by providing outdoor recreational areas for fishing, boating, picnicking, camping, etc.

*Suggested Graphics/Photographs*

- A surface hydrology map of the area
- Photographs of outdoor recreational areas to enhance reader interest

*References*

a. U.S. Congress. 1977. *Federal Water Pollution Control Act* (33 USC 1251 et seq.). Provides guidelines for restoring and maintaining the chemical, physical and biological integrity of the nation's waters.

b. U.S. Congress. 1969. *National Environmental Policy Act*(42 USC 4341). Establishes goals and policies concerning environmental conservation within the U.S., its territories and possessions.

c. U.S. Congress. 1968. *Wild and Scenic Rivers Act* (16 USC 1271). Establishes protection for the nation's wild and scenic rivers and designates that specific construction proposals be complemented by additional policy to protect rivers to fulfill other vital national conservation purposes.

### 3.12.2.1.6 Soils

**Soils Composition Affects Construction**

Soil composition may restrict future development, or affect construction design and cost. Your primary concern is with the quality and the properties of soils that affect construction activities, as well as prime and unique soils that are suitable for agricultural use.

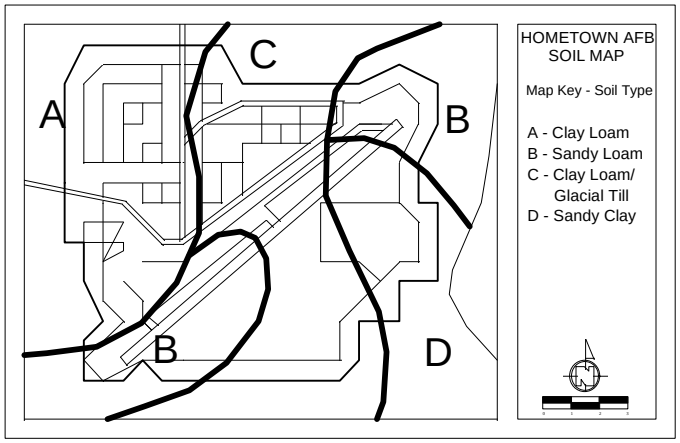
- *Construction Activities:* The primary soil factors to consider are erodibility, permeability and high-water table, elasticity, shrink/swell potential, and bearing strength.
- *Agricultural Use:* Prime and unique soils are those which by virtue of quality, growing season, and moisture supply can produce sustained high-quality yields of crops or unique crops (for example, cranberries). Develop land management alternatives to avoid the erosion or removal of these soils from present or future agricultural use.

*Sources of Data*
You should look first to your installation Engineering Section for soil information. It should have a U.S. Department of Agriculture/Natural Resources Conservation Service (formerly Soils Conservation Service (SCS)) soil survey and records of any soil borings done on the installation.

Other sources include the:
- Installation's *Integrated Natural Resources Plan*
- U.S. Army Corps of Engineers District Office
- Bureau of Land Management
- state/county/local planning agencies

*Helpful Hints*
County and regional soil surveys and soil data provide a basic set of land use and siting criteria related to both the engineering properties and the best uses of soil types in the area. Be sure to discuss specific limitations and any mitigation measures for areas with unsuitable soils.

*Suggested Graphics/Photographs*
- A map that includes the locations of major soil types on and near the installation. Highlight soil types that are not suitable for construction.
- A graphic depicting the boundaries of prime and unique farmland on the installation.




*References*
a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management*. Chapter 9 requires that prime and unique farmlands be identified in the installation *Integrated Natural Resources Plan* as well as in the *Comprehensive Plan*.

b. U.S. Congress. 1976. *Federal Land Policy and Management Act* (43 USC 1702). Provides a detailed outline of how public lands should be managed.

c. U.S. Congress. 1977. *Soil and Water Conservation Act* (PL 95-103 and 16 USC 2001). Provides guidelines for land use policy and soil conservation within the U.S., its territories and possessions.

### 3.12.2.1.7 Geology

Surface and subsurface geological formations can directly affect the siting of buildings, roads, runways, bridges and other major structures. Landforms, faults, and underground water supplies can dictate whether or not a site is suitable for construction. The plan should identify those features that could impact development.

*Sources of Data*
Your primary on-installation sources of geological information will be the Civil Engineer Squadron Engineering Section and Environmental Office.

Other sources are the:

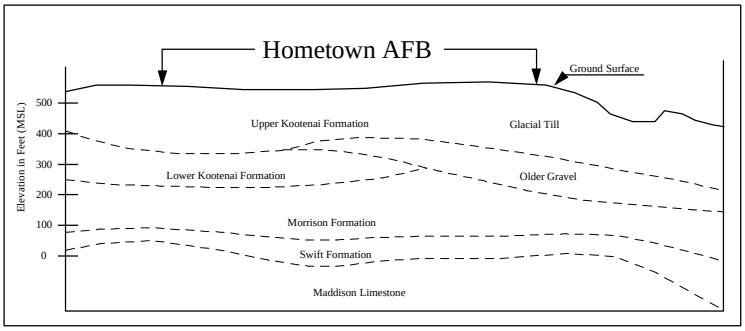
- Natural Resources Conservation Service
- state geological survey for land resources
- geotechnical maps, geophysical maps, mineral resources surveys, and energy resource surveys
- state Department of Natural Resources
- regional and county planning agencies
- utilities authorities/commissions

*Helpful Hints*

It is important to identify any undesirable geological characteristics in the *General Plan.* Findings in this area, particularly when new construction is planned, can cause unpleasant surprises and costly delays.

*Suggested Graphics/Photographs*

- Map of actual or potential areas of geological interest, particularly faults or underground water supplies
- Map depicting soil boring logs
- Graphic showing a stratographic cross section through the installation
- Photograph of distinctive geological features




*Cross Section of Geologic Formations Underlying Hometown AFB*

*References*

U.S. Air Force. AFCESA/EN. 1983. *AFM 88-3,* Chapter 7, *Soils and Geology - Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures).* Provides detailed geological considerations for engineering applications on U.S. Air Force installations.

## 3.12.2.1.8 Topography and Physiography

**10% Slopes Often a Constraint**

The terrain on which an installation lays influences, in large measure, the layout of the installation and/or the amount of work needed for site grading and cost of future development. Steep slopes (over 10%) are often constraints to construction. Use existing literature (such as *Comprehensive Plans*, geological surveys, and topographic studies, etc.), visual reconnaissance, and maps to describe the topography and physiology of the area.

*Sources of Data*

Existing C-Maps (previously designated as TAB C), if available, will show topography contours and physiographic features. If C-Maps are not available, the Department of the Interior/U.S. Geological Survey maps will provide similar information, but on a larger scale. Other sources include the:

- state geological survey
- Department of Natural Resources
- regional and local planning departments
- public works departments

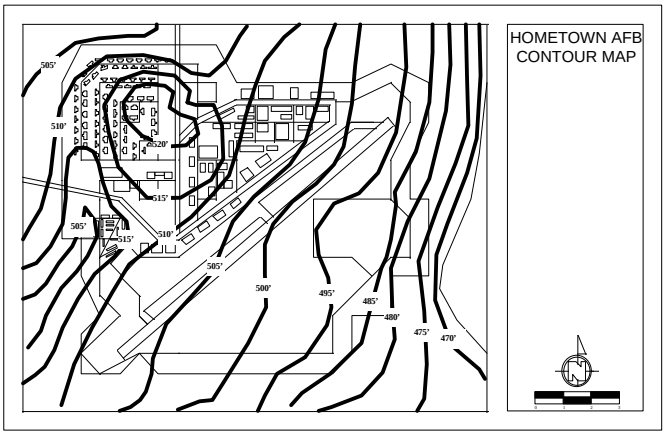
Incidentally, this would be a good place to note the absence of topological information, if applicable, and to recommend that complete and current C-Maps be produced.

*Helpful Hints*

You must know how to read and interpret a topographic map. Computer based digital terrain models, aspect maps (illustrating slope orientation), site sections, and slope tables provide useful data display alternatives.

*Suggested Graphics/Photographs*

A quality topographic installation map is essential for conducting site analyses.




*References*

a. U.S. Air Force. HQ USAF/LEEVX. 1986. Air Force Comprehensive Planning Bulletins on *Land Use Planning, Landscape Planning and Design*, and *Area Development Planning*. Provides guidance for comprehensive planning on U.S. Air Force installations.

b. U.S. Army. FM 21-26, *Map Reading.* Provides the basic methods used to read military maps.

## 3.12.2.1.9 Vegetation

A vegetation analysis presents an overview of existing plant material on and around the installation. It includes identification and location of threatened and endangered plant species for use in land use or site planning decisions. This information will help you determine the planning suitability of an area for development/redevelopment with respect to its resource potential and environmental sensitivity.

*Sources of Data*

The installation *Integrated Natural Resources Management Plan,*and Natural Resources planners in the Environmental Office, will be your primary data sources for this section.

**Integrated Natural Resources Management Plan**

Federal sources include the:

- U.S. Geological Survey (USGS)
- U.S. Fish and Wildlife Service (USFWS)
- Forest Service
- National Park Service
- Bureau of Land Management

State, regional, and city sources include the:

- Department of Conservation
- Natural History Survey
- Game and Fish Commission
- Department of Natural Resources
- regional/city planning departments
- utility districts/commissions

*Helpful Hints*

- Consider low cost alternatives to high maintenance vegetation.
- Research local botanical societies for ideas.

*Suggested Graphics/Photographs*
A digitized map depicting the location and boundaries of any endangered or threatened plant species

*References*
a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 11 discusses land management and grounds maintenance.
b. Presidential Memo. 1994. *Environmentally and Economically Beneficial Practice on Federal Landscaped Grounds* Directs that federal installations implement landscaping practices that encourage use of native plant species.

### 3.12.2.1.10 Forests

All installations with wooded areas must develop a *Forest Management Plan,* and installations with 50 or more acres of commercial forest resources must develop a *Technical Forest Management Plan.*These plans must address silvaculture practices to do the following:

- meet and maintain objectives of ecological integrity
- maintain biological balance in the forest community
- protect watersheds and wildlife habitats
- plan and coordinate the multiple uses of forest lands

If the installation has forest lands that are used for commercial harvesting, it must hire a professional forester to ensure that proper silvaculture harvesting methods are used, and that forests are protected from fire, disease, and insect attack.

**"Silvaculture"**

**Forest Management**

You should consider and refer to forest management plans when preparing the text of the *General Plan.* You should attempt to reserve areas of prime value for forest development (silvaculture) and, whenever possible, select alternative locations for facility development.

*Sources of Data*
Your primary sources of data will come from the installation Environmental Office. Other sources include:

- *Integrated Natural Resources Management Plan*
- *Forest Management Plan*
- Civil Engineer Squadron Grounds Maintenance Section

Federal sources you may query for additional information include the:

- U.S. Forest Service
- Bureau of Land Management
- Geological Survey
- U.S. Fish and Wildlife Service

State sources include the:

- Department of Conservation
- Natural History Survey
- Game and Fish Commission
- Department of Natural Resources

You also should seek information from regional and city planning epartments.

*Helpful Hints*

One of your major concerns in protecting forest resources is avoiding the potential damage that might occur to other ecosystem functions. Forests should be protected as habitat for endangered species, as watershed resources, and as effective visual, noise, and wind barriers.

*Suggested Graphics/Photographs*

- A map detailing forest areas on the installation (required)
- Photographs of forested areas
- A table listing types of trees

*References*

a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 8 provides Forest Management guidelines for use on U.S. Air Force installations.

b. U.S. Congress. 1976. *National Forestry Management Act* (PL 94-588, 16 USC 1600 et seq.). Clarifies the law outlined above concerning National Forests.

c. U.S. Congress. 1974. *The Forest and Rangeland Renewabl Resources Planning Act* (PL 93-378, 16 USC 1601 et seq.). Provides U.S. law on resource planning of forests and rangelands in the United States, its territories and possessions.

d. U.S. Congress. 1968. *Military Construction Act* (10 USC 2665). Provides guidance concerning general forest management within the U.S., its territories and possessions.

### 3.12.2.1.11 Agricultural Outleasing

When preparing the *General Plan,* include all pertinent information concerning the terms of any agricultural outleases that might be in effect, as they potentially affect future land use and development. Air Force policy encourages installations to outlease grazing and croplands as a means of maintaining good, ecologically sound stewardship of public lands. Additionally, by outleasing large plots, the installation can produce revenue to sustain the stewardship program and enhance other aspects of natural resources management and the outdoor recreational programs. However, the *General Plan* should recommend termination of agricultural outleases which conflict with the operational mission, inhibit future development, r are otherwise not advantageous to the installation.

*Sources of Data*

Your primary contact for outleased land will be the Real Property Office. Other information sources include:

- Natural Resources Conservation Service
- local/state agencies such as soil and water conservation districts
- state university agricultural extension services

*Helpful Hints*

Become intimately familiar with the funding mechanisms associated with this program so that the funds generated by your outlease program can be used on your installation.

*Suggested Graphics/Photographs*

- A graphic of outleased areas. Show the location, quantity, and boundaries of Air force land leased to other parties for agricultural purposes.
- A table listing the lease number, size of area leased, lessee, activity authorized by the lease, and the duration of the lease.

*References*

a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 9 outlines Air Force policy concerning agricultural outleasing.

b. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-9003, *Outgrant of Real Property.* Concerns transactions involving outgrants of U.S. Air Force real property.

c. U.S. Congress. 1977. *Soil and Water Conservation Act* (PL 95-103 and 16 USC 2001). Provides guidelines for land use policy and soil conservation within the U.S., its territories, and possessions.

d. U.S. Congress. 1976. *Federal Land Policy and Management Act* (43 USC 1702). Provides guidelines for land use policy and soil conservation within the U.S., its territories and possessions.

### 3.12.2.1.12 Fish and Wildlife

**Habitat Classification**

The U.S. Fish and Wildlife Service must classify all wildlife habitat that exists on Air Force installations.

- *Category I:* Installations that have suitable habitat for conserving and managing fish and wildlife.
- *Category II:* Installations that are unsuitable for conserving and managing fish and wildlife because of mission restrictions or resource limitations, or they are of limited size and do not have unimproved grounds.

If your installation is a Category I installation, you will be restricted in the use of land where the habitat exists. Category II installations will have no such restrictions.

Also, you should consider the potential recreational benefits of wildlife habitat when evaluating sites for development.

*Sources of Data*

Your primary source for Fish and Wildlife information is your installation *Integrated Natural Resources Management Plan* First, consult with your installation Environmental Office. The primary data source at the Federal level is the U.S. Fish and Wildlife Service.

Other Federal sources include the:

- National Marine Fisheries Service
- Natural Resources Conservation Service
- U.S. Geological Survey

State sources include the:

- Department of Conservation
- Natural History Survey
- Game and Fish Commission
- Department of Natural Resources

*Helpful Hints*

The installation *Integrated Natural Resources Plan* will specify whether your installation is Category I or II, and, if applicable, will include a fish and wildlife management component. Priority goes to protecting and preserving the habitat of threatened and endangered species and state species of special concern.

*Suggested Graphics/Photographs*

- A map depicting the location of hunting and fishing areas
- Photographs of managed fish/wildlife species

*References*

a. U.S. Air Force. AFCESA/EN. 1994. AFI 91-202, *US Air Force Mishap Prevention Program.* Provides guidance on the bird-aircraft strike hazard program.

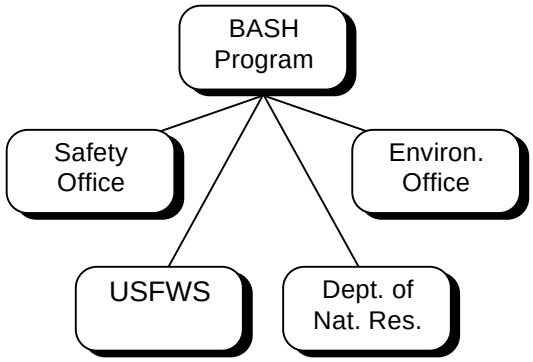
b. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 6 addresses fish and wildlife management directly, but also see Chapters 7 and 8.

c. U.S. Congress. 1982. The Sikes Act (16 USC 670 et seq.), *Conservation Programs on Military Reservations.* Provides the law on establishing and managing conservation programs on U.S. military installations worldwide.

d. The Pentagon, Department of Defense. 1989. DOD Directive 400.4, *Natural Resources Management Program* Provides guidance to the U.S. military services on managing natural resources on U.S. military installations.

## Bird Aircraft Strike Hazard (BASH)

The potential for bird aircraft strikes poses a considerable risk to aircrews. To minimize this risk, your installation's *BASH Reduction Plan* must address bird population control measures for those species which might pose a BASH problem. Since the location of bird habitats is usually dictated by the existence of water (lakes, streams, swamps), cover (trees, shrubs, tall grasses), and landfills, the installation may have to take steps to eliminate these attractions in the vicinity of runways. Because any initiative to affect wildlife habitat is a sensitive issue, you must first consult the installation Environmental Office which will coordinate with local and state wildlife agencies.



*Sources of Data*

- Installation Environmental and Safety Offices
- Airfield Manager
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey
- state Departments of Conservation and Game and Fish
- state Department of Natural Resources

*Helpful Hints*

In addition to land and wildlife management, various modifications to flight operations may be necessary to reduce BASH.

*Suggested Graphics/Photographs*

- A map of habitats and migratory areas near the airfield
- A map showing the migratory flyways and BASH areas

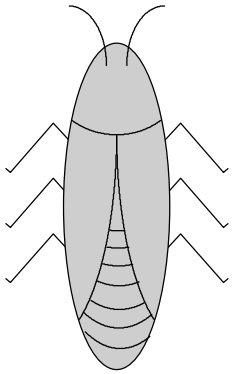
Both maps should be found in the installation's *BASH Reduction Plan.*

*References*

a. U.S. Air Force. AFCESA/EN. 1994. AFI 91-202, *US Air Force Mishap Prevention Program*. Provides guidance on anti-BASH measures.

b. U.S. Air Force. HQ USAF/CEVD. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 6 provides guidance on coordinating the BASH program.

### 3.12.2.1.14 Pest Management



Pest management involves the control of pests ranging from rodents to noxious weeds. Although pest management practices encourage the use of Integrated Pest Management (IPM) procedures, effective pest control often involves the use of pesticides. As a result, pest management requires great attention to detail, careful management, and strict documentation. The installation is required to provide special facilities for herbicide/pesticide storage and handling to prevent possible damage to sensitive or protected vegetation and wildlife, and non-point source pollution of water resources. Incorporate, by reference, the installation's *Pest Management Plan* which addresses these issues.

*Sources of Data*

- U.S. Department of Agriculture
- Installation Environmental and Entomology Offices
- Local soil and water conservation districts
- State agricultural extension service

*References*

a. Presidential Memo. 1994. *Environmentally and Economically Beneficial Practice on Federal Landscaped Grounds.* Directs that Federal installations implement landscaping practices that will reduce the use of fertilizers and pesticides while also conserving water.

b. U.S. Congress. 1972. *The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).* Establishes the registration procedures for herbicide/pesticide products.

### 3.12.2.1.15 Outdoor Recreation Areas

The factors contributing to quality of life on an installation include social programs and services, the quality of the natural and built environments, and recreational programs and facilities.

Outdoor recreation management, which is the responsibility of the installation's Morale, Welfare, Recreation Services (MWRS) Office, includes management of natural resources to provide opportunities for outdoor activities.

**Recreation Area Classifications**

Outdoor recreational facilities are grouped in the following three classes:

- *Class I, General outdoor recreation areas:* Areas suitable for activities such as camping, winter sports, and water sports.
- *Class II, Natural environmental areas:* Areas which can support dispersed recreation activities such as hunting, fishing, bird watching, driving and walking for pleasure, sightseeing, jogging, climbing, and riding.
- *Class III, Special interest areas:* Areas that contain valuable archaeological, botanical, ecological, geological, historic, zoological, scenic, or other features that require protection.

The Sikes Act requires that military installations promote public use of outdoor recreation resources when compatible with the installation's mission. Therefore, in your planning you must consider public access and facility capacity. The *General Plan* should contain recommendations to maintain and enhance outdoor recreation areas wherever possible.

*Sources of Data*

If your installation has outdoor recreation potential, contact MWRS to determine what coordination has been accomplished with the National Park Service. If none has occurred, determine who will make the contact. Remember, the Environmental Office has primary oversight for the archaeological, geological, zoological, historic, and scenic preservation programs which involve the outdoor recreation areas.

*Helpful Hints*

Although MWRS is primarily responsible for managing outdoor recreational resources, you should maintain close contact to ensure proposed outdoor recreational activities have no adverse impact on mission operations.

*Suggested Graphics/Photographs*

A map delineating actual and potential outdoor recreational areas

*References*

a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7064, *Integrated Natural Resources Management.* Chapter 10 discusses outdoor recreation management.

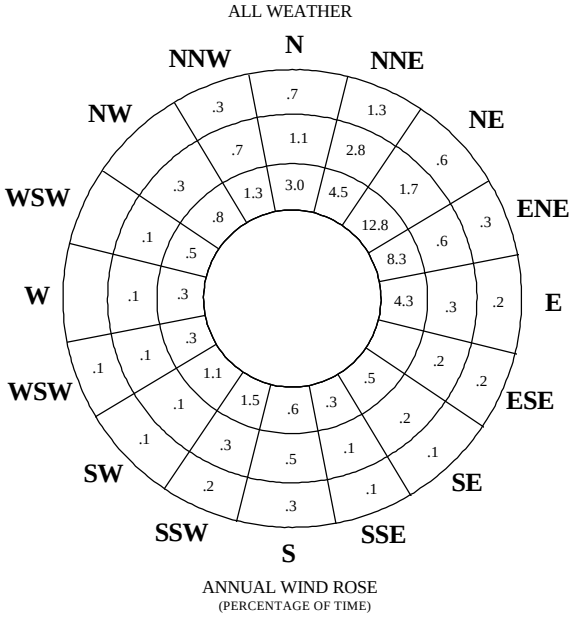
b. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7065, *Cultural Resources Management.* Directs that the *Cultural Resources Plan* be integrated into the installation comprehensive plan.

c. U.S. Congress. 1986. PL 86-797 (Sikes Act), *Conservation Programs on Military Reservations*, as amended by PL 90-465. Provides guidance for outdoor recreation management.

d. President. 1977. Executive Order 11989, *Off-Road Vehicles on Public Lands.* Provides direction to Federal Agencies concerning the enhancement of the cultural environment.

## 3.12.2.1.16 Climate and Weather

The climate and weather of the region in which your installation is located will influence your facility planning. The elements shape the regional landscape and influence facility site decisions such as location (land use), orientation, and type of construction. Climate and weather can also present constraints to development. For example, at northern tier installations, snow removal and emergency snow routes are primary considerations in traffic planning and in locating snow piling areas. Also, the direction a building faces and location of windows can have a significant affect on energy consumption.




*Sources of Data*

- Installation Weather Detachment
- National Weather Service
- Regional Planning Agency
- Chamber of Commerce

*Helpful Hints*

Weather patterns can vary significantly within relatively short distances, so you should evaluate your data source with regard to where the observations were taken.

*Suggested Graphics/Photographs*

- Annual and daily temperature charts
- Wind orientation charts (wind rose)
- Seasonal sun orientation charts, including azimuth and altitude angles

*References*

a. U.S. Air Force. Directorate of Engineering and Services. 1989. Air Force Planning Bulletin; *Base Comprehensive Planning, Air Force Comprehensive Planning Data Sources and Application.* Chapter 2, Section G, provides guidance for planners concerning climate and weather data sources useful in comprehensive planning.

b. U.S. Air Force. Directorate of Engineering and Services. Undated. *Passive Solar Handbook, Volumes 1, II & III.* Discusses passive solar concepts and their integration into comprehensive planning.

### 3.12.2.2 Environmental Quality

In this portion of the *General Plan,* your primary responsibility is to summarize the significant environmental factors that could affect development on the installation. Because environmental issues can be complex and the guidelines governing these issues subject to periodic change, your first step should be to contact the Environmental Office to obtain the most current information.

**Installation Environmental Office**

The following paragraphs address the key environmental areas that are found on many installations. The narrative in the plan should describe the areas that apply to your installation and highlight those which present significant constraints. If your installation has been exempted from complying with some guideline, annotate the authority of the exemption whether it be a letter, message, or verbal communication.

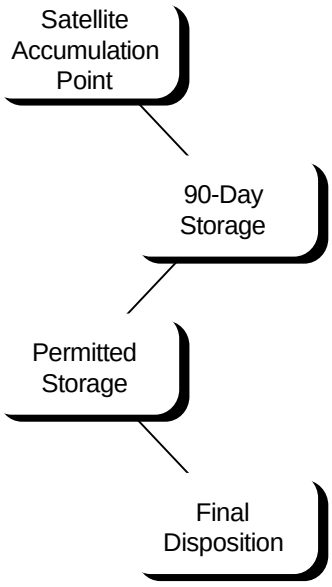
**Document Exemptions**

Also be aware of the role of the installation's Environmental Protection Committee (EPC). The EPC is responsible for achieving and maintaining environmental quality on the installation. In this role, the EPC reviews all proposed actions on the installation and makes recommendations to decision-makers. To avoid possible future delays and other potential problems, coordinate your proposals with the EPC early in the planning process. Also consider attending EPC meetings to stay abreast of their activities.

**Environmental Protection Committee**

#### 3.12.2.2.1 Hazardous Waste Generation and Storage Points

Hazardous wastes are certain solid wastes that appear in EPA's "Listed Wastes" in 40 CFR 261, or are wastes that demonstrate certain characteristics of ignitability, corrosivity, reactivity, or toxicity. Air Force installations typically generate waste solvents, oils, paints, paint sludges, and some medical waste which are regulated as hazardous waste. Federal regulations require that operations which generate 100 kilograms (about 220 pounds or one-half of a 55 gallon drum) of hazardous wastes per month be subject to regulation. Therefore, almost all Air Force installations are affected.




Keep the narrative as concise as possible and cross-reference it to detailed documentation, such as the Hazardous Waste Management, Waste Minimization, and Spill Prevention and Response Plans. Discuss the following as applicable:

*Regulatory Climate:* Briefly outline federal and state laws governing hazardous waste generation, transporting, treatment, and storage requirements.

*Existing Conditions:* Describe types of materials being handled, generation points, satellite accumulation points, and method of disposal. Also discuss any problems which might exist such as a lack of permitted storage facilities or handling equipment.

*Management Programs:* Emphasize compliance. Identify potential problem areas and recommend corrective actions.

*Sources of Data*

The Environmental Office is always the best source. A considerable amount of information should be readily available through interviews and gleaned from reports and studies, such as the Hazardous Waste Management Plan and Waste Minimization Plan, that the office has on file. The Environmental Office can also provide any off-installation points of contact.

Other sources would include the:

- Fire Department
- Bioenvironmental Engineer
- Supply Officer
- Safety Officer
- Maintenance Officer
- Transportation Officer
- hazardous waste treatment, storage and disposal facility operators
- Defense Reutilization and Marketing Office (DRMO).

*Helpful Hints*

Make the Environmental Office your first point of contact. They can point you toward specific documents, studies, or maps.

*Suggested Graphics/Photographs*

- A graphic that depicts the location of hazardous waste generation points and satellite accumulation points. Use information from the installation's B-1 Environmental Regulatory Issues Map (previously designated TAB B). Differentiate between permanent and interim storage facilities.
- Appropriate photographs would include generation and storage points and facilities. Particularly important would be any trend-setters on the positive side (formally cited as being on the leading edge by inspectors/regulators) and/or where there are shortfalls.

*References*

a. U.S. Congress. 1986. *Superfund Amendments and Reauthorization Act (SARA).* SARA Title III amended the CERCLA and established the Emergency Planning and Community Right to Know Act. Promotes emergency planning and preparedness at both state and local levels.

b. U.S. Congress. 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).* Requires notification to the EPA whenever an installation spills, loses, or releases into the environment reportable quantities of certain hazardous materials.

c. U.S. Congress. 1976. *Resource Conservation and Recovery Act (RCRA)* and its amendments. Regulates hazardous waste from its origin to ultimate treatment, storage or disposal.

d. U.S. Congress. 1976. *Toxic Substances Control Act* Regulates some specific hazardous materials such as polychlorinated biphenyls (PCB) and asbestos.

e. U.S. Congress. 1970. *Occupational Safety and Health Administration(OSHA) Safety and Health Act* Regulates facilities that use and store hazardous materials.

### 3.12.2.2.2 Solid Waste Disposal and Recycling Points

Solid waste is considered to be non-RCRA regulated trash, rubbish, garbage, bulky wastes, liquids, or sludges. It also includes medical/pathological wastes generated by the hospital or clinic. Recycling and recovery activities are part of solid waste management.

You should cover the following as applicable:

*Regulatory Climate*: This includes the state and federal laws governing solid waste management.

*Existing Conditions:*

- Current methods for disposing of solid waste

I. Contract Disposal Requirements
II. Solid waste disposal sites (solid waste incinerators, landfills [open and closed], hardfill areas [concrete and fill material], remaining capacity)
III. Recycling Facilities (central recycling facility, composting areas, mulching areas, etc.). Flag any potential capacity problems.

*Management Programs:* Emphasize what is being done to ensure compliance. Identify shortfalls, corrective actions, and plans for the future.

*Sources of Data*

- Environmental Office
- Bioenvironmental Engineer

The Environmental Office has information about operating installation landfills and storage and transportation of solid wastes to either on- or off-installation disposal sites. That office will also have information regarding contract disposal of solid waste, if applicable. The Bioenvironmental Engineer is also a good source for monitoring/compliance data. Solid waste is heavily regulated at state and/or local level. Get points of contact from the Environmental Coordinator if needed.

*Helpful Hints*

- Make the Environmental Office your first point of contact.
- Existing or anticipated problems with landfill or recycling point capacities may generate storage/facility requirements.

*Suggested Graphics/Photographs*

- A graphic to show the locations of solid waste disposal sites and recycling points. If available, use information from the B-1 Environmental Regulatory Issues Map (previously designated TAB B). Also indicate the dates when facilities are projected to reach capacity.
- Photographs showing landfills and recycling points. Particularly important would be any trend setters on the positive side (formally cited as being on the leading edge by inspectors/regulators) and/or where there are shortfalls.

*References*

*Note: The majority of the directives tabulated below are common to this and all other Environmental Quality program management areas and will not be repeated after each topic. AFI 32-7042 is unique to Hazardous Waste Generation and Storage Points.*

a. U.S. Air Force. HQ USAF/CEV. 1995 *Handbook to Environmental Quality* A quick-look reference and guidance document. Appendix A contains programmatic data.

b. U.S. Air Force. HQ USAF/CEV. 1994. AFI 32-7001, *Environmental Budgeting* Provides guidance on identifying, developing, and processing requirements to meet environmental standards.

c. U.S. Air Force. HQ USAF/CEV. 1994. AFI 32-7002, *Environmental Information Management System* Provides guidance and procedures to standardize use of the Work Information Management System--Environmental Subsystem (WIMS-ES) in the Air Force's computerized management information system to store, manage, and report environmental data of all kinds. Use it to measure compliance with Air Force environmental cleanup, compliance, conservation, and pollution prevention programs.

d. U.S. Air Force. HQ USAF/CEVC. 1994. AFI 32-7042, *Solid and Hazardous Waste Compliance* Identifies compliance requirements for all solid and hazardous waste, except radioactive waste.

e. U.S. Air Force. HQ USAF/CEVC. 1994. AFI 32-7045, *Environmental Compliance Assessment and Management Program* Provides guidance for establishing a comprehensive self-assessment program management system to fully comply with federal, state, local, DOD, and Air Force Environmental laws and regulations.

f. U.S. Air Force. HQ USAF/CEVC. 1994. AFI 32-7047, *Compliance Tracking and Reporting* Identifies requirements for managing and reporting enforcement actions and compliance agreements resulting from inspections of Air Force environmental programs by federal, state, and local regulatory agencies.

g. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning* Identifies requirements for Air Force coordination for environmental planning.

h. U.S. Air Force. HQ AFCEE/DGP. 1994. AFI 32-7062, *Air Force Comprehensive Planning* Establishes the Air Force Comprehensive Planning Program for development of Air Force Installations.

i. U.S. Air Force. HQ USAF/CEV. 1994. AFI 32-7080, *Pollution Prevention Program* Directive requirements for the Pollution Prevention Program.

j. U.S. Air Force. HQ AFCEE/Air Force Design Group. 1993. *Master Statement of Work for Preparation of Base Comprehensive Plans for Air Force Installations.* Use the Environmental Quality (B Component) and BCP Map specifications as checklists to ensure completeness.

k. U.S. Air Force. HQ USAF/CEV. 1989. AFR 19-11 crossover to AFI 32-7103, *Hazardous Waste Management and Minimization.* Covers responsibilities under RCRA.

l. U.S. Air Force. Directorate of Engineering and Services. 1989. *Environmental Quality Protection Planning Bulletin/Manual.* Provides a framework for defining and incorporating environmental quality considerations into the developing and implementing short and long-range planning, design, and construction programs.

m. U.S. Air Force. SGPA. 1985. AFR 19-7 crossover to AFI 48-119, *Environmental Pollution Monitoring.* Specifies requirements for establishing water quality surveillance and monitoring to ensure compliance with Federal, state, and local programs.

n. U.S. Congress. 1976. *Resource Conservation and Recovery Act (RCRA) and its amendments.* Title D establishes federal standards for managing non-hazardous solid wastes. The Hazardous and Solid Waste amendments (1974) added a number of materials to the listing of hazardous wastes and imposed strict limitations or prohibitions on the land disposal of certain types of wastes (check with the installation Environmental Coordinator).

o. U.S. Congress. *Solid Waste Disposal Act.* Requires that federal facilities comply with all federal, state, interstate, and local requirements concerning the disposal and management of solid wastes.

p. U.S. Department of Defense. DOD Directive 4100.15, *Commercial Activities Program.* Sets the overall policy that military installations will not compete with a locally available commercial recycling industry that offers a total solid waste resource recovery system and that installations use regional resource recovery programs whenever practical.

q. U.S. Department of Defense. 1976. DOD Directive 4165.60, *Solid Waste Management, Collection, Disposal and Recycling Program.* Provides guidance to all DOD facilities, for solid waste collection, disposal, material recovery, and recycling as required by the Solid Waste Disposal Act.

r. U.S. Air Force. HQ USAF/CEVC. 1993. AFPD 32-70, *Environmental Quality.* Specifies that adherence to environmental policy standards will be assessed by comparing the amount of solid wastes sent to off-installation disposal facilities in any given fiscal year (FY) against the baseline year of FY92.

s. U.S. Air Force. HQ USAF/CEVC. 1994. AFI 32-7042, *Solid and Hazardous Waste Compliance.* Identifies compliance requirements for all solid and hazardous wastes, except radioactive.

t. Various state/local regulations. Many state and local government requirements are more stringent than federal laws. Check with the installation Environmental Coordinator.

### 3.12.2.2.3 Fuel Storage Tanks

Fuel storage tanks represent a potential threat to the environment. Leaks from aboveground and underground fuel storage tanks (USTs) and associated piping create an environmental threat to groundwater resources. Leaks can also contaminate the surrounding soil, pose a threat of fires and explosions, and may emit volatile toxic vapors into the air. Focus the narrative as follows:

**"Fuel storage tanks represent a potential threat to the environment."**

*Regulatory Climate:* This includes the state and federal laws governing solid waste management.

- Several elements are in the implementing regulations, beginning with standards for the installation of new UST systems and the certification of the installation.
- New and existing UST systems have the same design and release standards, except that new systems are required to meet the standards at the time of installation.
- Existing systems have a phase-in schedule based on the age of the system, and must be upgraded with cathodic protection and spill/overflow control by December 22, 1998.

*Existing Conditions:* Describe the status of aboveground and underground fuel storage tanks on the installation. Include, in table format, information regarding above and underground storage tanks.

- Discuss environmental problems associated with leaking tanks and associated piping.
- Record installation date, tank content, and type of construction.

*Management Programs:* Emphasize what is being done to monitor tanks, particularly underground storage tanks (UST) to ensure compliance. Identify potential problem areas and proposed corrective actions.

- Discuss the major command (MAJCOM) policy for replacing/ upgrading USTs.
- Discuss the UST management plan.

*Sources of Data*

Each of the following is concerned with various aspects of fuel storage tank management and compliance:

- The Environmental Office
- Fire Department
- Fuels Management Office
- Bioenvironmental Engineering Office

Also, many states and some metropolitan regional planning agencies have developed storage tank legislation. Get points of contact from the Environmental Office, if needed.

*Helpful Hints*

You must remove, replace, or remediate in place, leaking tanks. Also, you must clean up any contaminated soil before you can develop the site.

*Suggested Graphics/Photographs*

- A graphic to depict the location of fuel storage tanks (aboveground and underground). Use available information from the B-1 Environmental Regulatory Issues Map (previously designated TAB B), and the Environmental Quality Protection Plan. The B-1 Map may also contain other data, such as capacities and contents, that will be helpful.

- Photographs of aboveground tanks and USTs being removed, and/or related activities. Particularly important are any trend setters on the positive side (formally cited as being on the leading edge by inspectors/regulators) and/or where there are shortfalls.

*References*

a. U.S. Air Force. HQ USAF/CEV. 1989. AFR 19-1 1 crossover to AFI 32-7103, *Hazardous Waste Management and Minimization* Outlines the requirements for annual review of the Oil and Hazardous Substances Pollution Contingency (OHSPC) and Spill Prevention Control and Countermeasure (SPCC) plans, and defines spill reporting requirements.

b. U.S. Air Force. HQ AFCESA/EN. 1981. AFM 85-16, *Maintenance of Petroleum Systems*. Governs the maintenance of permanently installed storage and dispensing systems for petroleum and unconventional fuels.

c. U.S. Air Force. HQ AFCESA/EN. 1982. AFM 85-5, *Maintenance and Operation of Cathodic Protection Systems*. Contains guidance for system maintenance and operations.

d. U.S. Congress. 1955. *Clean Air Act*. Applies where state regulatory agencies require UST construction and operation permits because of the potential for air emissions from tank vents.

e. U.S. Congress. 1972. *Clean Water Act*. Requires the development of a Spill Prevention Control and Countermeasure (SPCC) Plan for facilities that have UST capacities of more than 42,000 gallons.

f. U.S. Congress. 1984. *Resource Conservation and Recovery Act (RCRA) amendments*. Establishes a comprehensive regulatory program for USTs that store petroleum, petroleum by-products, or certain substances defined as hazardous under CERCLA Section 101(14).

g. U.S. Department of Defense. 1977. DOD Directive 5030.41, *Oil and Hazardous Substances Pollution Prevention and Contingency Program*. Addresses requirements for compliance with the National Oil and Hazardous Substances Pollution Contingency Plan.

h. Various state/local regulations. Many state and local government requirements closely parallel federal statutes. Some, however, may differ. Check with the installation environmental coordinator.

### 3.12.2.2.4 RCRA, IRP, and Toxic Substances

**Investigation**
**Characterization**
**Remediation**
**Closure**

In this part of the plan you will describe any ongoing or planned environmental remediation of the installation. The Resource Conservation and Recovery Act (RCRA) directs the cleanup of current hazardous materials/waste operations and spills. The Toxic Substance Control Act of 1976 regulates and controls the commercial use of chemicals and toxic substances. The 1976 act specifically addresses the use and disposal of Polychlorinated Biphenyls (PCBs), equipment that contains PCBs, and asbestos.

**Installation**
**Restoration Program**

The Installation Restoration Program (IRP) is a DOD-wide program to identify, investigate, and clean up past disposal sites. The IRP is a subcomponent of the Defense Environmental Restoration Program (DERP) which addresses the identification, investigation, and cleanup of contamination from hazardous substances and pollutants associated with past practices. DERP is funded through the Defense Environmental Restoration Account (DERA).

Although there may be some exceptions, environmentally contaminated areas generally constrain land use/development until cleanup is complete. Discuss the following:

*Regulatory Climate:* This includes the state and federal laws governing RCRA (solid and hazardous waste collection, storage, and disposal facilities) and IRP sites.

*Existing Conditions:*

- Identify and discuss all RCRA sites.
- Discuss the asbestos inventory; if extensive, include in an appendix.
- Address the existence/non-existence of PCBs and include storage facilities.

*Management Action Programs:*Discuss the status of the installation's efforts to remedy existing problems, if any.

*Identify and describe IRP sites:* Refer to IRP Management Action Plan.

*Asbestos Control:* Explain the overall strategy for achieving an asbestos-free environment. Include your installation's plan for identifying and removing asbestos.

*PCBs:* Take the same approach as used for asbestos. Discuss the management program to inventory, monitor, and ensure compliance.

*Spill Prevention and Response Plan*:Describe major provisions.

*Sources of Data*

- Environmental Office
- Bioenvironmental Engineer

*Helpful Hints*

RCRA and IRP sites are constraints only until they are cleaned up. Then, they may present development opportunities.

*Suggested Graphics/Photographs*

- A graphic to show the location of RCRA and IRP sites. If available, use information from the B-1 Environmental Regulatory Issues Map (formerly TAB B).
- Photographs of sites and clean-up activities. Particularly important would be any trendsetters on the positive side (formally cited as being on the leading edge by inspectors/regulators).

*References*

a. U.S. Congress. 1980, 1986. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA).* Establishes the nationwide process to clean up hazardous waste disposal and spill sites. The Defense Environmental Restoration Program (DERP) became law as SARA Section 211.

*b.* U.S. Congress. 1976, 1984. *Resource Conservation and Recovery Act (RCRA).* Regulates hazardous waste from its origin to ultimate treatment, storage or disposal.

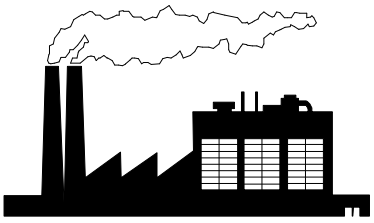
c. U.S. Congress. 1972. *Clean Air Act.* Requires that EPA establish National Emission Standards for Hazardous Air Pollutants (NESHAP) for which no ambient air quality standards are applicable and which may result in an increase in mortality or serious irreversible illnesses. EPA listed asbestos as a hazardous pollutant in 1974.

d. U.S. Department of Defense. 1977. DOD Directive 5030.41. *Oil and Hazardous Substances Pollution Prevention and Contingency Program.* Addresses requirements for compliance with the National Oil and Hazardous Substances Pollution Contingency Plan.

e. Various state/local regulations. Many state and local government requirements closely parallel Federal statutes. Some, however, may differ. Check with the installation environmental coordinator.

### 3.12.2.2.5 Air Emission Sources and Inventory

Air Force installations typically have numerous sources of air pollutant emissions which are regulated and may require permits for construction and operation. Emissions are of particular concern in areas that do not meet air quality standards (non-attainment areas), and therefore become serious constraints to mission execution and future development.



The primary air emission sources at Air Force installations are:

- particulates, sulfur dioxide ($SO_2$), and nitrogen oxides from fuel burning at steam and hot water generation plants and boilers
- particulates from the operation of incinerators
- volatile organic compound (VOC) vapors from the storage and transfer of certain fuels and chemicals (solvents), and the operation of degreasers, paint shops, printing operations, and other processes that use solvents
- emission of nitrogen oxides and hydrocarbons from aerospace ground equipment (AGE) and vehicle operations on the installation

State, county, and regional air quality regulations generally follow EPA guidelines but will vary depending on the type and severity of air pollution problems within the state or region. States establish emissions limits for various stationary sources and require permits to construct, modify, and operate sources of air pollution. Sources that violate permits may receive civil and criminal penalties. State, regional, and local regulatory requirements should be readily available in the Environmental office.

In the *General Plan,* you should include a list of installation emission sources and a status of permits as required. Address those sources that are not in compliance and describe initiatives to correct the problem.

*Sources of Data*
- Environmental Office
- Bioenvironmental Engineer
- Local/State regulatory agencies

*Helpful Hints*
- Some states will issue air quality "credits" for technical and programmatic improvements that reduce air emissions. These can be traded for the permitting of new facilities/processes that otherwise could not be accomplished within the existing permits.
- The 1991 *Intermodal Surface Transportation Efficiency Act (ISTEA)* links transportation planning to air quality. You should consult the environmental coordinator and legal office to determine applicability. Cross-reference to the Transportation narrative under Land Use.

*Suggested Graphics/Photographs*
- A graphic that shows the location of all air emission sources. Use the B-2 Environmental Emissions Sources Map, (formerly TAB B) if available.
- Photographs that show emission and monitoring sites. Particularly important would be any trend setters on the positive side (formally cited as being on the leading edge by inspectors/regulators).

*References*

a. U.S. Air Force. HQ USAF/CEV. 1994. AFI 32-7040, *Air Quality Compliance*. Identifies Air Force requirements for an air quality compliance program.

b. U.S. Air Force. HQ USAF/CE. 1988. AFR 19-6, *Air Pollution Control Systems for Boilers and Incinerators*. Provides guidance on how to select, design, operate, and maintain emission control devices on boilers and incinerators.

c. U.S. Congress. 1991. *Intermodal Surface Transportation Efficiency Act (ISTEA)*. Links transportation planning and funding to air quality.

d. U.S. Congress. 1977. *Clean Air Act, as amended*. The basic federal enabling legislation that governs air pollution.

e. Various state/local regulations. The primary state regulations are Air Quality Control Region (AQCR) regulations. Many have New Source Performance Standards (NSPS) for particular pollutants. Most states exercise their authority through permitting systems. Many states require vehicle emission inspections, and most regulate volatile organic compounds (VOC).

## 3.12.2.2.6 Wastewater Point Source Discharges

Here, briefly describe how wastewater discharge requirements may act as a constraint to development. For more information on the sanitary sewer system reference the Infrastructure section.

Typically, wastewater discharges can include any of the following:
- sanitary or industrial wastewater discharged directly to a receiving stream, or through an installation treatment facility

- sanitary or industrial wastewater discharged to an off-installation Publicly Owned Treatment Works (POTW) or to a treatment plant of another DOD or federal activity
- stormwater runoff from industrial areas to a receiving stream or water body

Discharges of wastewater from installation treatment facilities are normally regulated by discharge permits issued by federal and/or state regulatory agencies. Discharges to POTWs are subject to limitations specified in the agreements with the agency operating the treatment facility and may be subject to specific pretreatment requirements. Permitting requirements may be constraints. Cross-reference this section with the sanitary sewer system discussion in the Infrastructure component.

States normally have regulations that require permitting. They are often delegated the authority to administer the NPDES permits, normally a cooperative EPA/state process, for discharges within the state, but there may be differences in federal/state monitoring requirements and the number of pollutants controlled. State requirements should be readily available in the installation Environmental Office.

*Sources of Data*
- Environmental Office
- Bioenvironmental Engineer

The Environmental Office prepares wastewater discharge permit applications, monitors compliance, and reports monitoring results as specified in the National Pollutant Discharge Elimination System (NPDES) permit. The Bioenvironmental Engineer should also have information since that office monitors wastewater discharges and stream water quality at selected locations around the installation.

*Helpful Hints*
Make sure that wastewater discharge/treatment capacities and permits keep pace with future development plans.

*Suggested Graphics/Photographs*
- A graphic to show the location of all point source discharges. Use information from the installation B-2 Environmental Emissions Sources Map (formerly TAB B) if available.
- Photographs showing discharge points and monitoring sites. Particularly important would be any trend setters on the positive side (formally cited as being on the leading edge by inspectors/regulators) and shortfalls.

*References*
a. U.S. Air Force. HQ AFCESA/EN. 1989. AFR 91-9 crossover to AFI 32-1067, *Water Pollution Control Facilities*. Specifies additional requirements for operating waste treatment works at Air Force installations.

b. U.S. Air Force. SGPA. 1985. AFR 19-7 crossover to AFI 48-119, *Environmental Pollution Monitoring*. Specifies requirements for establishing water quality surveillance and monitoring to ensure compliance with appropriate federal, state, and local requirements. All Air Force installations are required to issue supplements to AFR 19-7 that identify specific monitoring locations and frequencies of sampling.

c. U.S. Air Force. HQ AFCESA/ENC. 1982. AFM 91-32, *Operation and Maintenance of Domestic and Industrial Wastewater Systems*. Specifies detailed operational and maintenance guidelines and requirements for water pollution control plants on Air Force installations.

d. U.S. Congress. 1972. *Clean Water Act (CWA)*. The principal federal legislation which addresses the control of water pollution. It is illegal to discharge pollutants from a point source without a NPDES permit. The CWA established the NPDES program for issuing these permits.

e. U.S. Department of Defense. 1977. DOD Instruction 4120.14, *Environmental Pollution, Prevention, Control & Abatement*. Establishes policies for installing improvements needed to abate water pollution emanating from DOD facilities.

f. Various state/local regulations. Check with the installation Environmental Office for those applicable in your area.

### 3.12.2.2.7 Stormwater Non-Point Source Discharges

Stormwater is typically runoff from all the land use areas that flows over the natural terrain/paved surfaces, and/or through some combination of gutters, ditches, and piping, with direct discharge into a receiving stream or surface water body. Consequently, the same regulatory requirements that pertain to wastewater apply to stormwater discharges. The combined waste/stormwater permitting requirements may be constraints. Refer to the Infrastructure section for more information on the stormwater drainage system.

*Sources of Data*
See Paragraph 2.2.6, "Wastewater Point Source Discharges."

*Helpful Hints*
- Make sure that the storm drainage system has capacity to accommodate future development plans.
- Some non-point source discharges may also require permits.

*Suggested Graphics/Photographs*
A graphic to show the location of all non-point source stormwater discharges. Use information from the B-2 Environmental Emissions Sources Map (formerly TAB B) if available.

*References*.
Same as Wastewater Point Source Discharges.

### 3.12.2.2.8 Drinking Water Supply Sources and Monitoring Sites

Briefly describe how drinking water supplies could impact development. More detail on the drinking water system is contained in the Infrastructure section.

## Public Water Systems

As defined by the *Safe Drinking Water Act*, a public water system is "any collection, treatment, storage, or distribution facility for the provision of piped water for human consumption," provided that the system for which it exists has at least 15 service connections or regularly serves at least 25 individuals daily for a total of at least 60 days per year.

However, military installations are not required to comply with the conditions of the *Safe Drinking Water Act*, if they meet all of the following criteria:

- systems consisting only of distribution and storage facilities and do not have any collection and treatment facilities
- installations that get all of their water from a public water system that is owned and operated by another party (non-Air Force)
- installations that do not sell water to any other party

Even though the above criteria may technically apply to an Air Force installation, as a practical matter, AFR 161-44, *Management of the Drinking Water Surveillance Program*, requires compliance with drinking water standards and monitoring requirements.

*Sources of Data*

The three primary sources are the:

- Environmental Office
- Bioenvironmental Engineer
- Medical Treatment Facility (MTF) Commander

The Environmental Office should have information readily available concerning regulatory agencies, permits and compliance. The Bioenvironmental Engineer samples water systems to determine compliance with drinking water standards. The installation medical activity interprets the results of water analyses and notifies state authorities when maximum contaminant levels are exceeded.

Almost all states have EPA authorization to administer drinking water compliance programs. States that have primacy may establish more drinking water regulations, monitoring schedules, and reporting requirements than those required in Federal Regulations. Air Force public water systems in these states are required to comply with these additional requirements.

*Helpful Hints*

Your first step is to determine if the drinking water system is in compliance. If it is not, determine if variances and/or exemptions exist. Variances and exemptions are granted by EPA, or approved states, to enable non-complying public water systems to continue operating. Include schedules and methodology for attaining compliance.

*Suggested Graphics/Photographs*

- A graphic showing the location of all water supply sources and sampling points on the installation. Use the installation B-2 Environmental Emissions Sources Map (previously designated TAB B) if available.

- Photographs showing supply and monitoring points and treatment facilities as applicable.

*References*

a. U.S. Air Force. HQ AFCESA/EN. 1989. AFR 91-9 crossover to AFI 32-1067, *Operation and Maintenance of Air Force Water Works Facilities*. Contains standards for operating and maintaining drinking water systems.

b. U.S. Air Force. HQ AFCESA/EN. 1982. AFR 91-5 crossover to AFI 32-1061, *Utility Services*. Contains standards for operating and maintaining drinking water systems.

c. U.S. Air Force. SGPA. 1979. AFR 161-44, *Management of the Drinking Water Surveillance Program* The operative regulation for managing drinking water programs at Air Force installations.

d. U.S. Congress. 1994. *Safe Drinking Water Act (SDWA) and amendments*. Specifies a system for protecting drinking water supplies by establishing contaminant limitations and enforcement procedures.

e. U.S. Department of Defense. 1978. DOD Directive 6230.1, *Safe Drinking Water*. DOD policy for providing adequate safe drinking water and complying with the Safe Drinking Water Act and standards established by the National Primary Drinking Water Regulations.

f. Various state/local regulations. Check with the Environmental Office for those applicable in your area.

### 3.12.2.2.9 Radon Emissions

Here, you should briefly describe the Radon Assessment and Mitigation Program (RAMP) on your installation. RAMP was initiated by a 1987 Assistant Vice Chief of Staff of the Air Force policy letter. It is designed to assess radon levels in family housing, administrative buildings, dormitories, child care facilities, and temporary lodging facilities.

Radon is a colorless radioactive gas released by the natural degradation of uranium. It can be found in high concentrations in soils and rocks containing uranium, granite, shale, and phosphate. Radon enters buildings through dirt floors, cracks in concrete floors and walls, floor drains, sumps, joints, and cracks and pores in hollow block walls.

Exposure to elevated levels of radon increases the risk of lung cancer. Radon gas can concentrate inside enclosed spaces such as houses and buildings to levels exceeding several hundred picocuries per liter of air (pCi/L). Some EPA data show radon levels of above four picocuries per liter of air in enclosed areas (houses) are considered unsafe. However, radon data vary, so it is very important that you check with the Bioenvironmental Engineer on your installation. Major features are:

- initial screening to identify actual/potential problems
- mitigation to reduce or eliminate problems the screening identified
- post mitigation assessments to ensure the effectiveness of mitigation actions

*Sources of Data*

- Environmental Office
- Bioenvironmental Engineer
- local/state regulatory agencies

*Helpful Hints*

Excessive radon emissions can restrict the use of existing facilities until the emissions are successfully controlled. Radon emission controls must be designed into new facilities built where soils would indicate a potential radon problem.

*Suggested Graphics/Photographs*

A graphic showing the location of all radon sources and sampling locations where radon sampling results exceed 30 pCi/L. Use information from the B-2 Environmental Emissions Sources Map (previously designated TAB B) if available.

*References*

Various state/local regulations. Check with the Environmental Office.

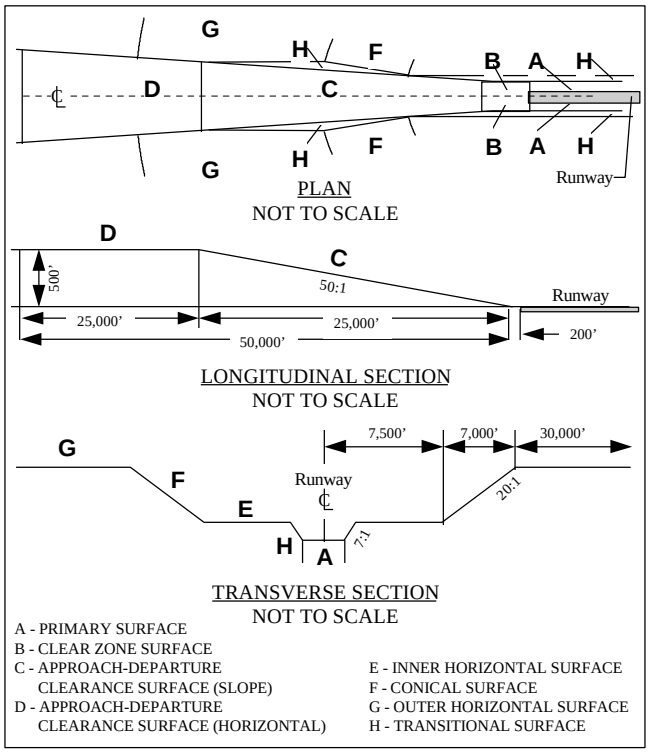
## 3.12.3 Built Constraints

In this section, you will describe the mission-related built constraints. Other constraints related to housing, administrative, or commercial uses should be mentioned in one of the remaining sections; *Land Use, Infrastructure, or Capital Improvements*

### 3.12.3.1 Airfield Clearance

Installations that support fixed and rotary winged aircraft are required to comply with clearance criteria established in AFJMAN 321013, *Airfield and Heliport Planning and Design Criteria*. These criteria govern the location and height of structures near the airfield to reduce obstructions to flight operations. Development in these areas requires cautious planning and must comply with these restrictions. Analyze building designs to determine whether or not proposed structures will meet the clearance height criteria. Joint-use civilian/military airfields may not be governed by these guidelines; however, they may be governed by FAA Part 77.

Waivers are frequently issued for existing facilities which do not comply with criteria. However, waivers must be kept current. AFJMAN 32-1013 directs that, with a few exceptions, the MAJCOM has waiver authority. The primary purpose of the waiver is to promote awareness of obstacles to aircraft operations and maintain a program to minimize the hazards.




*Runway Imaginary Surfaces (AFI 32-1026)*

For most installations, airfield and airspace imaginary surfaces extend past the installation boundaries onto public and private lands. In these situations, you must be aware of planned development off the installation and make the installation's concerns about obstructions known to the local officials.

*Sources of Data*

- Airfield Manager
- Flying Safety Office
- local community planning organizations
- Map C-1, *Installation Layout* and Map D-6, *Composite Installation Constraints and Opportunities*

*Helpful Hints*

- Coordinate projects through programmers and airfield manager.
- Process waivers through the Air Traffic Control Board and Facilities Board.
- Insure any project proposed in the airfield environment is well coordinated with airfield manager and safety office.

*Suggested Graphics/Photographs*

Installation map with overlay of airfield clearance zones

*References*

a. U.S. Air Force. AFJMAN 32-1013. April 1995. *Airfield and Heliport Planning and Design Criteria*. This Joint Manual, which will eventually incorporate AFRs 86-14, 86-5, and AFI 32-1026, provides detailed guidance on the imaginary surfaces that overlay an airfield, obstructions to air operations, and the procedures for seeking waivers for obstructions.

b. U.S. Air Force. HQ AFCEE/DGA. March 1995. AFI 32-1084, *Standard Facility Requirements Handbook.*

c. U.S. Air Force. HQ AFCEE/DGA. May 1994. AFI 32-1024, *Standard Facility Requirements.* Contains approved criteria for facilities for Air Force units.

d. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7063, *Air Installation Compatible Use Zone Program.* Establishes the requirement for an AICUZ program at all Air Force installations with an active runway within the United States and its territories.

e. U.S. Air Force. HQ AFCESA/ENC. 1994. AFI 32-1026, *Planning and Design of Airfields.* Provides guidance to personnel responsible for planning, developing, siting, and layout of runways, taxiways, aprons, pads, and support facilities for fixed and rotary winged aircraft.

f. U.S. Department of Transportation, Federal Aviation Administration. 1975. *Part 77, Objects Affecting Navigable Airspace.*

### 3.12.3.2 Explosive Safety Zones

Installations with munitions or other explosive storage, handling, and maintenance facilities are required to establish safety clearance zones around these facilities. The size of these zones depends on several factors including the category and weight of the explosives contained in the facility and the construction of the facility. Separation distances are calculated using established quantity-distance (Q-D) criteria found in AFMAN 91-201.

Explosive storage safety siting packages are primarily the responsibility of Weapons Safety. The DOD Explosive Safety Board has final approval.

*Sources of Data*

- Installation Safety Office. Maps C-1, *Installation Layout*; D-6, *Composite Installation Constraints/ Opportunities*; and D-8, *Explosive Safety Quantity-Distance Clearance Zones*
- DOD Explosives Safety Board

*Helpful Hints*

Because Q-D separation calculations are a significant safety issue on any installation, you should seek the advice of the installation's Safety Office before making any decisions about future facility siting. Explosive safety distance site plan packages require extensive coordination.

*Suggested Graphics/Photographs*

Installation map depicting Q-D clearance zones

*References*
U.S. Air Force. HQ AFSA/SEWV. 1994. AFMAN 91-201, *Explosive Safety Standards* (supersedes AFR 127-100). Provides safety criteria for storage of various classes and amounts of explosives.

### 3.12.3.3 Electromagnetic Radiation Safety Zones

These safety zones are typically established around radar antennas, satellite antennas, and communication sites with transmitting capabilities. The size of the zone depends on the maximum amount of radio frequency (RF) energy that the particular antenna can transmit. The safety zone parameter calculations should be done by the unit or wing level Radiation Safety Officer or by whomever is assigned this responsibility. This calculation is critical and should be done in conjunction with the preparation of the site plan. Ensure the calculation is included in the project documentation for future reference.

*Sources of Data*
- Antenna operating unit and Safety Office

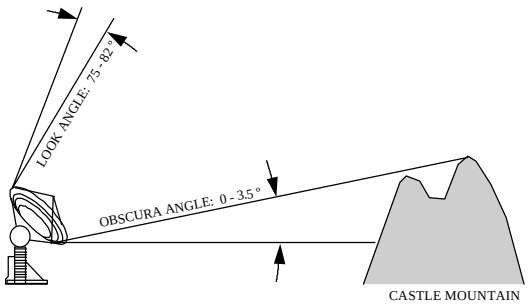
I. Map D-6, *Composite Installation Constraints /Opportunities*
- Map H, *Communications/NAVAID Systems*

*Helpful Hints*
Because of the safety implications, you should ensure the unit or wing Radiation Safety Officer, or whoever performs this duty, verifies the antenna data and calculations.

*Suggested Graphics/Photographs*
- Installation map or smaller area map depicting clear zones
- Photographs of hazardous transmitter facilities

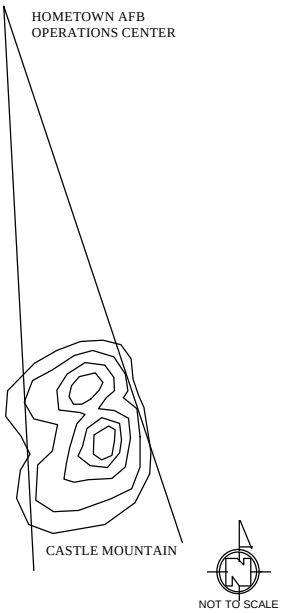
### 3.12.3.4 Antenna Look-Angles

Look-angle clearance is a critical issue when siting facilities near a satellite dish antenna, particularly with regard to an antenna that must acquire and track targets from horizon to horizon. The operating unit typically has a profile of the obstructions that affect its antenna's fields of view. Although a proposed site may appear to obstruct an antenna's view, the site may fall in the shadow of a distant obstruction such as a mountain range, and the closer structure would not be the limiting factor. Analyze antenna look angles each time a facility is proposed in the area.




Occasionally, obstructions or potential obstructions will be located off the installation. You should work closely with local planning agencies to avoid look-angle obstructions whenever possible. In some cases, it will be necessary to have the local planning agency establish building height restrictions in these areas.

Similar constraints are imposed by instrumentation line-of-sight requirements for cameras, radars, and weather equipment. Modify this paragraph to fit the specific requirements of your installation.




*Sources of Data*

- The organization which operates the antenna
- Local planning agencies

I. Map D-3, *Vicinity Existing Land Use*

II. Map D-4, *Vicinity Existing Zoning*

- Map D-6, *Composite Constraints and Opportunities*

*Suggested Graphics/Photographs*

- A graphic depicting the antenna beam/line-of-sight in relation to major surrounding obstacles
- Graphic depicting same information as shown on Maps D-3, D-4, and D-6

*References*

U.S. Air Force. HQ USAF/SCFX. 1989. AFR 700-14, *Radio Frequency Spectrum Management.*

## 3.12.3.5 Security Clear Zones

Security clear zones with controlled access are often established around an installation's critical mission resources. The requirement for these clear zones is established in AFI 31-101, *USAF Physical Security*, which also details the physical design requirements for a clear zone.

If applicable, address anti-terrorist measures in this section as well.

*Sources of Data*

The Security Police will be your primary source of information.

*Helpful Hints*

Some security clear zone requirements may not be depicted on a map and may require special annotation to highlight the additional constraints to those viewing a map or graphic.

*Suggested Graphics/Photographs*

An installation map showing Security Clear Zones.

*References*.

a. U.S. Air Force. HQ USAF/SP. 1995. AFI 31-210, *The Air Force Anti-terrorism (AT) Program*. Implements Air Force AT Program and establishes responsibilities and guidance for the AT Program for the protection of personnel and facilities.

b. U.S. Air Force. HQ USAF/SPSS. 1994. AFI 31-101, *USAF Physical Security*. Establishes guidelines for security arrangements for selected facilities.

### 3.12.3.6 Launch Operation Hazard

Some specific operational constraints apply only to those installations which launch missiles. Hazard zones are established around launch facilities to protect personnel and equipment from explosive forces, noise, and debris associated with the loss of a launch vehicle on the pad or after launch. The typical hazard areas that are defined around launch facilities include:

- *Launch Danger Areas and Impact Limit Lines*. Define the areas which may be affected if a missile explodes on the pad or after launch. The boundary locations are determined by the launch parameters, weather, flight azimuth, vehicle stages, modules, and trajectory.
- *Acoustic Pressure Zones*. Zones in which noise-induced air overpressures can reach 135 dB, especially at the lowest frequencies, and damage facilities.
- *Toxic Vapors Zones*. Areas into which highly toxic fumes from exotic missile propellant fuels may be released from launch vehicle explosions or equipment failures during fueling operations. Maximum concentrations acceptable to humans depend on the type of propellant involved. The affected areas will be defined by prevailing weather and launch parameters.
- *Quantity-Distance Radii*. Q-D is established by the greatest amount of explosive material associated with a particular launch area. These will vary because launch pads are designated for light, medium, or heavy launches. No inhabited buildings are to be constructed within the Q-D except hardened launch control facilities.

Other items you will have to consider about missile launch operations include clear lines of sight for launch surveillance equipment such as cameras. All launch operations are photographed and monitored. Monitoring devices are placed at fixed locations for each active pad and must remain unobstructed. In addition, Weather Information Network and Display System and the Field Mill Site Launch Pad Lightning Warning System facilities each require a 500 foot radius clear zone for effective operation. This instrumentation is generally positioned at multiple locations throughout

the installation to monitor weather conditions during all vehicle and launch operations, and, therefore, must remain unimpeded.

*Sources of Data*
Missile Launch Safety Office, Missile Launch Operations.

*Suggested Graphics/Photographs*
A graphic to show various clear zones. You may want to include these clear zones on the *Composite Installation Constraints and Opportunities Map* (D-6). However, due to the vast expanses involved, a separate map may better depict the limits affected by launch operations.

*References*
a. U.S. Air Force. AFSA/SEWV. 1994. AFMAN 91-201, *Explosive Safety Standards.*

b. U.S. Air Force. HQ AFCEE/CM. 1994. AFI 32-1023, *Design and Construction Standards and Execution of Facility Construction Projects.*

### 3.12.3.7 Other

This section can be used to identify any other installation-unique constraints such as jet engine blast zones, air space limitations, etc. You should describe the constraining condition, its impact on future development, and any mitigating measures that have been taken or are planned.

### 3.12.3.8 Off-Installation Constraints

Your constraints section should also address the impacts of off-installation physical constraints which may affect installation development efforts. Include such things as existing and planned development and capabilities of existing local road networks to accommodate current and increased traffic.

*Sources of Data*
Local and regional government agencies as well as Realtor associations.

*Helpful Hints*
You should regularly update your information on activities occurring around your installation. Don't wait for the local government agency to contact you; it may be too late if and when that occurs.

*Suggested Graphics/Photographs*
A graphic depicting Opportunities and Constraints in vicinity of the installation.

## 3.12.4 Opportunities

After you have drawn satisfactory conclusions as to what constraints limit development of the installation, you will also have a good idea of the opportunities that exist for potential and compatible development both on and off the installation.

### 3.12.4.1 Off-Installation

After compiling all off-installation constraints that might affect development on the installation, analyze the data and identify those areas that conceivably offer development potential. Also include a discussion of those areas that are not contiguous with the installation boundaries but could accommodate off-site facilities.

*Data Sources*
Visit municipal and county planning agencies to obtain information on existing and planned off-installation land uses. Zoning Board offices can provide zoning maps and pending requests for changes.

*Helpful Hints*
When visiting local planning agencies, be circumspect in what you say. You do not want to indicate the installation is contemplating expansion. Things change quickly, and you could be the source of speculation.

*Suggested Graphics/Photographs*
Graphics that depict present and future off-installation land use.

### 3.12.4.2 Installation

Here you have the opportunity to review unconstrained land on the installation to ascertain possibilities for future development.

Examples of the types of opportunities you might consider include:
- redevelopment of land for mission or recreational use
- realignment/consolidation of assigned units to make better use of available space
- use of available space to accommodate a new mission
- outlease of unused land
- privatization of functions (e.g., Child Development Center)

*Sources of Data*
Consult with Base Development Flight personnel regarding development opportunities.

*Helpful Hints*
Be especially sensitive to potential opportunities. All too often opportunities get overlooked when the discussion on constraints is extensive.

## 3.12.5 Conclusions and Summary

Use this paragraph to summarize the impacts of all identified (composite) constraints and opportunities. You may want to consider presenting a matrix here that summarizes all the known constraints to development on the installation. Although, many of these constraints in the matrix may be addressed in other sections of the *General Plan,* decision makers may find a summary list useful.

*Helpful Hints*

Be brief - don't rehash everything, just summarize the major impacting constraints and the major developmental opportunities. Don't be discouraged if the constraints greatly outweigh the opportunities; this is the usual situation on established installations.

*Suggested Graphics/Photographs*

- Map D-6, *Composite Constraints and Opportunities,* if available. Otherwise, you will have to develop a graphic that shows the constraints and areas of opportunities for future development and redevelopment.
- A matrix listing all known constraints to development on your installation. Also, provide a reference to the appropriate section of the *General Plan* for each constraint.

Composite Constraints and Opportunities Matrix

| Constraints / Impact Areas | Transportation | Land Use | Infrastructure | Capital Improvements | Environmental Compliance | General Plan Reference |
|---|---|---|---|---|---|---|
| Q-D Zones | ○ | ◎ | | | ✓ | Chap IV, C&O, para 3.1 |
| Traffic At Main Gate | ◎ | | | | | Chap IV, Land Use, para 2.1 |
| Gas Main, Area B | | | ✓ | ✓ | ◎ | Chap IV, Infrastr., para 8.3 |
| Historic District | | | | ◎ | | Chap IV, C&O, para 2.1.1 |
| Power Plant | | | | ○ | ◎ | Chap IV, C&O, para 2.2.5 |
| Abandoned Landfill | | ○ | | ◎ | ◎ | Chap IV, C&O, paras 2.2.2 and 2.2.7 |

Legend

| | |
|---|---|
| ○ | Minor Impact |
| ◎ | Significant Impact |
| ◎ | Severe Impact |
| ✓ | Opportunity |

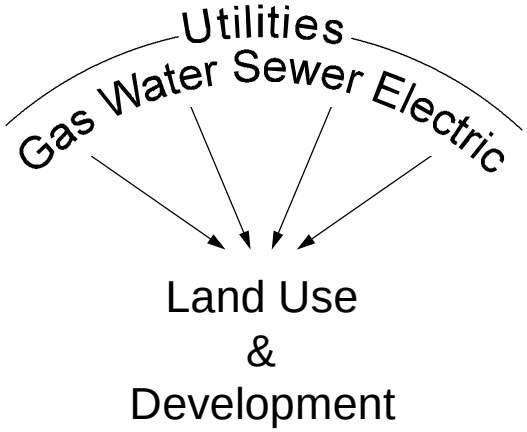
# 3.13 Infrastructure

## 3.13.1 Introduction

The Infrastructure component provides an overview of existing utilities, communications, and fire protection systems. It analyzes the capacity of each system to ensure future demands will be met. This section is not intended to be a series of detailed engineering studies. Rather, the *General Plan* summarizes demand/capacity data in a manner that the non-technical reader can readily understand.

## 3.13.2 Utility Systems Introduction

Utilities systems planning is a critical component of the comprehensive planning process. It explains how to provide or improve services such as water, sewer, electricity, and gas that are critical to mission accomplishment and quality of life.




Mission accomplishment relies on installation utilities, particularly electricity and water. Planning utilities systems should, therefore, consider durability and reliability. In high-threat areas, utilities need to be redundant, dispersed, and/or looped to enhance sustainability.

The analyses and computations described in the following sections should already have been done and documented in the existing *Comprehensive Plan* or other maps, studies and reports. You should have only to summarize them for inclusion in the General Plan. However, if the information doesn't exist, or if you are preparing an *Infrastructure Component Plan*, the following discussions will be helpful.

Gathering data, describing existing conditions, and assessing the potential for future growth will be unique for each system. The following sections describe these requirements. The common steps for researching and describing utility systems are summarized below.

For all utility systems, the sources for information and data include the following:

a. Civil Engineering
   - Engineering Design
     - A. planned improvements
     - B. system layout
     - C. system description
     - D. age
   - Installation Utility Engineer
     - E. current consumption
     - F. peak loads

G. capacity

- Installation Development Flight
  H. planned improvements
  I. priorities
- Engineering Maintenance Shops
  J. system layout
  K. problem areas
  L. maintenance
  M. requirements
- Funds Management - Utilities Section
  N. historical cost
  O. consumption records
- Environmental Office - environmental considerations - corrosive soil, need forcathodic protection

b. Local Utility Companies
- contractual limitations on amount of service or peak loads
- capacity of source lines
- planned improvements to source and lines, effect on local community, percentage of local consumption

c. Studies and Analyses
- project designs, capacity analyses, closure and realignment actions, studies, and responses
- existing installation Comprehensive Plan, maps, components, and element plans
- Commander's Summary Brochure
- infrastructure maintenance, repair and construction projects
- fusing and Coordination Studies, demand, flow rate, infiltration, pressure tests/studies
- new facility project designs (if requiring utilities analysis or detailed tie-in design)
- U.S. Army Corps of Engineers (COE) district office (project status, as-built information)

d. Military and Civilian Personnel Offices for installation personnel/population information

e. Installation Supply - Liquid Fuels
- POL storage and delivery systems
- engineering design, POL system capacities, limitations, conditions, and plans

f. Commander's Facility Assessment Program and Facilities Board actions
- proposedsitings of new facilities
- expansion of existing facilities
- infrastructure projects approved/programmed
- priorities for programmed projects

Convey the overall condition and ability of each utility system to support the present requirements and its ability to accommodate an increase in demand.

The level of detail required depends on the complexity of the individual utility system and the conclusions drawn from its overall condition. If, for example, the system is incapable of expansion, a rather detailed explanation may be required, to include listing the capacities of various system components. If additional capacity is not readily available, but can be achieved, explain the alternatives that would permit expansion to support future development.

Starting at the source, describe the system, highlighting areas that limit development or possess excess capacity. The chart on the following page lists the major components of each utility system.

Explain the current demand. Refer to consumption and billing records, and previous studies as indicators of current use. Use enough data so that average consumption is not driven up or down by aberrant conditions (floods, blizzards, heat waves, storms).

| Utility System | Source | Installation Connection | Distribution System |
|---|---|---|---|
| **Water** | Utility Company, Wells, Surface Water | Pipe, Pumphouse, Treatment Facility | Cast Iron, Plastic, Asbestos Cement, or Vitrified Clay Pipe, Water Storage, Fire Fighting |
| **Sanitary Sewer** | Facilities | On/Off Installation Sewage Treatment Plant<br>Lift Station | Pipe<br>Septic Systems Gravity Layout<br>Lift Stations |
| **Storm Drainage** | Precipitation | Drainage, Rivers, Streams, Washes, Wetlands, Pavements,<br>Off Installation Land, On Installation Land | Swales, Ditches<br>Covered Pipe, Culverts, Gutters, Cisterns, reservoirs,<br>Oil/Water Separators<br>Lift Stations |
| **Industrial Wastewater** | Specialized Facilities And Activities | On/Off Installation Treatment Facility Discharge Points<br>EPA And State Permit Points | Gravity Drainage<br>Lift Stations<br>Holding Tanks |
| **Electricity** | Utility Company<br>Installation Generated<br>User Generated | Substation<br>Transformers | Overhead<br>Direct Buried, Accessible Trench<br>Generator Backup |
| **Central HVAC** | Heat Plant<br>Cooling | Valve Stations | Above Ground, Direct Buried, Accessible Trench, Steel, Copper, Plastic Insulation Type |
| **Natural Gas** | Utility Company<br>Installation Generated | Valve Station | Steel, Plastic Piping, Direct Buried, Trench, Individual Service Tanks |

Discuss the capacity of the system. The capacity will be determined by the component or subsystem that most limits production. Some of the factors you need to consider are:

- *Contractual Limits*. Utility companies limit utility use on an annual, monthly, or instantaneous basis as is often the case with electricity. These limits are often referred to as utility demand limits. They may be expressed in millions of cubic feet per day for natural gas, gallons per hour for water, and millions of volt-amps for electricity. If the system is capable of an increase, what impact would future development have on the local community and the utility supplier? What is the reason for these demand limits? Can the contract be renegotiated for a higher limit? Is the local utility company operating at, or near, capacity?

## Contractual Limits

- *System Capacity*. Is the utility system operating at, or near capacity? Be careful not to omit limitations just because the entire system is not at capacity. For example, if the storm drainage system is incapable of handling a major storm, or the electrical substation can only be maintained at night due to lack of a backup transformers, explain the limitation.Is one part of the system at capacity while the remainder has additional capacity? Are there places on the installation where the infrastructure is already in place for future growth? Have facilities been demolished and their utility lines abandoned? The infrastructure required and available for new development may vary across the installation. You may need to be a little creative, showing system capacity on a map with additional capacity by area, or in a table listing main lines and excess capacity. Data can be arranged by utility system, zone or area, or as an overlay on a base map, shown in the following examples:

## System Capacity

  - **UTILITY SYSTEM**

**Heating System Line Capacities**

| Line Number | Zone | Operating Level |
|---|---|---|
| 1 | West of Mitchell Drive | 68% |
| 2 | East of Mitchell Drive | 72% |
| 3 | Flightline | 87%* |

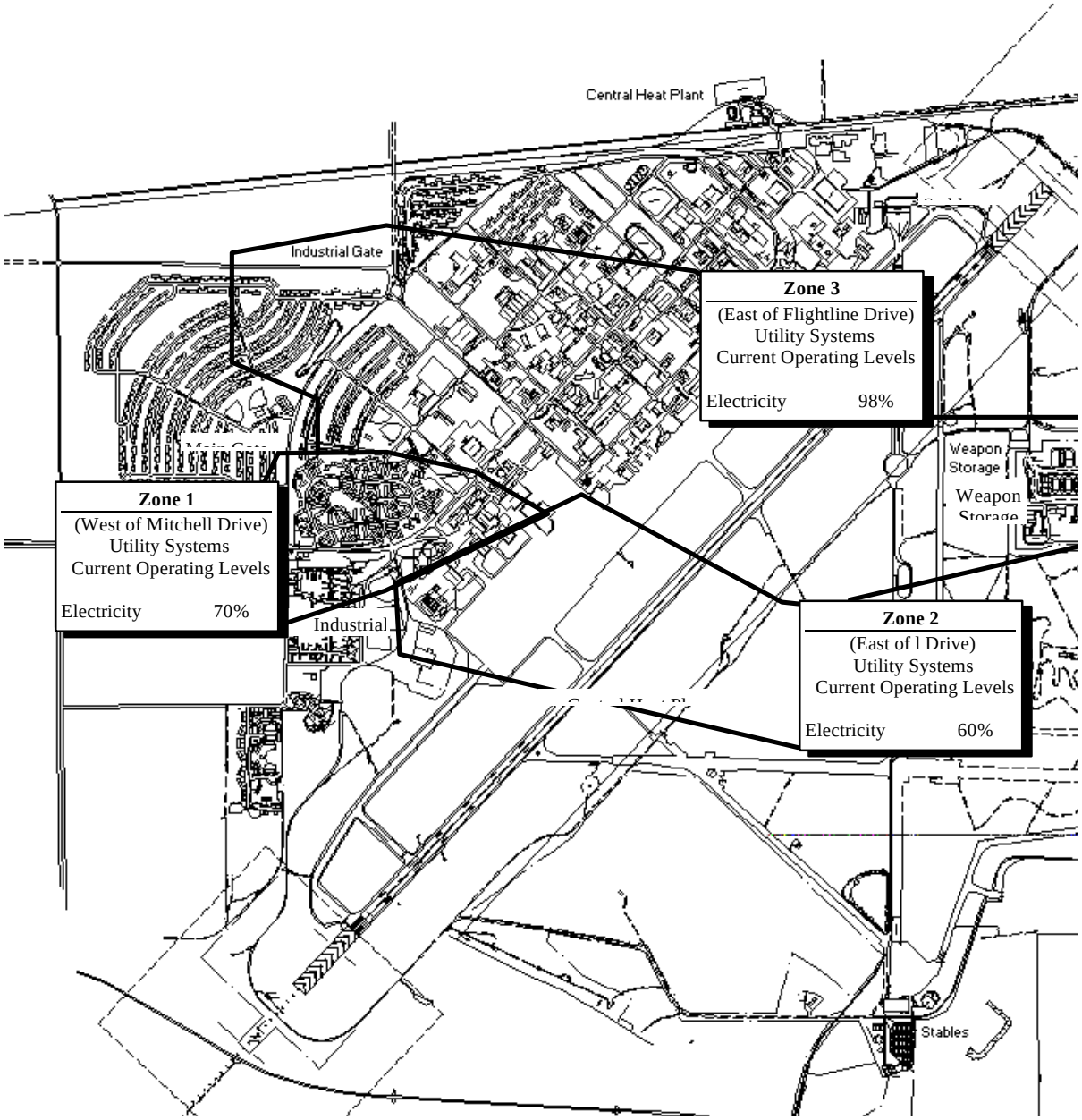
**Abandoning/Demolition of Bldg 110 will reduce operating level to 78%*

- **ZONE OR AREA**

**Utility Systems**
**Current Operating Levels**

| Type | Zone 1 | Zone 2 | Zone 3 |
|---|---|---|---|
| Electricity | 70 % | 60% | 98% |
| Water | 88% | 55% | 92% |
| Natural Gas | 62% | 55% | 65% |
| HTHW | 68% | 72% | 87% |
| Sewer | 68% | 60% | 70% |
| Storm Water | 55% | 87% | 60% |

Mitchell Drive separates Zones 1 and 2
Flightline Drive separates Zones 1 and 2 from Zone 3


Central Heat Plant
Industrial Gate
Zone 3
(East of Flightline Drive)
Utility Systems
Current Operating Levels
Electricity 98%
Weapon Storage
Weapon Storage
Zone 1
(West of Mitchell Drive)
Utility Systems
Current Operating Levels
Electricity 70%
Industrial
Zone 2
(East of l Drive)
Utility Systems
Current Operating Levels
Electricity 60%
Stables

- *Impact of Loss.* Also, address the mission impact if the system fails. Are there backup sources? Is catastrophic loss of the system likely? Is the system above ground? Consider separating vital utility system components from known hazards. Valve stations, primary distribution lines, and generation and storage facilities are examples of system components requiring additional protection. You should also consider the safety and survivability measures required by design criteria or building codes for settlement, earth movement, and wind and snow loads. Examples of areas with these unique hazards are explosives storage areas, airfield operating areas and clear zones, and training areas. Protection can come in the form of increasing the distance to the hazard source, construction of blast or fragmentation protection (barricades or buried components), or reducing or eliminating the hazard source.

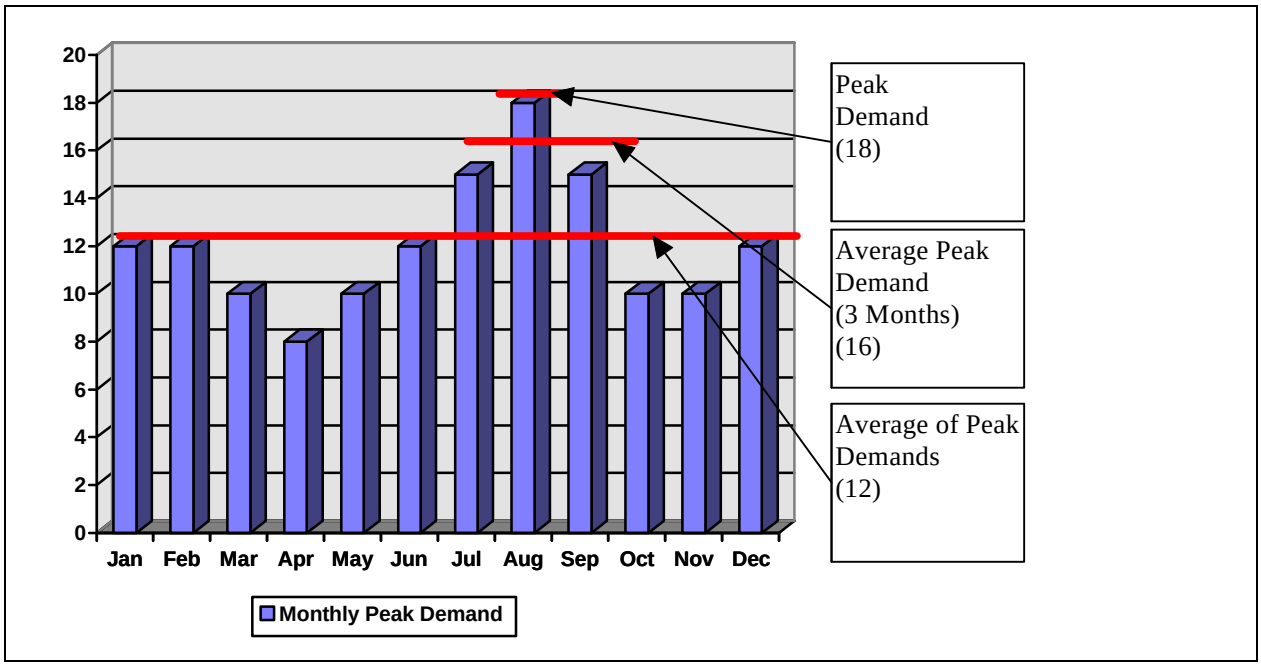
**Impact of Loss**

- *Underground Systems.* A description of underground utility systems subject to corrosion should also address cathodic protection, particularly where utility lines are direct-buried in highly corrosive soils. If the use of cathodic protection is extensive, it may be appropriate to include a separate section on cathodic protection systems.

**Underground Systems**

Finally, assessment of the utility system to determine its ability to accommodate growth requires careful selection of data.

The following chart shows how numbers, averages and selected data can be misleading . In this example, the capacity of the system is represented by the top line (20) of the scale. The chart shows the system operates at or below 75% of capacity for eleven months of the average year. However, unless a new mission or facility will operate for only 11 months of each year, the demand on the system is represented by the peak demand, peak use, or other recurring maximum; in this example 18. Thus, this system's additional capacity is only 10%.




*Utility Averages Chart*

If there are no reliable data available, then obtaining an engineering assessment of the system's capacity and peak use should be a top priority.

The following table shows the units and quantities measured for each system.

**Utility Systems Units of Measure**

| Utility System | Units of Measure | Measured Items |
|---|---|---|
| Water | MGD | Annual Flow, daily peak flow, monthly average flow |
| Sanitary Sewer | Gallons, BOD | Daily peak flow, monthly average flow |
| Storm Drainage | MGD | Lift station, permitted flows, etc. |
| Electrical | kVA, MW, KWH, | Demand peaks, average consumption |
| Central Heat/Cooling | MBTU/hr | Pressure, flow rates, heating/cooling demand |
| Natural Gas | CuFt | Daily peak, monthly average use |
| Liquid Fuels | Gallons | Supply capability, storage capacity, flow rates, aircraft and vehicles serviced |
| Industrial Waste | Gallons, BOD | Daily peak flows, monthly average flows |

BOD - Biological Oxygen Demand
CuFt - Cubic Feet ($ft^3$)
Gallons - Gallons (per day, month, year)
kVA - Kilovolt-Amperes
KWH - Kilowatt Hours
MBTU/hr - Million British Thermal Units per Hour
MGD - Million Gallons Per Day
MW - Megawatts

*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Utilities Systems Planning Bulletin* This bulletin provides a framework for defining and then incorporating the utilities systems needs into developing and carrying out near-term and long-term planning, design, installation, and construction.

## 3.13.3 Water System

Water supply is an indispensable feature of installation development. Certain elements of the water system, such as water supply and treatment facilities, usually can be located and designed in advance of detailed project site planning. The design of the distribution system, however, must be deferred until completion of topographic surveys and the development of the final site plan. Plans and specifications for water system facilities require the services of professional engineers thoroughly versed in water systems. These plans and studies are beyond the scope of the *General Plan*, but you should synopsize the conclusions and recommended system improvements.

**Sources Of Water Supply Include:**

- **Municipal Service**
- **Ground Water**
- **Rivers, Lakes, Reservoirs**

### 3.13.3.1 Existing Conditions

Briefly describe the entire system as well as summarize the system components and elements that you will analyze. These sub-systems are sources of water supply, treatment, fire protection, storage, and distribution. Use the "Utilities Systems Planning Bulletin," Paragraph 2-6, as your guide in addressing all the elements of the water system. In addition, include domestic water and special water demands, and sub-system capacities, i.e., pump/well, water supply rate (MGD), water storage (gal), and water distribution pressures (psi).

For the most part, water system/sub-system evaluations are tied to a supportable effective population (EP) and, where identifiable, industrial needs. (EP = Resident Population + [Non-Resident Population ÷ 3].) Define the effective population here, so you can use it as a yardstick to measure existing sub-system capabilities for determining residual capacities or shortfalls.

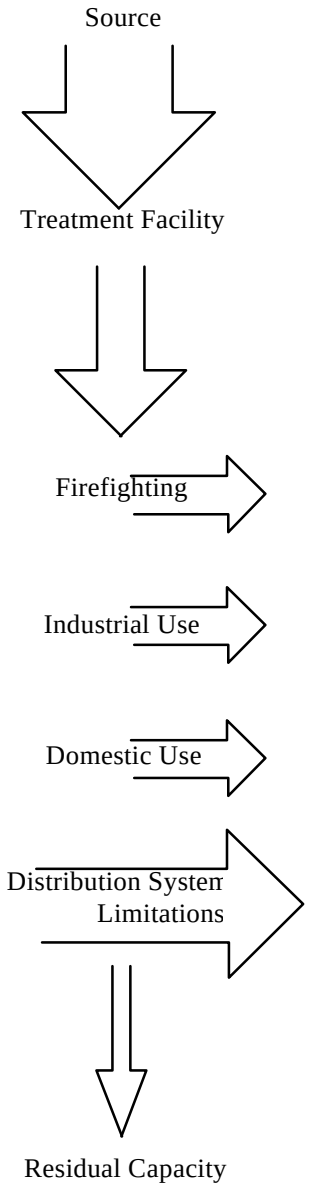
### 3.13.3.2 Planned Improvements

Briefly describe any projects or plans to expand, improve, or upgrade the system.

### 3.13.3.3 Assessment

In this section, provide a summary analysis of existing and projected demands versus capacity.

Depending on the installation, the source/supply may be underground aquifers (wells), rivers, or adjacent municipalities. In any case, identify capacities/limitations in terms of the established criteria; for example, MGD, that can be converted to gallons per capita per day (gpcd) and industrial availability. Discussions of aquifer capacities/limits may be somewhat subjective, but you can assess the wells that draw from them in terms of their rated pumping capacities (use a 16-hour pumping day). Similarly, water quantities that are drawn from a river are limited by the river flows and the river pumping facilities. There may be several limitations associated with municipality-supplied water; a frequent limitation is imposed by the water supply contract. (AFM 88-10, Vol. 1)




Treatment depends on source/supply. If aquifers/wells are used, treatment normally occurs at thewellhead, thus the "treatment support capacity" becomes the same as the well pumping limits. If your installation has its own treatment facility, the support capability is tied to the maximum gallons per day that the facility can treat. If the water supply comes from a municipality, you do not normally have to address treatment.

The distribution sub-system should be a network of primary and secondary feeders with service lines connected to facilities on the installation. Water tanks should be centrally located to facilitate distribution while remaining compatible with adjacent land uses. Also, consider life expectancies of the water sub-systems; for example, cast iron used in the distribution sub-system has a life of over 100 years, while steel has a life of only 25 years.

Fire protection is generally a matter of computing fire flow and fire demand based on the guidelines contained in ETL 91-3. Use these computations to determine required water storage. To determine water storage requirements, use the guidelines in Chapter 3 of AFM 88-10, Vol. 4. As indicated in Chapter 3, the computations are based on a combination of daily domestic/industrial requirements, fire demand, and water available under emergency conditions.

Assessing the water distribution sub-system is usually subjective. It involves the capacities of the distribution mains and the associated water pressures. Booster pumps and piping must be able to provide the required pressure demands. With regard to fire protection requirements, spacing of fire hydrants must follow the guidance provided in AFM 88-10, Vol. 5. General guidelines for these types of assessments are in Chapters 3 and 4 of AFM 88-10, Vol. 5. For more detailed analysis of a distribution sub-system, talk with a utilities consultant.

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Map G-1, *Water Supply System*, if available

*Helpful hints*

The *Future Land Use Plan* (or Land Use Component) and *Long Range Facilities Development Plan* generally are the basis for determining future water consumption demand. Through use of these plans, you can project the requirements of new construction throughout the installation.

Also, you can present the summary of capabilities/limitations in a table (e.g.; matrix format). The maximum capability of the water system is determined by the least capable sub-system. You should include recommendations to overcome limitations/deficiencies with this summary.

*Suggested Graphics/Photos*

- *Map of the Water System*. This map indicates the existing sources and capacity of water supply and shows locations and capacity of wells, entrances on the installation of other sources of supply, storage tanks, main distribution lines with pumping stations, hydrants, valves, metering points, and water treatment plants. Use Map G-1, if available, as a source of information for this graphic.
- *Photographs*. Representative photographs of sources of supply, such as rivers, lakes, and reservoirs as well as photographs of storage facilities, storage tanks and reservoirs. Photographs of water treatment facilities will also add visual interest.

*References*

a. *AFM 88-10, Vol. 1, Water Supply Sources and General Considerations*, 1987. Note especially Tables 2-1 and 3-1. This manual provides guidance for selecting water sources, determining water requirements for installations including special projects, and developing suitable sources of supply from ground or surface sources.

b. *AFM 88-10, Vol. 7, Water Supply for Special Projects, 1986*. This manual establishes the minimum water supply requirements for fire protection and domestic purposes at various small military projects.

c. *AFM 88-10, Vol. 3, Water Supply, Water Treatment*, 1985. This manual presents information on water quality standards and design criteria for water treatment processes.

d. *AFM 88-10, Vol. 4, Water Supply, Water Storage, 1985*. Note paragraph 3-1c. This manual provides design criteria for water storage requirements at military facilities, gives a typical design analysis for tanks and reservoirs, and provides guidance on the procedures to follow in selecting sites for these storage facilities.

e. *AFM 88-10, Vol. 5, Water Supply, Water Distribution, 1985*. Give special attention to Chapter 3, paragraph 3-1 and Chapter 4. This manual provides criteria for designing and constructing potable water distribution systems for fixed military installations.

f. *Engineering Technical Letter (ETL) 91-3, Water Supply for Fire Protection, 1991*. This ETL provides design guidance and criteria for determining fire flow water demands for new unsprinklered construction, and minimum residual water pressure for fire flow.

## 3.13.4 Sanitary SewerSystem

### 3.13.4.1 Existing Conditions

The major parts of the system are the collection system and the treatment facility.

a. Describe each major component of the collection system, to include:

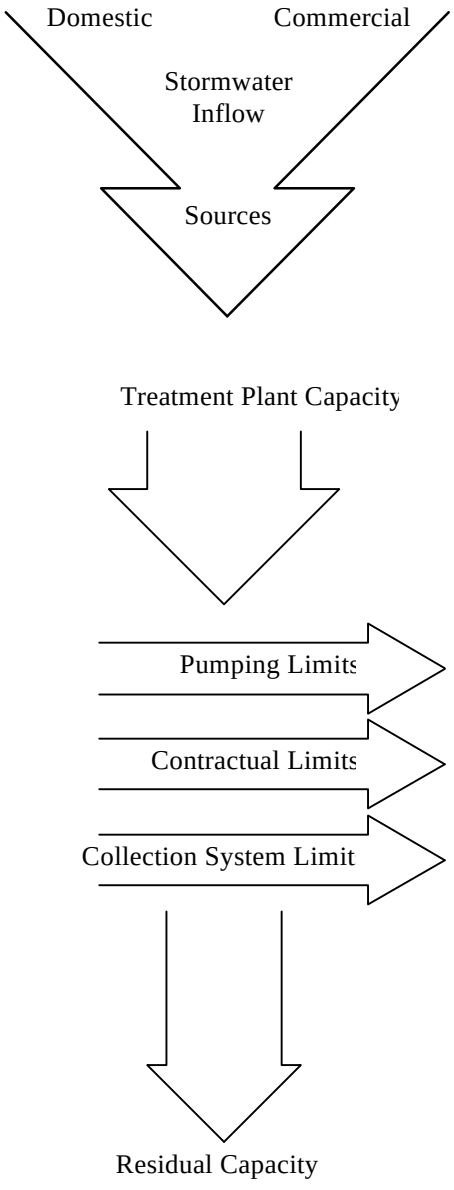
- type of sewer (gravity, pumping, etc.)
- tributary area (the area contributing wastewater to a particular sewer segment)
- contributing population, pipe size and material, and appurtenances (manholes)
- quantity and capacity of pumps and force main if a pumping sewer (a force main is the pipeline which receives wastewater from a pumping station and conveys it to the point of discharge).
- infiltration and inflow rates (data from flow records or calculate from AFR 88-11, Vol. 1)

b. Compare "extreme peak flow rate" of sewers with capacity. Note that pumping capacity must be adequate to discharge peak flow rates with the largest pump out of service.

c. Identify installation areas not connected to the collection system and non-installation areas connected to the system.

d. Identify septic tanks, package treatment plants, etc. (AFR 88-11, Vol. 1, 2).

Where treatment is provided to the installation, review sanitary sewage contract provisions, specifically any contractual limitations on treatment. For installation treatment plants, describe the plant. Specify the capacity and type of plant (preliminary, primary, secondary, and advanced [tertiary] treatment). As available, further describe plant age, condition, flow-measuring devices, sludge-handling operations, etc.. List current flows and flow rates of waste water, and determine expansion capability, as necessary. Finally, what is the disposition of the effluent? If it is discharged to surface streams, review the National Pollutant Discharge Elimination System (NPDES) permit and any required state permits.




### 3.13.4.2 Planned Improvements

You should review the project lists, both funded and unfunded, to see if more work is planned or being done on the sanitary sewer system. Is the treatment facility being modified to increase capacity or in response to the latest Environmental Protection Agency regulations? What parts of the collection system are under repair, if any? Is the collection system being extended to newly developing areas of the installation?

### 3.13.4.3 Assessment

In this section, you need to compare the flow against the capacity and determine the residual. The residual allows you to determine the available capacity to support future growth. For planning, the flow demand should be based upon the current per capita per day flow. When that data is unavailable or unreliable, the following rules of thumb apply: **For resident population** two-thirds to four-fifths of the average per capita use of water (usually estimated at 150 gpcd). **For non-resident population** use 30 gpcd, or count each non-resident as one-third person for population calculations. The variance depends upon local conditions.

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Map G-2, *Sanitary Sewerage System*

*Helpful Hints*

Review all relevant realignment and/or closure input data prepared by the installation. Another good way to verify system operations is to review the routine reports that are submitted to the Environmental Protection Agency (EPA), the state environmental office, higher headquarters, and any other oversight or regulatory agencies.

Separate your assessment of the sanitary sewer system into the various components:

- collection systems
- lift stations
- septic tanks
- treatment facility

*Suggested Graphics/Photos*

- A graphic map, Map G-2 if available, showing the sanitary sewer collection system and wastewater treatment facility.
- Photos of the treatment facility.

*References*

a. U.S. Air Force, AFM 88-11, Vol. 1. *Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances*, 1985. This manual provides information, instructions, procedures, and criteria for the design of gravity sanitary and industrial wastewater collection systems for Air Force installations.

b. U.S. Air Force, AFM 88-11, Vol. 2. *Sanitary And Industrial Wastewater Collection - Pumping Stations And Force Mains*, 1985. This manual provides information, instructions, procedures, and criteria for the design of gravity sanitary and industrial wastewater pumping facilities at Air Force installations.

c. U.S. Air Force, AFM 88-11, Vol. 3. *Domestic Wastewater Treatment*, 1978. This manual provides general information and guidance for the design of domestic wastewater treatment plants.

## 3.13.5 Storm Drainage System

### 3.13.5.1 Existing Conditions

The storm drainage system is normally a passive system that handles precipitation (rain, hail, or snow) from a storm. The amount of storm runoff is dependent on such factors as soil conditions, ground slope, and the amount of paving or construction of new facilities. The system may be "open" culverts or "closed" pipes. The system may or may not connect with the sanitary sewer. If it does, the total system is classified as a combined sewer. If the water table is close to the ground surface, then the installation may have a series of holding ponds with earthen dams to control runoff.

Stormwater runoff can be classified as non-point source pollution and thus it might be regulated.

### 3.13.5.2 Planned Improvements

Include a discussion of those projects currently planned or programmed for improving the installation's storm drainage system.

### 3.13.5.3 Assessment

Usually the storm drainage system is not a limiting factor for future growth on a installation. However, drainage patterns and structures are included in site designs for all new facilities. You must consider the downstream impact of any alterations to existing topography.

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Map G-3, Storm Drainage System

*Helpful Hints*

A tour of the installation facilities may reveal evidence of water overflow at critical points: bridges, culverts, and water inlets at road junctions.

*Suggested Graphics/Photos*

- A graphic depicting the major on-installation drainage pattern can be developed from information contained in Map G-3. You may be able to combine this graphic with graphics for the sanitary sewer system and the water distribution system.
- Photos of any unique or noteworthy structure in the system are appropriate.

*References*

a. U.S. Air Force. HQ AFCESA/DMP. 1987. *AFM 88-5, Chapter 1, Surface Drainage Facilities for Airfields and Heliports.*

b. U.S. Air Force. HQ AFCESA/DMP. 1983. *AFM 88-5, Chapter 4, Drainage for Areas other than Airfields.* Design guide for drainage structures and systems. Includes sections on calculating drainage requirements, drainage structures, and erosion control.

## 3.13.6 Electrical System

Mission accomplishment relies heavily on all utilities, but particularly on electricity and water. This dependence on electricity often requires a substantial effort to provide back-up power to guarantee the continuance of the mission functions when power is lost. Power conditioning requirements to protect sensitive equipment are present on nearly every installation. Therefore, in addition to describing the system and the level of use, you should discuss system reliability, backup, redundancy, ability to isolate sections of the system, physical security, and condition of the power for sensitive electrical equipment, in this section, as appropriate.

### 3.13.6.1 Existing Conditions

Describe the following elements of the electrical distribution system:

- *Power Source*. Utility company, capacity, condition, age of source lines, installation power generation, power conditioning requirements, emergency back-up, central plants and individual facility generators, and special mission power requirements.
- *Connection to the Installation Power Distribution System* Substation capacity, age, location, transformer sizes, limits on expanding service, limits to maintenance operations, alternate connections and services available from the supplier or alternative generating source(s).
- *Primary Distribution System* Age, condition, physical layout, material, size, capacity, location, buried, pole-mounted, overhead, underground, and sections abandoned.
- *User Interfaces*. Age and condition of transformers and service lines, percentage requiring upgrade, level of use, back-up systems available - fixed and mobile, and special power conditioning requirements for sensitive equipment and special missions.

**Electrical System Description**

- **Power Source**
- **Connection to the Installation Power Distribution System**
- **Primary Distribution System**
- **User Interfaces**

### 3.13.6.2 Planned Improvements

You should review the project lists, both funded and unfunded. Consult with the Engineering Flight for planned system improvements.

Keep it simple; refer to the number of projects and the overall cost to complete them in a stated number of years. Reference the *Capital Improvements Plan* section or an appendix containing programmed projects listings (Infrastructure Program).

### 3.13.6.3 Assessment

Details about system components are usually unnecessary, but highlight the elements that require repair, are undersized, or otherwise limit development. Explain how you determined the figures for current use and system capacity. End with what is available for growth.

Explain the level of effort required to expand service. Explain requirements for new transformers, new mains, feeders, service lines, improved fusing,backfeed loops, and the impact on installation current operations if these are not increased, repaired, or maintained.

The availability of electricity is often contractually limited by the supplier. In this case, investigate the possibility of increasing the contractual limit.

*Sources Of Data*

- Paragraph 2, "Utility Systems Introduction"
- Utilities element of the existing installation *Comprehensive Plan*
- Engineering and capacity studies
- Map G-4, *Electrical Distribution System*

*Helpful Hints*

Use consistent units (MWH, kVA, MW) throughout the section. Also, explain the method used for determining system capacity (design records, historical data, engineering analysis), current usage (yearly average, monthly average, peak demand), and additional capacity for growth for the system.

Keep excessive lists and details from the body of the plan and place infrastructure projects in one location for easy updates following project completion, changes in funding priority, and system changes. Let the reader know, for example, that the system is $1.3 million and five years from being completely upgraded or, without an investment of $600,000, the system will be unreliable in two years.

*Suggested Graphics/Photos*

A graphic showing the primary electrical distribution system, to include substations, on-installation power generation facilities, and above ground/underground primary distribution lines. Use Map G-4 as a resource if available.

*References*

*AFM 88-9, Electrical Power Supply and Distribution, 1984*
Design guide for electrical power supply and distribution systems. Includes design criteria and data for various system components, street lighting, and distribution system materials.

## 3.13.7 Central Heating and Cooling Systems

A central heating or cooling system includes a central plant from which distribution lines connect to individual buildings. The heating and cooling provided by individual facility furnaces and air conditioners are internal building systems. These separate systems are not considered as part of the utilities planning for the installation.

**Use of central heating/ cooling depends on:**

- **Plant Capacity**
- **Climate**
- **Type of Construction**
- **Type of Occupancy**

Unlike other utility systems where demand is a function of installation population (water, wastewater), the requirements for heating and cooling are determined by the sizes and uses of the installation's facilities.

Heating and cooling are generated for two reasons: space and process. Space heating and cooling is that which is required for the occupied areas of a facility, be it a warehouse, office, or shop. Process heating and cooling is for all other requirements such as domestic hot water, computer and equipment cooling requirements, manufacturing and maintenance support.

### 3.13.7.1 Existing Conditions

Describe the basic layout and function of the system. You should include the current capacity of the existing system and whether the capability exists for expansion. Be sure to address the issues that affect, or could potentially affect, the system.

Items to consider:

- What is the plant's fuel source? How reliable is this source?
- Are fuel reserves available? How long will this reserve last?
- What utilities support the heating or cooling system (electricity, water , wastewater, natural gas)?
- What is the transfer medium (high temperature water, steam, freon, chilled water)?
- Is there a back-up system in the event of a catastrophic failure?
- Is the system protected from natural disasters, sabotage, accidents? Is the distribution system buried, overhead, encased in utility trenches?
- What are the types, capacities, location, and condition of the distribution systems?

**Fuel Source**
**Reserves**
**Support**
**Transfer Medium**
**Back-Up System**
**Protection**
**Distribution**

### 3.13.7.2 Planned Improvements

Review Military Construction (MILCON) and Operations and Maintenance (O & M) project lists for funded and unfunded system improvements. Consult with the Engineering Flight for other planned expansion or improvement projects.

### 3.13.7.3 Assessment

Central heating and cooling systems are generally advantageous at large permanent installations with adequate utility corridors that accept piping from the central plant. The principal disadvantage, however, is that they require extensive distribution systems with a resultant and significant loss of energy. Therefore, evaluate the economy of any planned improvement/upgrade to the central system. Internal building systems are becoming more common and are mostly the rule in new construction. Remember, separate systems are not considered as part of the utilities (infrastructure) planning for the installation.

Questions to consider:

- Is the system adequately supporting the mission?
- Is the current system capable of accommodating additional development?
- What new construction is planned? Is the existing heating and cooling system adequate to support the new construction?
- Are new roads being planned where distribution piping can be placed?

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Any existing engineering or capacity studies,
- Utility Systems element of the installation *Comprehensive Plan*
- Map G-5, *Central Heating/Cooling Systems*

*Helpful Hints*

Consult closely with the Engineering Flight. You should be prepared to collect, review, and consolidate information from system maps, as-built drawings, reports and studies, public works and utility company information, field observations, and interviews. You should obtain information on planned improvements and upgrades from the other component plans.

Also consider applying appropriate demand/use factors for the heating and cooling requirements for space heating. These factors are unique to each installation, and depend on the available plant capacity, local climate, type of construction of facilities to be heated/cooled (for example, insulated wood-framed, wood-sided building versus uninsulated steel-framed, brick-sided building), and the type of occupancy.

Think about the need for redundancy, to improve reliability or survivability, in the planned improvement/upgrade, that is, should there be a backup boiler or parallel piping?

*Suggested Graphics/Photos*

- Map of the central heating and cooling systems showing the distribution and return lines, and the location, type, and capacities of central plant fuel stores. Use Map G-5, if available, as a source for this graphic.
- Interior and exterior photos of the Central Plant. Maps or photos of any environmentally sensitive areas through which distribution lines exist or are planned.

*References*

*AFR 88-28, High Temperature Water Heating Systems, 1991.* This regulation is a guide for designing high temperature water heating systems. Design includes the heating plant and the distribution piping and equipment.

## 3.13.8 Natural Gas System

Where a reliable supply is available, natural gas is usually the fuel of choice. It is generally no more expensive than other fuels, and, with the exception of electricity, it is more easily transported and convenient to use. However, the convenience of electricity, although more expensive, can be the deciding factor when expediency is required in facility design.

### 3.13.8.1 Existing Conditions

From an engineer's standpoint, line sizes, heating value, and specific gravity of the natural gas supplied to installation facilities are important when sizing furnaces or boilers for a building. However, what you need to communicate to the decision-makers is much less technical; for example, what is the current status of our natural gas system, what improvements are planned, and how much unused capacity currently exists?

As with the previous sections, you should give a general description of the system. The information you should present includes:

- identification of the gas company
- location and size of the mains
- age of the system
- general description of the system layout
- system capacity
- current level of use

Additionally, specify any limits on the availability of gas supplied to the installation such as contractual limits, supplier maximum capability, or limits due to line sizes or conditions.

### 3.13.8.2 Planned Improvements

Review project lists for funded and unfunded system improvements. Consult with the Engineering Flight for other planned system changes.

Base the planned improvements upon the condition of the existing system and on the *Capital Improvements Plan*. Base the amount of additional gas needed upon the size and use of new facilities. The engineer will consider the needs for domestic water heating, cooking, central heating, and other loads generated by existing and new facilities.

### 3.13.8.3 Assessment

Natural gas is metered when it enters the installation, making assessment rather straightforward. Determining the future requirements and the capacity of the system will require some technical expertise, relating the physical properties of the gas to needs and availability. If the amount of gas is contractually limited, you should research the possibility of changing the limit should future plans require an increase.

You must coordinate closely with the engineer and the gas company (supplier) to determine whether you have enough capacity to accommodate the requirements of the installation. If these requirements cannot be met by the supplier, you must consider another type of fuel. If natural gas is available and additional lines are required to increase service, you must determine the point of connection and regulate and meter the pressure following the rules and practices of the supplier.

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Natural gas system engineering and capacity studies
- Utility Systems element of the installation Comprehensive Plan
- Map G-6, Natural Gas Distribution System

*Helpful Hints*

Find out about the reliability of gas service by contacting the supplier. There may be the option of either "firm" or "interruptible" service. "Firm" is the most reliable service and it guarantees that the service will be available at all times. "Interruptible" gas service is, as the term implies, subject to interruption at times of heavy demand or shortage of fuel. Interruptible gas requires a supply of standby fuel to use during periods of interruption of the primary fuel supply, but is less costly than firm gas service.

*Suggested Graphics/Photos*
A graphic map showing the primary gas distribution system on the installation. You can use Map G-6, if available, to produce this graphic. Also indicate the location of the connection to source and main valve/metering stations.

*References*
*AFM 88-12,Gas Distribution, 1990* Design manual for gas distribution systems. Includes instructions and engineering data relating to gas distribution systems, including pressure regulators, valves, meters and other necessary appurtenances. Serves as a guide to designing new systems, evaluating designs by others, and analyzing existing systems to determine their adequacy.

## 3.13.9 Liquid Fuels Systems

**System Determinants**

- **Mission**
- **Number and Type of Aircraft**
- **Refueling Needs**

Liquid fuels systems include all fuel delivery, storage, and distribution systems on the installation. You should discuss aviation fuel (JP, AVGAS), de-icing fluids, motor fuel (diesel, gasoline, compressed natural gas, and other alternative fuels), and heating fuel oil.

### Existing Conditions

Your installation's missions determine fueling requirements. These requirements dictate tank capacities, flow rates, and delivery systems.

Describe each of the various types of systems on the installation. A typical system consists of underground pipe lines, railroad spurs and/or fuel truck access roads providing fuel from off-installation sources to installation header stations, aboveground and underground storage tanks (UST), and a system of distribution lines. Many installations will have a hydrant refueling system to service aircraft at their parking areas.

### 3.13.9.2 Planned Improvements

Consult with Fuels Management personnel for planned system improvements or changes. Review the MILCON and O & M project lists for funded and unfunded improvement projects.

### 3.13.9.3 Assessment

Provide an assessment of the various liquid fuel systems from both an operational and an environmental viewpoint. Factors to consider in assessing the systems are:

- existing storage capacity
- ability to acquire additional storage
- proximity to easements, explosives clear zones, existing facilities
- existing hydrant refueling system layout and capability
- aircraft parking plan and proposed changes
- adequacy of pipelines and pumps
- condition of existing systems components with emphasis on environmental impact from leaking storage tanks and pipelines
- location, capacity, and continued availability of the fuel supply

**Evaluation Criteria**

- **Storage**
- **Location**
- **Refueling**
- **Pipelines and Pumps**
- **Environmental Impact**
- **Availability of Fuel Supply**

*Sources of Data*

- Installation Supply - Fuels Management Office
- Engineering Flight, for design and maintenance information
- Existing studies
- Installation *Comprehensive Plan Utility Systems* element
- Map G-7, *Liquid Fuel Systems*

*Helpful Hints*

Be brief. Highlight the benefits from the improvement projects. Include examples of project benefits such as increased safety, compliance with environmental requirements, additional aircraft parking hydrant systems, more rapid refueling of aircraft, additional vehicle refueling pumps. A laundry list of project numbers and dry descriptions from the DD Form 1391s is generally not required in the *General Plan*. Simply explain how the system will be improved, with a general estimate of cost and time to complete the projects.

The biggest liquid fuels system, usually aircraft fuels, as well as the smallest, perhaps mogas or fuel oil, can have equally devastating impacts on the environment, with unwanted public relations repercussions. Thus, your assessment should touch on the actual and potential impact that environmental regulations and laws have on the mission and installation. You may be able to present and reference this information from the Constraints and Opportunities component.

*Suggested Graphics/Photos*

A map showing the source (pipeline valve station, rail car off-loading headers, truck off-loading headers), distribution system (service lines, hydrant systems, refueling truck headers), and storage facilities. Use Map G-7, if available, to produce this graphic.

*References*
U.S. Air Force, AFM 88-12, Chapter 1, *Gas Distribution*, 1982. This manual contains instructions and engineering information relating to gas distribution pipe systems, including pressure regulators, valves, meters, and other necessary appurtenances, for the distribution of fuel gas, natural and manufactured, from the point of delivery by the gas supplier to the points of connection with building piping.

## 3.13.10 Industrial Wastewater System

Industrial wastes are commonly generated by fabrication shops, repair shops, aircraft and vehicle wash racks, food preparation facilities, and medical facilities. The waste streams from these facilities and processes often contain contaminants that are hazardous or are beyond the capability of the ordinary sanitary sewage treatment facility. These wastewaters are frequently collected and treated by a separate industrial waste system.

### 3.13.10.1 Existing Conditions

The obvious first step is to identify both the sources of industrial wastewater and any pre-treatment this wastewater receives before entering the normal sanitary sewer system. An example of both elements is the oil-water separator as part of a vehicle washing facility.

The next step is to identify the type of contaminants this industrial waste is placing in the system and whether the domestic wastewater treatment facility can handle it. When normal biological treatment by the wastewater treatment facility is not sufficient, then you need to determine what chemical and physical pretreatments are needed and how to dispose of these industrial wastes. The *General Plan* should briefly describe the existing collection systems and pretreatment facilities.

### 3.13.10.2 Planned Improvements

Review the project lists, both funded and unfunded. Because of the increasing regulation of industrial pollutants, you should contact the installation Environmental Office to learn of any planned system improvements to meet regulatory requirements.

### 3.13.10.3 Assessment

You must base your assessment on the proven capacity of the treatment facility to handle the demands of the industrial waste. Is the base currently in compliance with its NPDES permit? You must consider each new user that adds industrial waste to the system individually to determine if the current system can handle the increased loading or whether new treatment facilities must be added.

*Sources of Data*

- Paragraph 2, "Utility Systems Introduction"
- Engineering Flight and the Environmental Office
- existing studies and reports
- installation *Comprehensive Plan Utility Systems* element
- Map G-10, *Industrial Waste Systems*

*Helpful Hints*

Focus on the treatment facility and review the routine required reports.

*Suggested Graphics/Photos*

- A graphic showing the industrial wastewater system and pretreatment facilities as part of the sanitary sewer system. Use Map G-10 as a source.
- Photos of the specific pretreatment facilities to help the reader visualize the system.

*References*

U.S. Air Force, AFM 88-11, Vol. 1. *Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances*, 1985. This manual provides information, instructions, procedures, and criteria for the design of gravity sanitary and industrial wastewater collection systems for fixed Air Force installations.

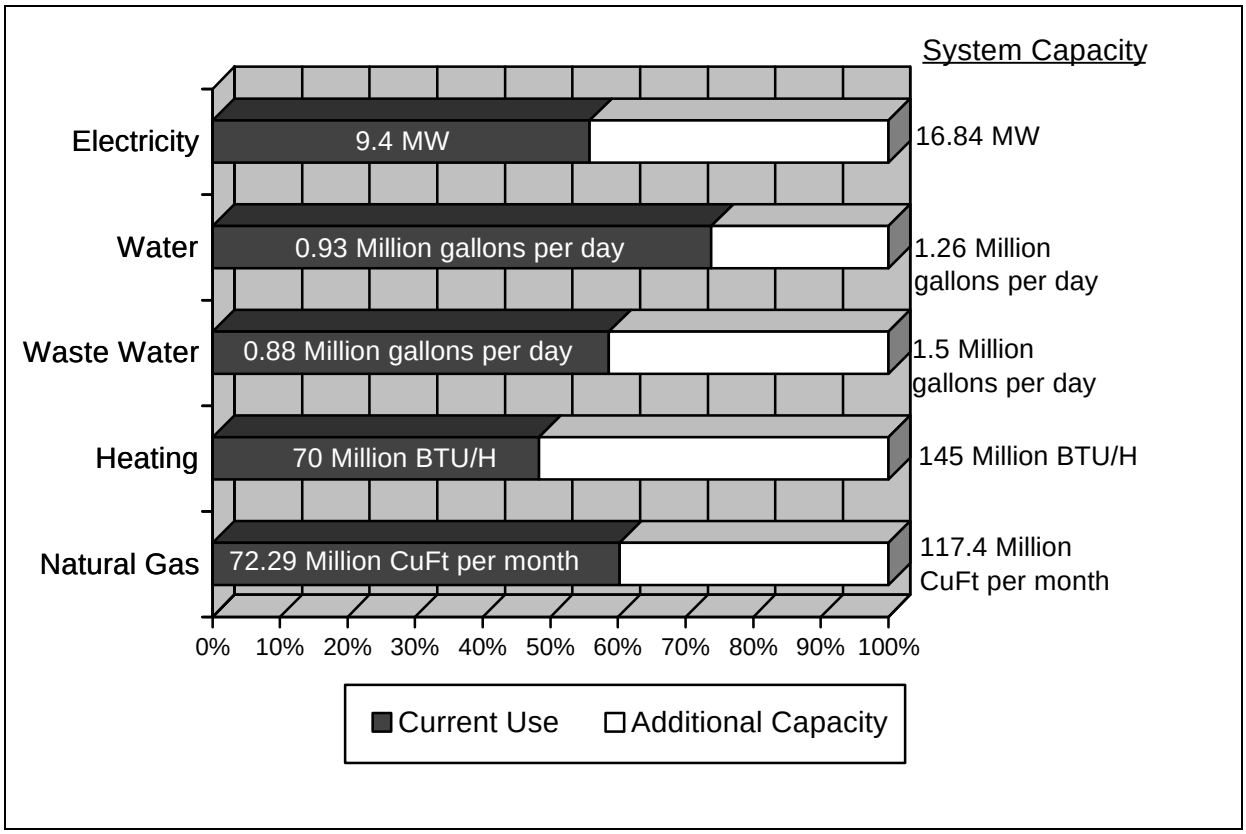
## 3.13.11 Other Utility Systems

Use this section to cover utility systems unique to your installation. These may include compressed air systems, nuclear or solar systems, and other infrastructure elements not addressed above. Sources of data and references will be specific to the subject matter.

## 3.13.12 Utility Systems Summary

In the summary section, you should present your most significant findings concerning the utility systems. Include a concise recap of the condition and capacity of each system to support existing and future missions. The "bottom line" is how much growth the utility systems infrastructure can support. You can conveniently package your assessments in graphic layouts for non-technical presentation and ease of understanding.

The following chart is a graphic example of the summary information that the preceding sections of the Infrastructure chapter explained in more detail.




*Utility System Current Use and Additional Capacity*

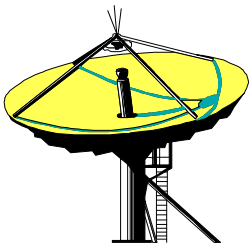
Using the information presented above, the non-technical reader can gain a broad understanding of the capacities of utility systems to accommodate future growth. The least capable sub-system (electricity, water, etc.) will determine overall utility system capability. You should be prepared to discuss and provide recommendations to ameliorate or eliminate any system limitations.

## 3.13.13 Communications Systems

The Air Force has provided extensive communications connectivity and bandwidth throughout all its installations. This communications infrastructure allows the installation to provide local telephone service, maintain a Local Area Network (LAN) of one or several interconnected computer networks, connect to long-haul communication systems, and operate wireless voice (radio) networks in the local area. Additionally, non-Air Force tenants may have established additional, separate connectivity to satisfy their own mission requirements.

### 3.13.13.1 Information Transfer System

The physical transfer media for the transmission and distribution of information - voice, data, and video - consist of several types. They include copper wire, optical fiber, and coaxial type cables, as well as microwave, satellite, and other radio frequency (RF) antennas. Although some instances call for cable to be simply buried, most of the installation cable should be run underground in various ducting systems. Other cable may be above ground.



#### 3.13.13.1.1 Existing Conditions

Various manhole and duct systems, as well as a utility corridor (Utilidor) system can provide underground conduits for routing communication cabling throughout the entire installation. Briefly describe any such systems. Present a simple schematic of the underground systems with a reference to a more detailed diagram.

Investigate the history of the cabling to determine installation dates, type cabling, modifications, etc. Much new cabling is optical fiber, which offers greater bandwidth (capacity) and increased reliability and maintainability. It also offers greater protection from High-altitude Electro-Magnetic Pulse (HEMP) interference, and from electrical power cabling or thunderstorm electrical discharge (lightning), as well as intrusion, jamming, and signal interception. Optical fiber is usually supplemented by some copper wiring and coaxial cable, used in support of telephone systems, television, and local area network data communications. Briefly describe the installation cable plant.

**"Much new cabling is optical fiber ..."**

The installation may have a number of microwave antennas. Some may support cable TV reception (receive-only), while others may provide direct, high-capacity telephone and data communication links (transmit and receive). Provide a short summary of your microwave capability.

You may also have a wide variety of temporary or permanent satellite antennas. Some may involve a powerful transmitter, representing a significant electromagnetic radiation hazard area on the installation. Briefly describe the satellite antenna situation, with look-angle requirements. Provide details on any transmitter which poses a radiation hazard. Schematics or diagrams may be useful. Cross reference with the Constraints and Opportunities Component.

#### 3.13.13.1.2 Planned Improvements

Any additions or replacements to the existing cable plant should be optical fiber. If not already the case, the cable plant should be ducted in underground systems, whenever possible.

Provide a synopsis of all programmed and planned improvements that are being pursued by the installation.

### 3.13.13.1.3 Assessment

Existing communication systems should satisfy current requirements. Programmed improvements should precisely meet near-term requirements. Planned improvements should adequately address long-range projections for the installation. Comment on any exceptions.

*Sources of Data*

- Communications Squadron
- Civil Engineering Squadron
- vendors contracted to lay special lines
- users of any special lines
- tenant owners/operators of specific transmitters/receivers and their associated antennas, particularly those of powerful transmitters

You can extract much of the data provided in this portion of the *General Plan* from the installation *Communications - Computer Systems Blueprint (BCB), Volume I*. This is a system development strategy for installation communications infrastructure, custom-developed for many USAF installations by the 1845th Engineering Installation Group, Tinker AFB.

*Helpful Hints*

It's easy to get too voluminous and technical in this section. Present the "big picture" with enough details to explain how the elements in this section will impact on constraints and opportunities for future development.

*Suggested Graphics/Photos*

- Scaled CAD drawings of the installation showing the installed cable plant, satellite antenna farms, and microwave relay stations.
- A graphic depicting the electromagnetic radiation hazard area around any powerful transmitter.
- A graphic illustrating the look-angle requirements for any satellite antenna, or the line of sight requirements for any microwave relay station.

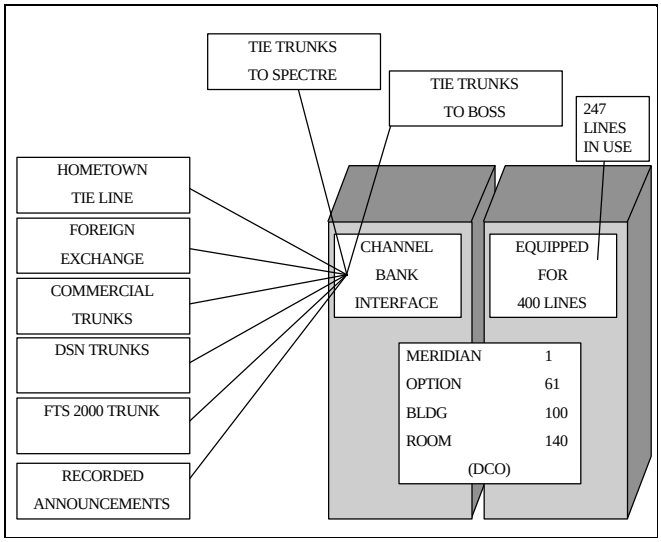
*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Communications Systems Planning Bulletin* Serves as a source for communications planning principles and methodologies.

## 3.13.13.2 Telephone Switching System

### 3.13.13.2.1 Existing Conditions

Since the divestiture of AT&T, numerous telecommunications companies, offering local and long distance service, have flooded the market. One of these vendors may be under contract to operate the installation telephone switching system. Generally, a primary host telephone switch will be centrally located in the installation cantonment area, with other switches (if needed)trunked off the host. The host switch should provide common-user access to the Defense Switched Network (DSN), the Federal Telecommunications System (FTS) - 2000, and the International Switched Voice Service (ISVS). Evaluate all the switches for existing use and maximum capacity. Preferably, all lines off all the switches should connect to a single 10,000-group exchange which would provide everyone on installation with the same exchange prefix.



*HAFB Telephone System*

Each of the systems is described below.

- DSN. The Defense Switched Network is a government-only system, which provides primarily voice traffic to DOD users. Currently, DSN is not Integrated Services Digital Network (ISDN) compatible.
- FTS-2000. The Federal Telecommunications System (FTS) - 2000 is an integrated network of voice, data, and video telecommunications services that has been adopted by the General Services Administration (GSA) as the designated system for federal government agencies, subject to organizational exclusions and mission exemptions. Typically, an installation would use their FTS-2000 service node for commercial, long-distance service. The FTS-2000 is ISDN compatible.
- ISVS. The International Switched Voice Service (ISVS) complements FTS-2000 by providing commercial, long-distance service to locations outside CONUS.

### 3.13.13.2.2 Planned Improvements

Provide a synopsis of all programmed and planned improvements (or upgrades) your installation is pursuing.

### 3.13.13.2.3 Assessment

Evaluate the need for a line expansion if the fill rate is reaching capacity. Additionally, assess the capability of the host switch to support an ISDN environment in the future. Evaluate the extent of common-user connectivity to the telephone system.

*Sources of Data*

- Key personnel from the Communications and Civil Engineering Squadrons
- Local telephone company, other vendors under contract, and the major tenants

You can extract much of the data provided in this portion of the *General Plan* from the installation *Communications - Computer Systems Blueprint (BCB), Volume I*. This is a system development strategy for installation communications infrastructure, custom-developed for many USAF installations by the 1845th Engineering Installation Group, Tinker AFB.

*Helpful Hints*
The fill rate is somewhat meaningless unless the number of lines in use approximately equals the number of lines needed. There are other constraints to the number of telephone lines in offices and workspaces, beyond just the simple capacity of the switch. The major tenants should be interviewed to more completely assess the need for telephone communications.

*Suggested Graphics/Photos*
A graphic portraying and summarizing switch capacities.

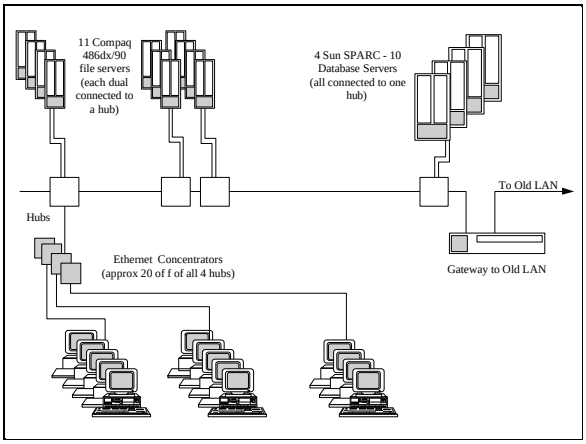
*References*
U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Communications Systems Planning Bulletin*. Serves as a source for communications planning principles and methodologies.

## 3.13.13.3 Data Communications

### 3.13.13.3.1 Existing Conditions

Most installations will be in a constant state of transition with their Local Area Network (LAN) architecture. Describe the conditions which exist at the installation being evaluated. Three examples are illustrated below.

- *Old LANs*. The older system architectures were generally centralized, remote-access systems based on a single (or just a few) minicomputer, such as the DEC MicroVAX, running centralized office automation and specific application software. User access was accomplished via dumb terminals or PC's emulating VT-100-like terminals.
- *New LANs*. The newer system architectures are generally distributed, client-server systems implemented with numerous file and database servers, sometimes centrally administered in the Base Network Control Center (BNCC), and running network server software. You gain access via microcomputer PC's running client network software which is capable of independent processing.
- *Wang*. Most USAF installations also have a proprietary Wang-based LAN, which is linked into a USAF Wide Area Network (WAN). Some applications using this network include the Work Information Management System (WIMS), Base Contracting and Acquisition System (BCAS), and



*Logical Architecture of New LAN*

Services Information Management System (SIMS). Each application normally runs on a dedicated Wang minicomputer located in the work area of the using organization. WIMS primarily supports the Civil Engineering Squadron. BCAS primarily supports base contracting. SIMS primarily supports the Enlisted Dining Facility.

### 3.13.13.3.2 Planned Improvements

Planned improvements should include a transition from the old architecture to the newer systems, which are now typically implemented in a physical star topology using unshielded twisted pair (UTP) copper wire or optical fiber. The proprietary Wang-based network will migrate to a newer, open system,regionalized around several mainframes situated throughout the country.
Provide a synopsis of all programmed and planned improvements (or upgrades) the installation is pursuing.

### 3.13.13.3.3 Assessment

Evaluate the extent of connectivity and network services available throughout the installation. All organizations should be on the LAN; most should have multiple stations.

*Sources of Data*

- Communications Squadron
- Civil Engineering Squadron
- Major tenants regarding their current LAN situation, whether they use the installation LAN or are at least connected to it, and their future requirements.

You can extract much of the data provided in this portion of the *General Plan* from the installation *Communications - Computer Systems Blueprint (BCB), Volume I*. This is a system development strategy for installation communications infrastructure, custom-developed for many USAF installations by the 1845th Engineering Installation Group, Tinker AFB.

*Helpful Hints*

Numerous LANs on the installation can be inter-connected via various hubs (concentrators, etc.), repeaters, bridges, routers, or gateways.
Repeaters and bridges connect multiple segments of the same network together; routers and gateways connect different networks into an internetworking arrangement. Gateways are present where network protocol conversions are required. PC-based network operating systems currently available include Microsoft LAN Manager and IBM LAN Server (essentially the same product), Banyan VINES, Novell Netware, Artisoft LANtastic, and Microsoft Windows NT.

*Suggested Graphics/Photos*
A schematic of the logical architecture of all the LAN's in existence that have base-wide scope. Illustrate any LAN connections to a wide area network or long-haul system.

*References*
U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Communications Systems Planning Bulletin.* Serves as a source for communications planning principles and methodologies.

## 3.13.13.4 Long-Haul Communications

### 3.13.13.4.1 Existing Conditions

Most USAF installations are connected to an extensive array of long-haul media and Wide Area Networks (WANs). Describe the conditions which exist at your installation. Some common examples follow:

- *DDN.* The Defense Data Network (DDN) is the primary means of providing long-haul data communications for all DOD data systems. It is a common-user, packet-switched (X.25 protocol) network supporting two end-user networks, MILitary NETwork (MILNET) and Defense Secure NETwork (DSNET), at a rate of 64 kilobytes per second (kbps). You can gain DDN access off the LAN (old or new architectures) and the Wang-based network (WIMS and BCAS) via separate gateways and circuits (usually via AFNET / DISN) connected to an Air Force / DDN concentrator on installation or at a larger installation nearby.
    A. MILNET is used to support unclassified data traffic, such as electronic mail (e-mail), file transfers, and remote log-on.
    B. Three DSNETs, designated 1, 2, and 3, carry SECRET, TOP SECRET, and Sensitive Compartmented Information (SCI) traffic, respectively.
- *AFNET/DISN.* The Air Force NETwork (AFNET) provided a dedicated, high-speed, bulk transmission system to support the communications requirements of major commands, centers, and field operating agencies. The network integrated digital voice, analog voice, data, and video. Bandwidth allocation was dynamic, and it supported both circuit and packet switching. The Defense Information Systems Agency (DISA) is in the process of implementing the Defense Information Systems Network (DISN). Essentially a DOD version of AFNET, it is currently incorporating AFNET into DISN, and will hereafter be referred to as DISN.
- *AFSCN.* The Air Force Satellite Control Network (AFSCN) is a global network of space and ground Tracking, Telemetry, and Command (TT&C) resources. They perform mission operations, day-to-day space vehicle operations and maintenance, and payload data transfer to support assigned DOD space programs. Your installation may have its own TT&C resource, which preferably has been upgraded to the Automated Remote Tracking Station (ARTS) configuration. AFSCN also makes use of Defense Satellite Communications System (DSCS) and the Domestic Satellite (DOMSAT) program. Any installation with a DSCS site requires special security protocols, as these sites are Priority A resources.
- *AUTODIN.* The AUTOmatic Digital Interface Network is the current, record-copy message distribution system for DOD. This world-wide network operates on multiple levels to accommodate both General Service (GENSER) and SCI traffic at various security classifications.

### 3.13.13.4.2 Planned Improvements

The Air Force will stop using AUTODIN after the Air Force portion of the Defense Message System (DMS-AF) is implemented using DDN (writer-to-reader messaging service to desktop PCs on the WAN/LAN).

The future target architecture is Broadband-Integrated Services Digital Network (B-ISDN), with Asynchronous Transfer Mode (ATM) cell switching, and Synchronous Optical NETwork (SONET) transmission interfaces. These are all broadband technologies which will support the integration of high capacity voice, data, and video over long distances, while providing high growth potential and flexibility.

DISN should eventually provide an integrated (voice, data, and video), open-system, cell-switched (ATM protocol), B-ISDN for use DOD-wide. DISN will eventually replace DDN, DSN, AUTODIN, DCTN, and other DOD networks.

Provide a synopsis of all programmed and planned improvements (or upgrades) that your installation is pursuing.

### 3.13.13.4.3 Assessment

Evaluate the sufficiency of long-haul system availability on your installation, with regard to mission support, general administration, and quality of life. Also evaluate the extent of common-user connectivity to the long-haul systems which are unclassified.

*Sources of Data*

- Communications Squadron
- Civil Engineering Squadron
- Major tenants

You can extract much of the data provided in this portion of the *General Plan* from the installation *Communications - Computer Systems Blueprint (BCB), Volume I*. This is a system development strategy for installation communications infrastructure, custom-developed for many USAF installations by the 1845th Engineering Installation Group, Tinker AFB.

*Helpful Hints*

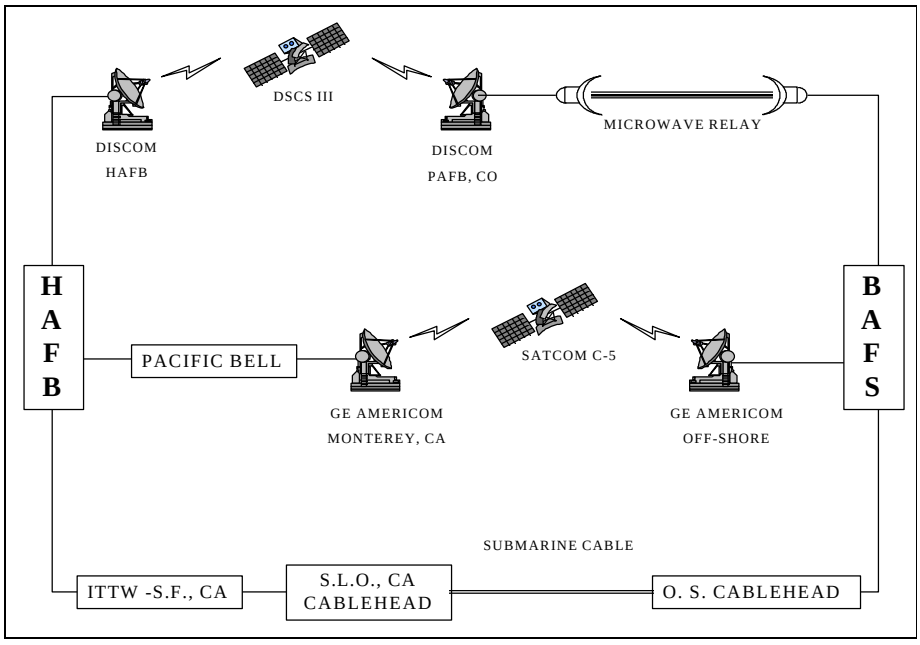
Although your discussions of many of the systems that could be covered under this section are subject to restrictions from various levels of classification and compartmentalization, it may still be allowable to mention that they exist, and even to identify nodes and locations.

*Suggested Graphics/Photos*

Include illustrations of the logical architecture of as many long-haul systems and WAN's as practical.

*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Communications Systems Planning Bulletin.* Serves as a source for communications planning principles and methodologies.



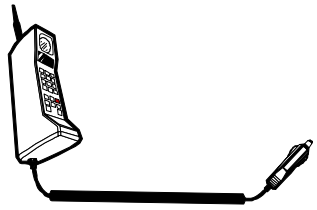

*Hometown AFB Communications Network*

## 3.13.13.5 Radio Systems

### 3.13.13.5.1 Existing Conditions

Several RF systems, besides satellite and microwave systems, may be in operation at your installation. These may involve various missions and commercial interests to support installation and wireless communications systems. Examples are discussed below.

- *LMR.* The Land Mobile Radio (LMR) system operates multiple channels, establishing several user networks. These networks primarily service installation support functions such as those for security police, fire, disaster preparedness, etc.
- *Paging.* This capability may be provided by a dedicated system installed on the installation, a nearby public facility, or other military installation within range.
- *Cellular.* Same as for Paging above.



### 3.13.13.5.2 Planned Improvements

The trends are to provide higher capacity (more channels) LMR systems, and better coverage for paging and cellular systems.

Provide a synopsis of all programmed and planned improvements (or upgrades) your installation is pursuing.

### 3.13.13.5.3 Assessment

Evaluate the adequacy of the existing radio systems.

*Sources of Data*

- Communications Squadron
- Civil Engineering Squadron
- Security Police
- Fire Department
- Disaster Preparedness personnel

You can extract much of the data provided in this portion of the *General Plan* from the installation *Communications - Computer Systems Blueprint (BCB), Volume I*. This is a system development strategy for installation communications infrastructure, custom-developed for many USAF installations by the 1845th Engineering Installation Group, Tinker AFB.

*Suggested Graphics/Photos*

A graphic showing pager and cellular phone coverage in the local area of the installation.

*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Communications Systems Planning Bulletin*. Serves as a source for communications planning principles and methodologies.

## 3.13.14 Fire Protection

The *Fire Protection* portion of the *General Plan* provides an overview of installation fire protection systems and facilities and, in general, interfaces these systems and facilities with the installation development planning process.

The *Installation Fire Protection Plan* is a detailed document that forms the official basis for the Installation Fire Protection Program. The *Installation Fire Protection Plan* sets forth several objectives that the planner must consider while preparing the *Fire Protection* part of the *General Plan.* These objectives include the need to:

- ensure mission continuity
- preserve human life
- protect property, facilities, and systems

### 3.13.14.1 Existing Conditions

**Resources**

- **Firefighters & Equipment**
- **Storage & Containment Facilities**
- **Water Supply**

Describe the current operating conditions of the fire department:

- age, number, size, and location of fire/crash stations
- number of vehicle bays
- sleeping capacity
- description of fire hydrant system, to include water pressure and water source data
- description of installation fire fighting vehicles
- description of any special purpose training facilities, such as a smoke training tower or building
- response times and distances

In addition to discussing the existing fire protection facilities, comment on the layout of the installation and the construction characteristics of installation buildings:

- accessibility (width of roads, turn-around space)
- age
- type construction (wood, cement block, etc.)
- sprinkler systems
- building heights

You will need to determine if the installation has executed agreements with local jurisdictions for mutual assistance and provide a synopsis of these agreements. Mention of these agreements is particularly important, especially if the installation controls, or must protect extensive forested or grass covered areas where the risk of fire could exceed the installation's fire suppression capability. Likewise, the need for mutual (local community) support also applies to other high risk areas, such as multi-story buildings, ammunition storage areas, or other unique but hazardous areas or facilities you must consider in the Installation Fire Protection Program.

### 3.13.14.2 Planned Improvements

Here you should discuss programmed facilities, their intended uses, estimated completion dates (FY) and specifically address the following areas:

- Specific improvements or structural additions to existing fire protection facilities. Describe newly constructed or programmed fire/crash facilities, structural additions or improvements to existing facilities, and any addition, renovation or replacement of water storage facilities.
- The need to expand various components of the fire protection system, particularly if such a necessity has been identified to support new construction that would require fire protection.

Consult with the Installation Fire Chief on future fire protection initiatives, such as procuring additional fire fighting apparatus that could require shelter, any extension or renovation of the installation fire hydrant system, or any planned additions to or upgrading of electronic signaling systems.

The Wing/Installation Operations Plans Office can provide information on proposed mission changes that would either increase or decrease the need for fire protection. For example, a planned aircraft conversion, or added requirements for munitions storage facilities.

Consult with the Installation Development Flight regarding future construction programs, land acquisitions and/or dispositions.

### 3.13.14.3 Assessment

Your assessment should evaluate whether or not the capacity of installation fire protection systems will meet current and future demands. Recommend any improvements that should be made.

*Sources of Data*

- Fire Chief
- Installation Fire Protection Plan mutual support agreements
- Real Property Inventory to identify facilities that have installed fire detection and suppression systems
- Map G-1, *Water Supply System,* for information on water line, water storage tank and pumping station locations
- Communications Squadron for information on electronic signaling systems

*Helpful Hints*

Make the Installation Fire Chief the first point of contact. The Fire Chief's insights into current conditions will be most beneficial in preparing this discussion.

*Suggested Graphics/Photos*

- A graphic depicting the location(s) of high risk fire areas. Use Map N, *Fire Protection Systems,* and Map O, *Crash Grid,* if available,
- Photographs of fire/crash stations and equipment. Also show high risk areas or facilities where fire would cause serious damage to life and property, such as munitions storage areas, fuel storage areas, hot cargo parking areas, aircraft parking areas, and the hazardous material storage areas.

*References*

a. U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Fire Protection Planning Bulletin.* This bulletin contains fire protection planning principles and methodologies. It covers the data collection process, the identification and evaluation of alternatives, and possible solutions to meet near-term and long-term fire protection needs.

b. AFM 88-10, Vol. 7, *Water Supply for Special Projects,* 1986. This manual establishes the minimum water supply requirements for fire protection and domestic purposes at small military projects.

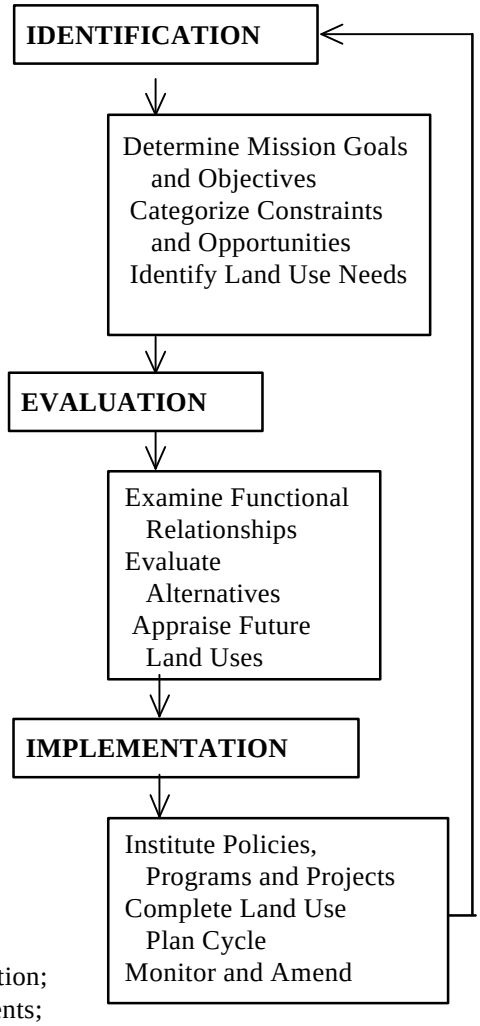
c. AFM 88-10, Vol. 4, *Water Supply, Water Storage,* 1985. This manual provides design criteria for water storage requirements at military facilities, gives a typical design analysis for tanks and reservoirs, and provides guidance on the procedures to follow in selecting sites for these storage works.

d. Engineering Technical Letter (ETL) 91-3: *Water Supply for Fire Protection,* 1991. This ETL provides design guidance and criteria for determining fire flow water demands for new unsprinklered construction, and minimum residual water pressure for fire flow.

# 3.14 Land Use

## 3.14.1 Introduction

**LAND USE PLANNING PROCESS**




The Land Use component of the *General Plan* presents an overview of current land uses and transportation systems on your installation. Here you will describe current and future land use configurations and how well they support existing and projected installation needs. You should also address in this section the importance of the relationship of land use and transportation networks. In many cases, transportation networks will drive land use configurations, particularly on established installations with little room to accommodate new growth.

Also, if your installation has an active runway, you must discuss the current status of your Air Installation Compatible Use Zone (AICUZ) Program and the impact it is having or may have on development. More information on the AICUZ Program can be found in Paragraph 2.3.

Your Land Use component should follow the basic process as outlined below:

- *Identification*: Determine existing land use relationships and configurations. Identify future land use requirements.
- *Evaluation*: Examine possible solutions to meet future requirements given constraints and opportunities on and around the installation.
- *Implementation*: Specify land use changes that are needed to accommodate specific policies, programs and projects to meet future needs of the installation.

More specifically, the plan should:

- identify and analyze the functional relationships on the installation;
- document the process of determining future land use requirements;
- analyze the planning factors that influence land use compatibility;
- relate land area to existing and future mission and support requirements;
- integrate private and public plans, projects, and development that can potentially affect the installation;
- analyze transportation networks both on and off the installation; and
- recommend road improvements to increase efficiency.

*Helpful Hints*

- To ensure you have identified the most current installation land use needs, you should interview key members of the installation staff. Also, review the land use categories listed in Appendix A of the *USAF Land Use Planning Bulletin* These categories relate to functional activities, and each will serve as a clue as to what staff to interview.

- Keep in mind that many, if not all, of the limitations in the Composite Constraints and Opportunities Section of the *General Plan* will have a direct bearing on your land use planning. Therefore, close coordination between the Land Use and Constraints and Opportunities sections is essential.

*References*

a. U.S. Air Force. HQ AFCEE/DGP. 1994. *Air Force Instruction 32-7062, Air Force Comprehensive Planning.* Implements AFPD 32-70 by establishing the Air Force Comprehensive Planning Program for Air Force installations.

b. U.S. Air Force. HQ USAF/CEVC. 1993. *Air Force Policy Directive 32-70, Environmental Quality.* Establishes policies for achieving and maintaining environmental quality.

c. U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin.* Explains the concept of land use planning and describes a process for developing, submitting for approval, implementing, and updating the land use component of installation comprehensive plans.

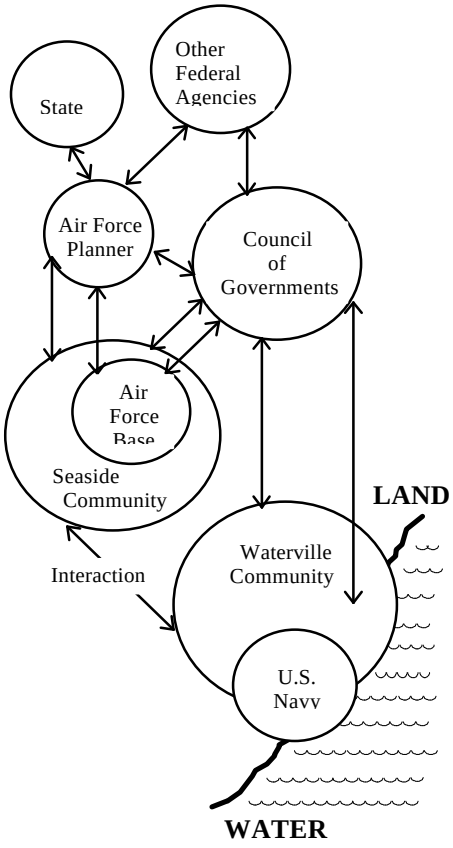
## 3.14.2 Existing Land Use

Briefly describe the current land uses on and around the installation. Include an analysis of the installation's AICUZ Program if applicable.

### 3.14.2.1 Installation Land Use

In this paragraph, present the current land uses on the installation. Describe the various categories of land use as defined in the *Land Use Planning Bulletin* and include a description of any special categories developed to meet your installation's unique needs. Highlight and discuss any significant problem areas that will need to be addressed later when analyzing future requirements and alternatives. Each subparagraph should:

- discuss the major facilities on the installation in each land use category;
- identify the total land area devoted to the various land uses;
- assess adequacy of land available for key functions; and
- identify incompatibilities between and among adjoining land uses.




*Sources of Data*

- Land Use Element or Component Plan
- Real Property Inventory
- Interviews with key installation personnel

*Helpful Hints*

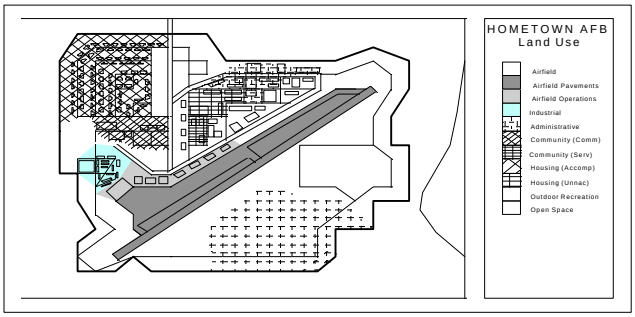
For help in determining what facilities belong in which land use category, refer to the *USAF Land Use Planning Bulletin, Appendix A.*

*Suggested Graphics/Photos*

- Photographs of typical or major facilities or activities in each of
- the land use categories, such as:

- Mission Operations - aircraft,flightline buildings, launch facilities, command and control facilities
- Administrative - wing/installation headquarters buildings
- Community Commercial - Base Exchanges, physical fitness centers, dining halls
- Outdoor Recreation - basketball courts, swimming pools, picnic pavilions
- Open Space - (Self explanatory)

- Map showing existing land use areas by category. You can depict the various land use categories by colors or patterns. Color is usually more effective. Use Map D-1, Existing Land Use, if available, as a source of information for this graphic. For specific colors and patterns, refer to the *Master Statement of Work for Preparation of Base Comprehensive Plans for Air Force Installations*




*References*

a. U.S. Air Force. HQ AFCEE/DGP. 1993.*Master Statement of*
b. *Work for Preparation of Base Comprehensive Plans for Air Force*
c. *Installations.* Contains detailed guidance for preparing
d. *Comprehensive Plans*, including elements and maps.

b. U.S. Air Force. HQ USAF/LEEVX. 1986*Land Use Planning Bulletin*. Appendix A. Describes the land use categories and types of facilities found in each category.

### 3.14.2.2 Off-Installation Land Use

**Regional Interaction**

A major concern to many Air Force installations is the increasing amount of development occurring adjacent to their boundaries. Identify and discuss those issues which now, or could in the future, impact your installation. Examples include:

- high noise and accident potential concerns related to aircraft operations (discussed in paragraph 2.3); and
- land use incompatibilities such as installation residential areas being adjacent to off-base industrial or commercial areas.

To adequately address the land uses surrounding your installation, you should discuss:

- direction, distance, and population of civilian communities surrounding the installation;
- land use and ownership, i.e. public or private, of the area around the installation;
- zoning restrictions or easements on land surrounding the installation and identification of the agency responsible for monitoring these restrictions;
- a brief assessment of land use compatibility between the installation and the surrounding community;

- planned or potential development in the vicinity of the installation; and
- summary of past, present, or planned initiatives to resolve actual or potential problems.

*Sources of Data*

- The Land Use Component of the installation's *Comprehensive Plan*
- Local/regional zoning authorities for zoning classification maps depicting authorized or restricted land uses near or adjacent to the installation

*Helpful Hints*

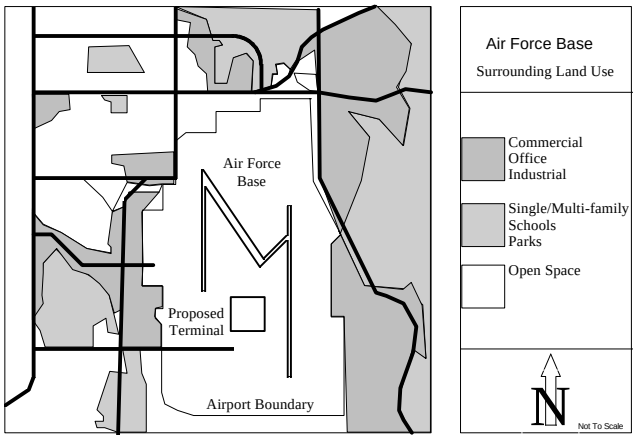
You should visually survey areas outside of the installation boundary in order to assess the potential for encroachment.

*Suggested Graphics/Photos*

- Off-installation land use graphics depicting land uses and applicable zoning classifications. Use Maps D-3, *Vicinity Existing Land Use;* D-4, *Vicinity Existing Zoning;* and D-6, *Composite Installation Constraints/Opportunities*
- Photographs of typical facilities surrounding the installation.

*References*

U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin* Chapter 6 discusses adjacent off-installation land uses.




*Surrounding Land Use Graphic*

## 3.14.2.3 Air Installation Compatible Use Zone (AICUZ) Program

**Utilize AICUZ to Promote Compatible Land Use**

In this part of the plan, you should describe your installation's AICUZ Program and any issues regarding off-base land use incompatibilities resulting from airfield activities. The AICUZ program was initially established by DOD in response to the Noise Control Act of 1972 to promote an environment free from noise that jeopardizes public health or welfare. The Air Force, as well as the Army and Navy, developed a program to protect their respective airfields from encroachment and incompatible land development. In many situations, this type of development has led to a partial or complete loss of an installation's ability to perform its flying mission.

AICUZ Programs (ICUZ for Army installations) have been established at all active military airfields in the United States and its territories, trusts, and possessions. Related noise abatement programs at overseas locations are dependent on the host country agreements. The thrust of AICUZ studies conducted at military installations is to

promote compatible land uses. The two parameters used in the studies to determine incompatibility are noise and accident potential.

Noise health hazards and compatibility studies have been prepared by U.S. Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA). Using the NOISEMAP computer program, the Air Force generates noise exposure contours based on aircraft operations and performance standards. These computer-generated contours are shown at 5 decibel intervals beginning at 65 decibels (60 decibels for installations in California) and running through 80 decibels. The contours are used to make land use and zoning recommendations to local communities.

The aircraft accident criteria are based on Air Force accident studies. The studies revealed that nearly 75% of all accidents within a ten nautical mile radius of the bases occurred in a 3,000 foot wide corridor which extends 15,000 feet from the ends of the runway. Based on this analysis, the Air Force established a clear zone and two accident potential zones that extend from each end of a runway.

The clear zone for a class B runway is 3,000 feet wide and 3,000 feet long beginning at the end of the runway. Accident Potential Zone (APZ) I is 3,000 feet wide by 5,000 feet, and APZ II is 3,000 feet wide by 7,000 feet long. All combined, they extend a total of 15,000 feet from the runway end.

The AICUZ booklet or study provides recommendations to the decision-makers in local communities in managing land use near air installations. It is one of the determinants for effective land use controls that municipalities should consider in their planning and zoning processes. The program encourages communities to adopt land use controls that will ensure compatible development in adjacent areas adversely affected by military operations. Noise generated by military operations usually is a very sensitive issue with local communities. For this reason, you should keep your local community advised about operations on the installation which would affect noise profiles. Through this ongoing contact with local communities, you should be able to identify proposed development early in the planning stages that may conflict with the compatible use zones established through the AICUZ study.

## Joint Land Use Study

If your installation and the surrounding community have potential incompatibility problems that can eventually threaten base missions and operations, there is an additional source of planning guidance. In 1983 through the Air Force "Education-with-Industry Program," the Air Force and the Sacramento Area Council of Governments developed a comprehensive land use plan for areas adjacent to McClellan and Mather AFBs in California. The project was part of a federally legislated Economic Development Administration grant to conduct a pilot study for the first Comprehensive Land Use Plan (CLUP) for a military installation. In 1985, the Office of the Secretary of Defense (OSD) took control of this program and changed the name to Joint Land Use Study (JLUS) Program. This program provided the other military services an opportunity

to engage in cooperative planning with local communities to promote compatible land use development around military installations.

Establishment of a JLUS program requires a commitment from both the participating base and the surrounding community. Each military department annually nominates eligible bases that can form a solid community and installation partnership on which to base a future JLUS. As an incentive to the community, the Office of Economic Adjustment (OEA) offers "matching" grants. Recommendations of the JLUS committees are used to guide local governments in developing compatible land use controls.

In your discussion of the AICUZ Program, be sure to address:

- future development constraints on and off base due to noise and safety concerns,
- aircraft noise levels,
- facility height restrictions,
- maintenance of the clear zone (CZ),
- the numbers of people exposed to high noise levels, and
- the risk of aircraft accidents in Accident Potential Zones I and II (APZ I and APZ II).

Identify any encroachment into high noise areas and APZs. Also, consider future problem areas that could arise and what steps should be taken now to avoid them.

*Sources of Data*

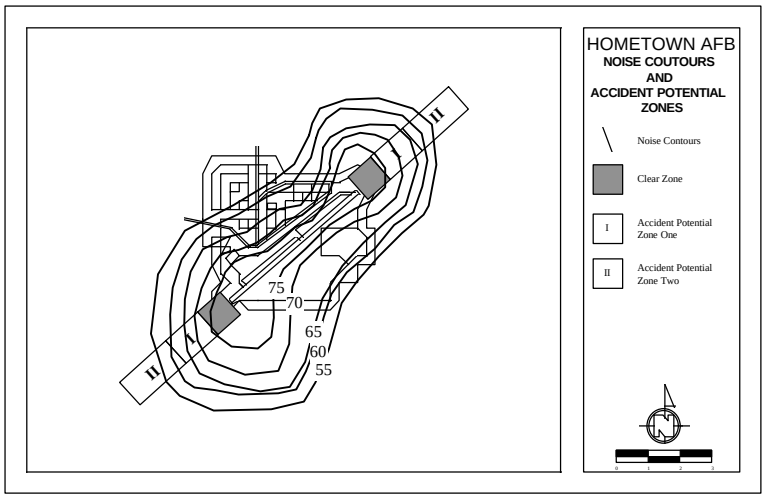
- AICUZ study for the installation
- Map F, *Air Installation Compatible Use Zones*
- Local planning department
- Council of Governments planning agency
- MAJCOM/CE manages AICUZ while the Installation Commander has local responsibility

*Helpful Hints*

- Maintain close contact with local community officials and stay abreast of their development plans.
- Work closely with the legal office to ensure proper procedures are followed. The AICUZ Program can be a very sensitive issue between the base and civilian communities. Land values can be affected and as a result lawsuits are common. Work closely with the base legal office to ensure proper procedures are followed.
- Determine population of those working and living within incompatible land use areas. This information can be useful when completing Air Force-wide surveys.

*Suggested Graphics/Photographs*

- A graphic showing noise contours on and off installation. Use Map F, *AICUZ Map Series*, if available, as a source. Contours should be marked with the appropriate noise level (i.e. 65 LDN, 70 LDN, etc.).
- A graphic showing AICUZ Accident Potential Zones on and off the installation




*Noise Contours*

*References*

a. U.S. Air Force. HQ USAF/CEVP. 1994. AFI 32-7063, *Air Installation Compatible Use Zone Program*. Implements DOD Instruction 4165.57 and establishes the Air Force AICUZ program.

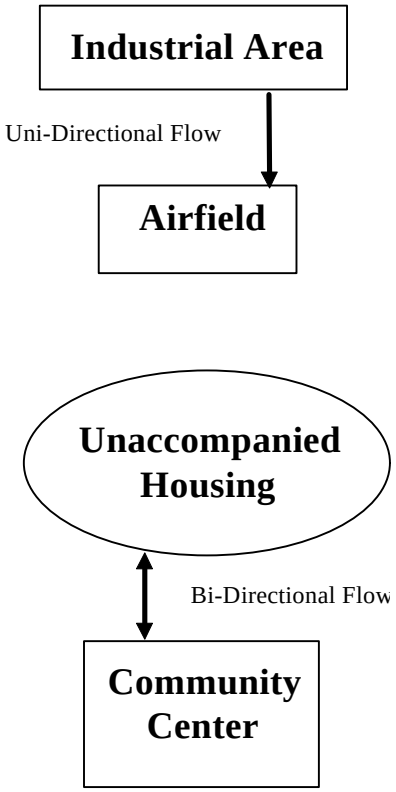
b. U.S. Air Force. HQ USAF. 1992. *Air Installation Compatible Use Zone (AICUZ) Handbook, Volumes I, II, and III.* See especially Volume 1, *AICUZ Program Manager's Guide,* for comprehensive treatment of the AICUZ program, process, and principles.

c. U.S. Department of Defense. 1977. DOD Instruction 4165.57, *Air Installations Compatible Use Zones*. Sets forth DOD policy on achieving compatible use of public and private lands in the vicinity of military airfields.

d. U.S. Department of Defense. 1993 *Joint Land Use Study: Program Guidance Manual*. General planning guidance on organizing a JLUS Committee where incompatible land uses may adversely affect the community or the installation mission.

e. Federal Aviation Administration (FAA). Part 150 *Airport Noise Compatibility Planning*. This source may be applicable for joint use airfields where AICUZ studies are not required.

## 3.14.3 Functional Relationships Analysis




To assess the compatibility among and between land uses on your installation, you must conduct a Functional Relationships Analysis. This analysis evaluates the appropriateness of relationships between adjoining land uses.

A functional relationship exists when the efficient performance of activities within one land use category depends upon maintaining or enhancing the flows that originate in another category. These flows may be either be uni-directional or bi-directional. A uni-directional flow can be represented by the transfer of fuel from an industrial area storage tank to an airfield, as only the airfield receives primary benefit from the proximity of the two uses. A bi-directional flow is exemplified by unaccompanied personnel living close to the community center. Being less mobile as a group, unaccompanied personnel are more dependent upon the community center and benefit from its proximity. In the other direction, the community center becomes a more fully utilized and meaningful focus of social interaction because of enhanced accessibility.

Although you may not want to spend much time discussing the details of the analysis in the *General Plan,* you should identify any significant discrepancies as background justification for recommendations you make later in the plan.

*Sources of Data*

- The Land Use component of the *Comprehensive Plan*
- Map D-1, *Existing Land Use*
- Real Property Inventory to determine category codes, and current functional use, of existing facilities

*Helpful Hints*

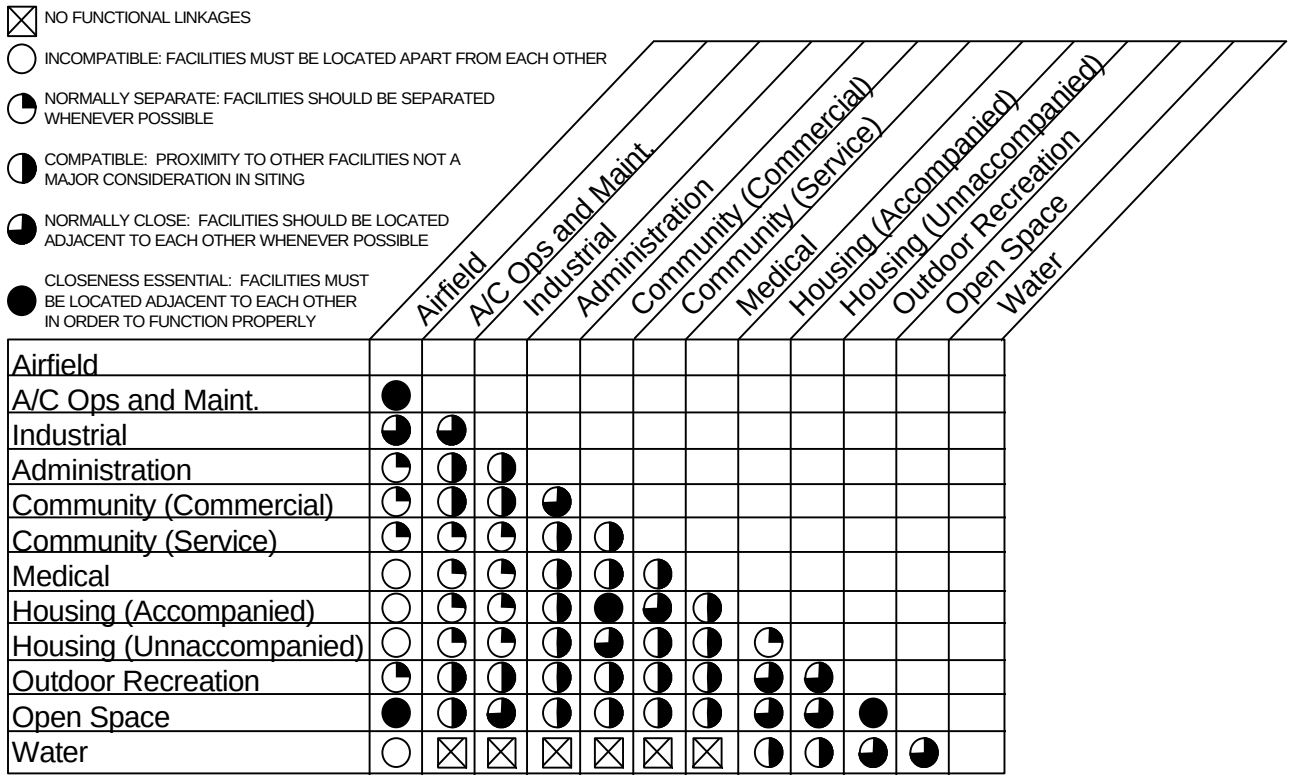
*Refer to the Land Use Planning Bulletin, Charts 1-13* for assistance in determining compatibility and incompatibility among or between land uses.

*Suggested Graphics/Photos*

- Graphic depicting the existing interrelationships of various installation functions
- Photographs that illustrate a compatible functional relationship, such as an elementary school located adjacent or near the family housing area, or officer/NCO club facilities located near or adjacent to unaccompanied or transient quarters

*References*

U.S. Air Force. HQ USAF/LEEVX. 1986.*Land Use Planning Bulletin.* Chapter 4 discusses functional relationships analysis. Also, refer to Appendix E which lists other references that were compiled during the preparation of the Bulletin.




*Air Force Land Use Functional Relationships*

## 3.14.4 Future Development Needs

Address future installation land use needs individually by land use category. Derive these needs from existing deficiencies and from projected changes in population and mission, operations, and support requirements. Limit discussion in the plan to needs having a major impact on the installation.

One of the major determinants of the future land use plan is the installation's physical plant and its ability to support current and future development. A crucial phase in the land use planning process is determining the need for capital improvements. In assessing the need for these improvements, examine each land use area with regard to the following:

- Are there buildings or structures whose condition is so deteriorated that they should be demolished?

- Are there buildings that are clearly inadequate and substandard for the activities and functions they contain, due to deficiencies in size, design, layout, etc.?
- Are there examples of dispersed but functionally related activities whose efficiency could be improved through consolidation in a single structure?
- Are there buildings clearly in unsuitable locations, that are incompatible with their surroundings, too inaccessible to pedestrians, or ill-served by the installation transportation system, etc.?
- Are there buildings that are clearly under utilized? Do they present opportunities for improved efficiency of use through renovation, rehabilitation, etc.?
- What improvements to the infrastructure and transportation systems will be necessary to accommodate future projections?
- What will be needed in the way of new construction to accommodate future projections?

This evaluation of development needs establishes the foundation for the *Capital Improvements Plan*. Once facility needs have been identified, you can translate them into a future land use plan.

*Helpful Hints*

- Be bold but realistic in developing alternatives. Most installations are largely built and therefore offer little flexibility for new land use patterns. Your biggest opportunities will usually be in proposing new uses for existing facilities, infilling small vacant areas, and redeveloping areas where existing facilities are to be demolished.
- A "Future Development Need" could have as its basis an initiative to correct an incompatible functional relationship.

*Sources of Data*

- The *Land Use* element/component of the *Comprehensive Plan*
- CE Base Development Flight
- Wing/Installation Plans Office (XP)
- Interviews of key personnel
- Map D-6, *Composite Installation Constraints and Opportunities*

*Suggested Graphics/Photos*

Photographs of facilities that should be renovated, rehabilitated, demolished or are of special concern to the plan.

*References*

U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin.* Chapter 5, *Preparing the Future Land Use Plan*, specifically addresses this subject.

## 3.14.5 Future Development Alternatives

Developing, analyzing, presenting and discussing alternative land uses is critically important to the overall comprehensive planning process. The process provides a forum for involvement and participation by functional managers and senior leaders throughout the installation and ensures all facts, needs, and conditions are considered in plan development.

In developing the Future Land Use portion of the *General Plan*, you should have already completed the process of considering alternative solutions to meeting projected requirements. Typically, you will be presenting only one Future Land Use plan in the *General Plan*. This plan should consider the possible alternatives and reflect the consensus of the installation leadership as to where the installation is headed in light of the projected mission. Background information relative to the alternative solutions should be documented in the *Land Use Component Plan* should you need to defend the plan or if situations change that make previously considered alternatives viable options.

## Growth Scenarios

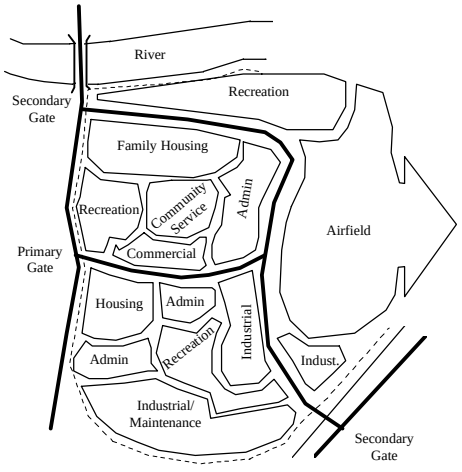
There may be circumstances where the Installation Commander wishes to include alternative Future Land Use plans in the *General Plan* based on growth scenarios aside from the one considered to be the most realistic in terms of available information. These alternative plans may reflect either increased or decreased mission scenarios or both. If these are included, a brief explanation should be provided to explain the rationale behind their development.

*Sources of Data*

The source of data for Alternative Future Land Use plans will generally come from different functional agencies on the installation who will estimate resource requirements based on "what-if" scenarios. You will have to determine how these requirements translate into land use areas. Also, if a *Land Use Component Plan* has been developed, information on proposed alternatives may be available if they were included in its development.

*Suggested Graphics/Photos*

Alternative Future Land Use map(s) depending on the number to be presented. Since these are conceptual, bubble diagrams can be used to illustrate the different land use areas or patterns.




*Suggested Graphic: A Concept Plan*

*Helpful Hints*

First determine if alternative Future Land Use plans are needed in the *General Plan*. If the decision is to include them, ensure they are relatively realistic. Most installations have a fairly well-developed infrastructure and therefore offer little flexibility to create new land use patterns without requiring a major investment. Potential alternative future land use proposals are found in undeveloped land areas, reuse of existing facilities, and areas potentially available through removal of substandard, inadequate facilities.

*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Comprehensive Planning Approach and Process*. Chapter 3 discusses how to develop and present alternative plans.

## 3.14.6 Future Land Use

In this section, you will write about and graphically depict future land uses on and off the installation. Development of Future Land Use maps and plans should take into account transportation, population increase or decrease, and any other concerns that may impact the defined land use boundaries both on and off your installation.

### 3.14.6.1 Installation

**"Define Boundaries of Future Land Use Areas"**

The primary focus of this portion of the *General Plan* should be a Future Land Use Map that clearly defines the boundaries of the future land use areas on your installation. Include a table that defines the area in each land use category. Also, discuss and explain the major changes between the existing land use plan and the future plan.

Develop your plan based on the selected alternative that best corrects existing land use deficiencies and provides for future land use requirements. Ensure your plan is consistent with your analysis of opportunities and constraints and supports the plan goals and objectives.

*Sources of Data*

- The *Land Use* element/component of the *Comprehensive Plan*
- Interviews of key personnel
- Map D-6, *Composite Installation Constraints and Opportunities*

**Review Existing Studies As You Prepare The Plan**

*Helpful Hints*

- Make sure you develop the *Future Land Use Plan* in conjunction with the *Transportation Plan*. Review existing transportation plans and studies to ensure they support the *Land Use Plan*. Conversely, ensure that the *Future Land Use Plan* will not generate undesireable circulation requirements.
- Also, review minutes of the Facilities Board meetings for future projects that may affect land use.

*Suggested Graphics/Photos*

- Photographs of areas where you anticipate land use changes might occur. Aerials may be needed to provide adequate coverage of the area.
- A map that depicts future land uses. Use Map D-1.1, *Future Land Use Plan*, if available, as a source of information for this graphic. If land use changes are not planned, then this graphic is not required.

*References*

U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin.* See Chapter 5, *Preparing The Future Land Use Plan.*

### 3.14.6.2 Off-Installation

**Examine Surrounding Land Use Plans**

In this discussion, you should look at future land use plans for the area surrounding the installation and discuss the degree of compatibility with projected mission requirements.

If the development plans for the land surrounding the installation would create land use incompatibilities, you should discuss actions necessary to correct them. Also, discuss the installation's options if efforts to change the community's plan are unsuccessful.

*Sources of Data*
- AICUZ Study
- *Land Use* element/component of the *Comprehensive Plan*
- Interviews with key personnel on the installation
- Interviews with key agencies off the installation including city/county/regional/state planning agencies

*Helpful Hints*
- Maintain close contact with local planning agencies to stay abreast of proposed changes to development plans that could impact the installation.
- Periodically make a "windshield survey" of the surrounding area to monitor activities.

*Suggested Graphics/Photos*
A map depicting communities development plans and projected zoning around the installation

*References*
U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin.* Chapter 5, *Preparing the Future Land Use Plan*, specifically addresses this subject.

## 3.14.7 Transportation

The future installation transportation plan will depend on careful analysis of existing conditions. Consider all modes of transportation, identify points of congestion, and recommend areas for improvement. Both the existing and future transportation plans should focus on how the transportation network is integrated with land use, capital improvements, and other development activities.

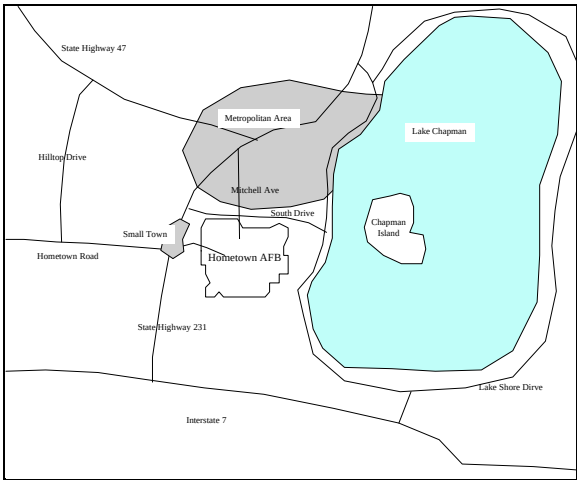
### 3.14.7.1 Introduction

**Coordinate Installation Efforts with Local, Regional and Federal Officials**

Land use on any base is usually interrelated with transportation networks. The transportation element of your plan should emphasize the importance of this relationship. In addition to analyzing the installation's transportation system, you should also evaluate the surrounding area's network and its capacity to support the installation's missions. Inadequate access roads or the lack of public mass transit could impact mission performance.

To be effective in dealing with transportation issues off the installation, it is important that you establish and maintain good relations with local, regional, and state transportation agencies. Cases often arise where roads serving the installation will require improvements that will have to be funded by the city, county, or state. Having a good working relationship with these agencies and understanding how they operate will be very useful in obtaining their support for making these improvements.

Also, you may apply for federal funds for off-installation road improvements. If the Military Traffic Management Command (MTMC) validates the need for such improvements to support the installation's mission, DOD may approve the use of DOD funds to pay for part or all of a project that improves access to the installation.



*Local Transportation Network*

## 3.14.7.2 Local and Regional Network

Local and regional transportation networks include highway, airport, mass transit, rail, and water port systems. In this section, describe the role these systems play in supporting the installation's mission.

### 3.14.7.2.1 Off-Base Street Network

Briefly describe current street connections between your installation and the civilian community. Identify congested roads, bottleneck intersections, and any potential problems that may impede traffic flow or access.

Be cognizant of potential problem areas that may warrant future construction considerations. Suggest transportation alternatives such as flex-time, carpooling, and route changes for employees in an effort to reduce private vehicular use.

**Describe Areas with Peak Travel Problems**

In your efforts to increase energy conservation and meet environmental goals, encourage local officials to improve the transportation networks serving the installation.

### I3.14.7.2.2 nter-connecting Bicycle/Pedestrian Routes

Depending on the location of your installation relative to local population centers, bicycle and pedestrian routes may be important to your transportation system. Survey the area for off-road bicycle paths or dedicated traffic lanes that personnel residing off-base can use to travel to/from the installation.

Determine if and where new trails can be built and provide a description of proposed improvement areas.

### 3.14.7.2.3 Highway

**Major Arterials and Interstate Highways**

Evaluate major arterials that serve the installation and their ability to sustain base transportation needs. Also, describe the interconnecting system of state and local highways (not inner-city streets). Identify any areas that limit the system's ability to support the mission. Unsafe conditions should be highlighted and steps outlined as to what should be done to improve the conditions.

Assess the current road network for its capacity to serve future growth on the installation. Include an evaluation of the potential impact local community growth may have on the roads supporting the installation. Most city, regional, and state planning agencies have performed extensive transportation studies and have developed plans for future transportation network development. Review these plans to ensure they support the installation's projected needs.

### 3.14.7.2.4 Mass Transit

**Public Transportation And Your Installation**

Determine your installation's access to off-installation public transportation systems. Installations near urban areas are typically serviced by commercial bus service and possibly light rail. Examine routes, destinations and schedules and whether the service supports flexible hours.

Evaluate the existing systems as to their capabilities to support growth on the installation. Future planning will provide you the opportunity to develop alternatives to driving. This is particularly true if the infrastructure supporting the city or town near the installation is part of a progressive plan toward energy conservation, traffic reduction, and control over toxic emissions and air pollution.

### 3.14.7.2.5 Air

Describe location of the nearest commercial airline terminal serving the installation. Determine the current capacity of the airport to support military air passenger and cargo traffic. Indicate the distance from the installation to the airport. Explain existing components of the air traffic system such as terminal size, condition, or runway length. If your installation does not have a runway or does not have a long enough runway to support large military or Civilian Reserve Air Fleet (CRAF) aircraft, you will need to determine the capacity of nearby civilian airfields to accommodate these aircraft.

Identify the need for improvements to existing facilities such as airport expansion (longer runways, new freight facilities, larger passenger terminal) to support military traffic. Take into account new missions and future community growth. Consider not only military use of the airport, but commercial use of the facilities as well. Your state's planning network and the Federal Aviation Administration may have plans for future expansion of the commercial airfield and passenger/freight terminals.

### 3.14.7.2.6 Rail

Describe off-installation railheads in the vicinity of the installation as well as the availability of rail freight and passenger service. Also, determine the availability of military or civilian loading equipment that could handle large freight.

Perform a needs assessment on current maintenance of rail spurs and railheads. As a cost reduction measure, the track may be abandoned if it is no longer functional. Be sure your assessment includes the needs of the installation and the impact rail removal would have upon your installation's current and future missions.

### 3.14.7.2.7 Water Port

Examine existing port facilities that could support the installation. Determine the availability of cranes, dock space, and other components. Be sure to assess the port's relationship to rail and truck routes as this can be of particular importance to bases located near port facilities and to overseas installations. Consider the installation's need for specific development or expansion of local port facilities. Explain existing plans or propose changes for expansion or curtailment of port facilities.

#### ***Sources of Data***

- Much of this information is available from the installation Traffic Management Office (TMO). If necessary, contact state and local transportation departments and commercial transportation personnel to obtain information about future programs and the specific problems of handling military traffic. This would include materials handling equipment (MHE) available for loading and downloading, highway and bridge weight and size restrictions.
- Review the Transportation element of the *Comprehensive Plan.*

#### ***Helpful Hints***

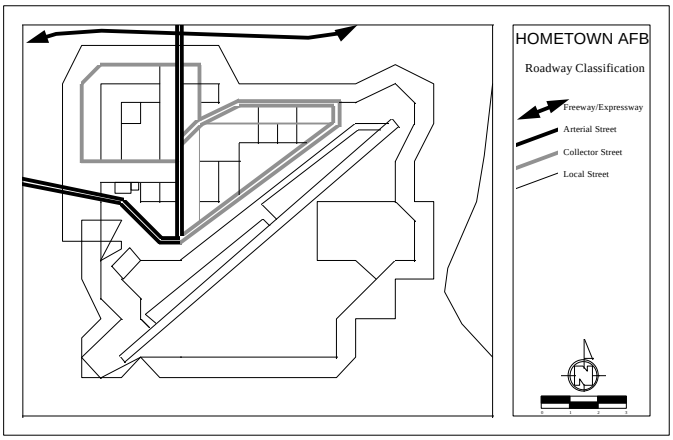
Personally observe traffic flows and patterns during peak travel periods.

#### ***Suggested Graphics/Photos***

- Graphic map showing roads, highways, rail lines, airports and water ports within a 50-mile radius of the installation
- Photographs of significant features of transportation systems supporting the installation

### 3.14.7.3 Installation Network

In this part of the plan, briefly discuss transportation networks on the base. Include roadways, streets, parking, traffic signals, congestion points, pedestrian paths, bicycle routes, shuttle buses, and other modes of transportation.




*Roadway Functional Classification*

#### 3.14.7.3.1 Roadways/Streets

Describe the main traffic flow from off-base to and from the major work areas of the installation. Also, address the routes from the Family Housing and Dormitory areas. Note where these routes join or cross and any resulting congestion. Discuss signals, reversible lanes and other traffic control measures.

Review projected new traffic flow patterns that might occur as the installation grows. Review all proposed changes in land use and the expected impact on traffic flow. Consider additional traffic signals as well as synchronized signals as means of moving traffic more efficiently. Look toward reducing as well as controlling vehicular traffic. Where possible, consider closing streets to reduce the number of intersections and improve traffic flow. A side benefit may be improved land use.

#### 3.14.7.3.2 Parking

Identify areas burdened with inadequate parking. Assess their location in relation to major work areas on base. Also, re-examine modes of transportation around the base and keep them in mind as you develop a parking plan. Before additional parking areas are constructed, you should carefully evaluate the use of incentives to reduce the demand for parking. For example, close-in parking might be reserved for carpools. In areas where space for additional parking is not available, you might consider satellite parking areas near the main thoroughfares on or off the installation with shuttle service to the major work centers.

Analyze and determine whether current and future land uses require additional parking facilities and suggest locations or improvements. Address planned construction to alleviate overcrowding in existing parking areas. Also, discuss programs to foster alternative means of transportation.

#### 3.14.7.3.3 Pedestrian Routes

Discuss opportunities for walking paths in conjunction with an energy conservation campaign to reduce the use of Privately Owned Vehicles (POV) for installation travel. Map proposed routes from the Family Housing area and around the cantonment area.

### 3.14.7.3.4 Bicycle Paths

Discuss whether existing paths provide adequate and safe bike routes. It may be helpful to perform a survey to determine potential demand. Develop possible opportunities for connecting installation paths with local community trail systems. Continue to emphasize energy conservation and reduction in POV use. Consider combining bicycle and pedestrian ways on less heavily used routes.

### 3.14.7.3.5 Installation Shuttle Bus

Work with transportation officials to examine the current system. If a shuttle exists, determine the location of stops and shelters and examine the schedule to see if it meets the needs of base personnel. As necessary, recommend new routes, schedule changes, or additional buses. If the installation population grows, new routes may be necessary for areas that are not currently served by the shuttle.

### 3.14.7.3.6 Military Passenger/Cargo Terminals

Describe uses of passenger and cargo terminals located on your installation. Mention whether or not your terminals support other military installations in the area. List types of aircraft served by the terminals and highlight any significant airfield restrictions on heavy lift aircraft. If your base has no terminal, explain how your installation handles passengers and cargo.

Address projected changes to the passenger and cargo operations for your installation and discuss any impact they may have on the mission.

### 3.14.7.3.7 Installation Railheads

If railheads exist on your base, list location of rail spurs and describe frequency, type of use, and capacity.

Survey users of the rail line to determine whether the installation needs the spur to support military operations. If rail remains a viable mode of transportation, summarize needed improvements to the system.

## 3.14.7.4 Future Transportation Plan

Following your analysis of existing conditions, you should determine your projected transportation needs. Be certain to integrate future transportation needs with land use considerations in order to produce a solid, unified Future Transportation plan. Develop written and graphic descriptions of your plan.

The future transportation plan should:

- identify key improvements that are needed,
- present planning objectives to serve those needs,
- reduce energy and resource use,
- increase efficiency, and
- meet and maintain environmental standards.

### 3.14.7.4.1 Off-Installation

Keep in mind the overall goals for your installation and its relationship to the community. Describe transportation improvements planned by local, regional and state agencies, and evaluate their effect on traffic movement to and from the installation. Consider all facets of the transportation system supporting your installation and identify improvement areas based on future community and installation growth.

### 3.14.7.4.2 Installation

Identify the impact that base population growth or reduction will have on current traffic patterns. Promote land use that can reduce traffic and POV use. Develop recommendations such as carpooling, mass transit connections, and walk and bike paths throughout the installation. Graphically identify proposed improvements similar to the matter in which off-installation future plans are shown.

#### ***Sources of Data***

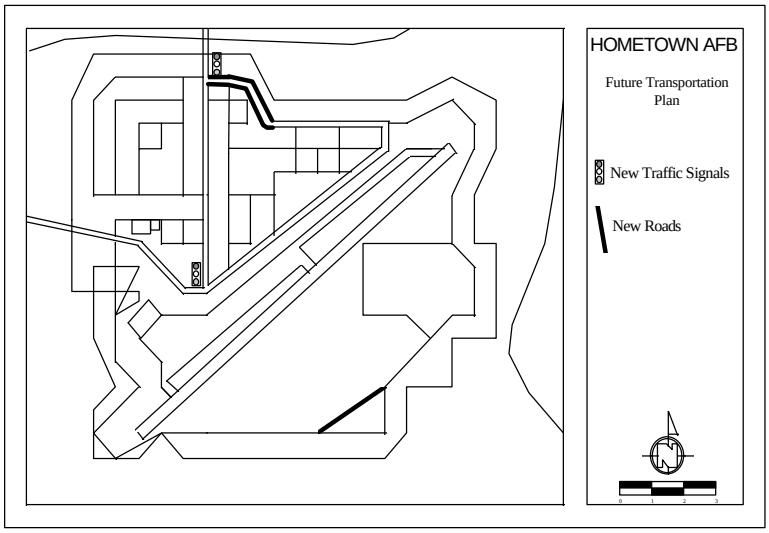
- The Transportation element of the*Comprehensive Plan*
- Law Enforcement, Ground Safety and Traffic Engineering personnel
- *Defense Access Roads Needs (DARN) Report*
- Military Traffic Management Command (MTMC) studies

#### ***Helpful Hints***

Maintain close contact with local and regional traffic planning agencies to ensure a coordinated and cooperative approach to solving potential problems.

#### ***Suggested Graphics/Photos***

- Photos of choke points during peak travel times and overcrowded parking facilities
- Diagrams of proposed construction projects which will enhance the installation transportation network
- A graphic showing existing and proposed installation streets, pedestrian ways, bicycle routes and parking lots. Use Map I-2, *On-Base Network*to produce graphics.




*Future Transportation Plan*

## ***References***

a. U.S. Air Force. AFSA/SEGO. 1994. *The U.S. Air Force Traffic Safety Program*.

b. U.S. Air Force. HQ USAF/LEEVX. 1984. *Transportation Bulletin*. Gives transportation planning principles and methodologies, with practical examples of how they are applied to the specific needs on Air Force installations. Appendix F also contains an expanded bibliography of pertinent reference materials.

c. U.S. Air Force. HQ USAF. 1982. *AFR 75-88, Highways for National Defense*. Prescribes policies and procedures on matters pertaining to DOD highway needs during peacetime and emergencies in the U.S. and its territories. Chapter 2 specifically discusses access road needs for Defense installations.

d. U.S. Army. HQ Military Traffic Management Command (MTMC). 1985. *MTMC Pamphlet 55-10, Traffic Engineering for Better Roads*. Conveys ideas on the application of traffic engineering principles for roadway planning and design to provide functional as well as attractive roadway networks.

e. U.S. Army. HQ Military Traffic Management Command (MTMC). 1985. *MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings*. Clarifies existing standards and provides definitive guidelines to conform to the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).

f. U.S. Army. HQ Military Traffic Management Command (MTMC). 1982. *MTMC Pamphlet 55-15, Traffic Engineering for Better Gates*. Contains the applicable bits and pieces of information, combined to form a basic guide to gate planning and design. It is intended to be an idea generator and an index to more specific manuals dealing with each aspect of design.

g. U.S. Army. HQ Military Traffic Management Command (MTMC). 1981. *MTMC Pamphlet 55-16, Volume I, Mastering Alternative Work Schedules*. Introduces the alternative work schedule as a way to reduce rush-hour traffic.

h. U.S. Army. HQ Military Traffic Management Command (MTMC). 1980. *MTMC Pamphlet 55-16, Volume II, Mastering Ridesharing*. Presents methodology for designing, implementing, evaluating and maintaining a ridesharing program.

i. U.S. Army. HQ Military Traffic Management Command (MTMC). 1981. *MTMC Pamphlet 55-16, Volume III, Mastering Traffic Engineering*. Helps planners and engineers who want to reduce traffic congestion and

fuel consumption by getting maximum service from existing roadways and by encouraging alternative transportation means, e.g. the bicycle.

j. U.S. Army. HQ Military Traffic Management Command (MTMC). 1978. *MTMC Pamphlet 55-11, Development and Maintenance of Traffic Control Device Inventories for DOD Installations.* Helps readers establish permanent inventories of all traffic control devices and upgrading existing devices to conform to current standards.

k. U.S. Army. HQ Military Traffic Management Command (MTMC). 1976. *MTMC Pamphlet 55-8, Traffic Engineering Study Reference.* Identifies the more common problems experienced with traffic operations on military installations, the types of studies most frequently used in determining solutions to the problems, and the aspects of each study that concern data collection, analysis and interpretation.

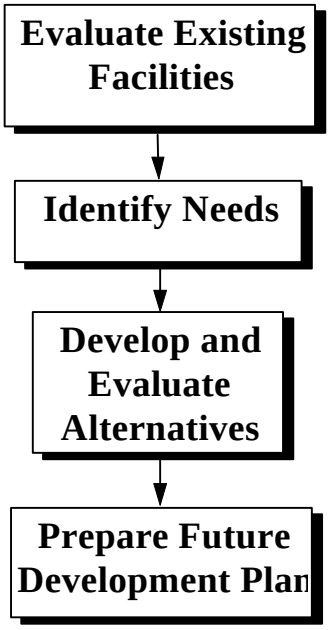
l. U.S. Army. HQ Military Traffic Management Command (MTMC). 1976. *MTMC Pamphlet 55-9. Do's and Don'ts for Transportation Master Planning.* Deals with common problems encountered in administrating vehicular traffic, including street systems, parking, pedestrians, safety, land use and general aesthetics.

# 3.15 Capital Improvements Program

## 3.15.1 Introduction

The *Capital Improvements Program* (CIP) 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. The major components of the CIP are *Facility Development* and *Urban Design.* The elements that make up *Urban Design* consist of *Architectural Compatibility, Landscape Development, Area Development Plans, Housing Community Plans* and *Quality of Life.*

## 3.15.2.1 Facility Development




Facility development represents the physical culmination of the planning process. Requirements identified during the data gathering and evaluation phases of this process form the basis for the reuse of existing or construction of new facilities.

In the following paragraphs, you should: describe the condition of existing facilities; determine requirements for new or renovated facilities, or for the removal of facilities; and prepare a plan for future development.

### 3.15.2.1 Existing Facilities

Begin with the general status of the significant facilities on the installation. Include an overall assessment of the condition of the facilities and their functional adequacy. Group them by functional use for easy correlation with the *Land Use Plan.* Identify facilities in each category that are scheduled for demolition. Your primary reference should be the Commander's Facility Assessment (CFA).

*Sources of Data*

- Commander's Facility Assessment
- *Capital Improvements Program* component of installation *Comprehensive Plan*
- Real Property Inventory
- Facility maintenance records
- Facility surveys
- Current project lists
- Interviews with facility occupants, operators, and users
- Visual inspection

*Helpful Hints*

- Paint a broad but vivid picture of the installation, highlighting the areas where major facility requirements exist.
- Separate narrative into subparagraphs to enhance readability and comprehension; for example, mission, industrial, administration, unaccompanied housing, outdoor recreation, and community.
- Relegate lists of major facilities to a table or an appendix depending upon the amount of data presented.
- Look at use, condition, and functional adequacy and make observations regarding needs and possible alternatives as discussed below.

**"Paint a broad but vivid picture of the installation..."**

*Suggested Graphics/Photos*

- Facility photos to give the reader a feel for the installation and the kinds of facilities included in each category.
- A table as an appendix that lists major facilities by functional area with facility numbers, descriptions, areas, and capacities.

**APPENDIX A**

**MAJOR FACILITIES**

| NO. | DESCRIPTION | AREA (GSF) | CAPACITY |
|---|---|---|---|
| | **ADMINISTRATION** | | |
| 1001 | Base Headquarters | 22,680 | 140PN |
| 1003 | Civil Engineering | 13,770 | 5 PN |
| 1005 | Contracting | 16,200 | 100 PN |
| 3045 | Morale & Welfare | 8,910 | 55 PN |
| 3046 | Morale & Welfare | 32,400 | 200 PN |
| | **MAINTENANCE** | | |
| 4000 | Vehicle Maintenance | 27,500 | 10 VE |
| 4010 | Vehicle Maintenance | 38,700 | 14 VE |
| | **COMMUNITY** | | |
| 5000 | Base Exchange | 78,000 | |
| 6005 | Hospital | 225,000 | 65 BD |

## 3.15.2.2 Needs and Alternatives

In the *Capital Improvements Program*, you should identify and quantify facility requirements on the installation and select courses of action to satisfy them. The needs discussed here are distilled from the previous component plans as well as from justification documentation for existing maintenance, repair, and construction programs. Another primary source of information would be the Commander's Facility Assessment. This latter document will give you a total look at facility improvement requirements for the whole installation. Based on this data, the discussions in the component plans should validate significant existing projects, as well as, highlight new requirements that are not included in existing programs.

Once you have developed a list of facility requirements, you must identify and evaluate feasible alternatives to new construction as means of satisfying facility requirements. As a minimum, you should evaluate the following for each facility requirement:

- Carry out programmatic solutions; that is, those not requiring new facilities. An example would be moving units to different facilities to better match needs with available space.
- Make the best use of existing facilities. Improve space use. Convert excess facilities.
- Use off-installation facilities. Government or privately owned facilities may be available for lease or for use on a "rent free" or "operations and maintenance cost" only basis. Interservice support agreements can often provide a vehicle for long term use of government facilities at another installation.
- Acquire facilities from the private sector: Lease or purchase existing facilities off-installation. Explore build-to-lease facilities on or off-installation.
- Provide new Government constructed and owned facilities.
- Take no action. Maintain the status quo.

**"...identify and evaluate feasible alternatives to new construction..."**

**ALTERNATIVE HIERARCHY**

**Programmatic Solutions**
↓
**Diversion**
↓
**Conversion**
↓
**Use of Available Off-Base Facilities**
↓
**Use of NearbyDoD Facilities**
↓
**Renovation of Existing Facilities**
↓
**Acquisition From Civilian Sector**
↓
**New Construction**
↓
**No Action**

*Sources of Data*

- Installation Commander
- Commander's Facility Assessment
- Manpower and Organization office: Future personnel strength data
- Installation/Wing Plans (XP): Mission changes
- Installation Development Flight: Facility Utilization Studies, project data, etc.
- Facility Board Minutes and approved project listings
- Other sources include the installation's Pavement Program (PAVER) and Roofing Program (ROOFER)

*Helpful Hints*

- Interview building occupants, operators, and users.
- Visit existing facilities.
- Review authorized space allowances IAW AFH 32-1084. Many units and organizations actually need less and a few need more than their allowances.

*Suggested Graphics/Photos*

Photos to portray exemplary facilities as well as those with major problems.

### 3.15.2.3 Future Development Plan

Summarize here the future development plan with a minimum 15 to 20 year horizon. The development plan should encompass the needs addressed in all components of the *Comprehensive Plan*. The plan should encompass major projects from all funding sources and include the construction, renovation, and demolition of facilities. The following is one method of subdividing this section of your plan:

- *Current Development Plan:* This plan covers active construction programs, extending approximately one year into the future. It is the implementation phase which translates the long-range and short-range plans into physical development.

- *Short-Range Development Plan:* This plan coincides with the lead time for facility construction programs, generally extending five years into the future. It integrates planning decisions with the appropriate construction and funding programs. Your siting and programming of facilities must be guided by and consistent with the other components of the *Comprehensive Plan*, particularly the *Land Use Plan.*
- *Long-Range Development Plan:* This plan typically covers a period extending 6 to 20 years into the future.

Ensure that your installation Demolition Plan, if one exists, is integrated into this portion of your *General Plan.* This will provide decision-makers at your installation and at headquarters a full view of which facilities will or will not be available as development occurs.

*Sources of Data*

Compare the needs identified and alternatives selected in Paragraph 2.2 with the *Capital Improvements Program* component of the installation *Comprehensive Plan* and with the projects and priorities established by the installation Facilities Board, Environmental Protection Committee, and other local, technical advisory groups.

*Helpful Hints*

Your analysis of existing and projected facility requirements should validate projects already contained in the *Capital Improvements Program* as well as identify the need for new projects. Provide rationale for the new projects as well as for any current projects you recommend changing or deleting.

*Suggested Graphics/Photos*

- A Development Program table showing the major projects that are an outgrowth of the alternatives analysis. Include a descriptive title, funding source, and the fiscal year the project is to be executed.
- A graphic portraying the locations of major projects on an installation map cross referenced to a Development Plan table. Use Maps M-1, *Current Development;* M-2, *Short Range Development;* and M-3, *Long Range Development Plan,* if available, to produce this graphic.

**DEVELOPMENT PROGRAM**
**MAJOR PROJECTS**

| NO. | DESCRIPTION | (GSF) | FY | FUND SOURCE |
|---|---|---|---|---|
| P-35 | Construct Exchange Branch | 25,000 | 98 | AAFES |
| P-44 | Renovate | 22,680 | 98 | O & M |
| P-52 | Construct Bowling Alley | 53,770 | 99 | NAF |
| P-55 | Construct Security Police Facility | 42,200 | 99 | MILCON |
| P-58 | Renovate Bldg 4235 | 48,910 | 99 | MILCON |
| P-60 | Construct addition to Bldg 4455 | 12,400 | 00 | NAF |
| P-68 | Construct Vehicle Maintenance Facility | 48,700 | 01 | MILCON |

*References*

a. U.S. Air Force. HQ USAF/CEP. 1994. *Air Force Instruction 32-1021, Planning and Programming of Facility Construction Projects*

b. U.S. Air Force. HQ USAF/CECP. 1994. *Air Force Instruction 32-1022, Planning and Programming of Non-Appropriated Fund Facility Construction Projects*

c. U.S. Air Force. HQ USAF/CEP. 1994. *Air Force Instruction 32-1032, Planning and Programming Real Property Maintenance Projects Using Appropriated Funds.*

d. U.S. Air Force. HQ AFCEE/DGA. 1994. *Air Force Handbook 32-1084, Standard Facility Requirements.* This document contains approved criteria for the type, number, and size of facilities the Air Force and the Air Reserve Forces can use, occupy, or build to support their missions. It replaces AFM 86-2.

e. U.S. Air Force. HQ USAF/CEHH. 1994. *Air Force Instruction 32-6002,Family Housing Planning, Programming, Design and Construction.*

f. U.S. Air Force. HQ AFCEE/DGP. 1994. *Air Force Instruction 32-7062,Air Force Comprehensive Planning*. Establishes the Air Force Comprehensive Planning Program for development of Air Force Installations. It contains responsibilities and requirements for comprehensive planning and describes the procedures for developing, implementing, and maintaining the *General Plan.*

g. U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Long-Range Facilities Development Planning Bulletin.*

h. U.S. Air Force. HQ AFCEE/DG. 1993. *Master Statement of Work for Preparation of Base Comprehensive Plans for Air Force Installations* Provides detailed guidance for preparation of installation *Comprehensive Plans.* Refer to Part Three, Section VIII.M., for specific guidance on the *Future Development Plan.*

## 3.15.3 Urban Design

Urban Design is that component of the *Comprehensive Plan* or *General Plan* that addresses the physical development of the installation. It is primarily concerned with the urban fabric, the layout, and the texture of the installation. In other words, urban design is the physical characteristic of the installation.


Typically, the urban design of an installation is governed by the Architectural Compatibility Guide and the Landscape Development Plan. However, other plan supplements, such as area development plans, paint plans, or related documents, may direct the color, texture, and theme for future construction, renovation, or changes to the buildings and urban scape of the installation.

Influences on the urban design of an installation are based on a number of factors. Local architecture, theme, and building practices, as well as Air Force or other Service standard designs may contribute to the urban make-up of an installation. There are several basic and pre-eminent design traditions which could have influenced your installation:

- Monumental Garden City Design
- Suburbs and Garden Cities
- Modernist City Design
- Megastructure, or the City as a Building

There are certain rules of urban development. Urban designers have developed and practiced these rules, and by studying them we can apply them to our installation to achieve a higher quality of life. For example, some of the basic concepts for a good site design today can be attributed to the urban designs developed by Frederick Law Olmstead, Sr. in his Riverside, Illinois, General Plan:

- Residential areas near transportation nodes and routes

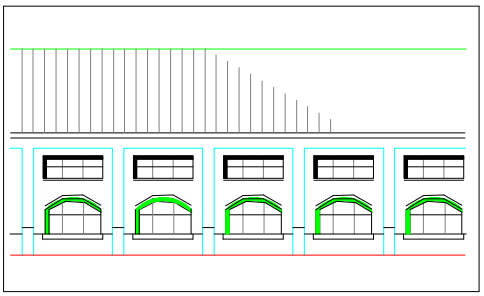
- Commuter usage a factor in location
- Communal spirit (a sense of belonging)
- Measures to prevent private intrusion on public functions
- Guiding principle in urban design -- “village-like” areas in proximity to “public grounds”
- Villages linked by public drives

Other urban designers have continued to influence the fabric of our cities and installations. An awareness of these influences, theories, and design concepts is important. The positive aspects of these designs should have been adopted through the installation’s Architectural Compatibility Guide. This document should provide the principal direction for the urban make-up of your installation.

The Urban Design portion of your *General Plan* should consist of two parts. The first part should address the current status of the Architectural Compatibility and Landscape Development programs on your installation. These two programs will set the design guidelines for development. The second part of this section should describe the key features of proposed *Area Development Plans*, the *Housing Community Plans*, and the *Quality of Life Plan* that incorporate the previously established guidelines.

### 3.15.3.1 Architectural Compatibility

Here you summarize the significant aspects of the installation’s *Architectural Compatibility Guidelines*. If a separate *Architectural Compatibility Guidelines* or similar plan has not been accomplished for your installation, you should point out the need for one in this section.

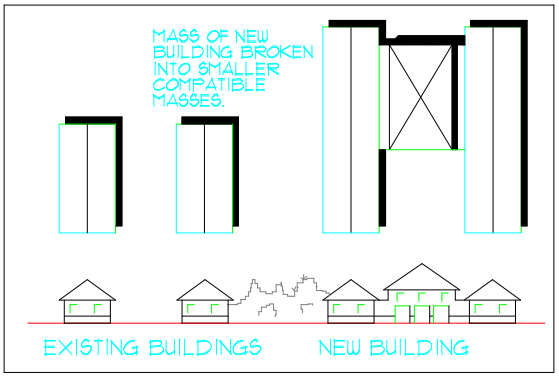


*Architectural Character*

#### 3.15.3.1.1 Existing Conditions

Begin with a brief description of the overall architectural character of the installation. Describe the individual areas on the installation that are defined by their own distinct architectural character. Identify the most significant features that establish the distinct character of the area and those features that represent liabilities to this primary theme. While much of your focus may be on the positive physical and visual qualities of the installation as a whole, you should also identify areas that need improvement.

This section of the plan should not be a guidebook on the theory of good architecture. You should briefly address the salient positive as well as negative architectural characteristics of the facilities on the installation.




*Compatible Building Masses*

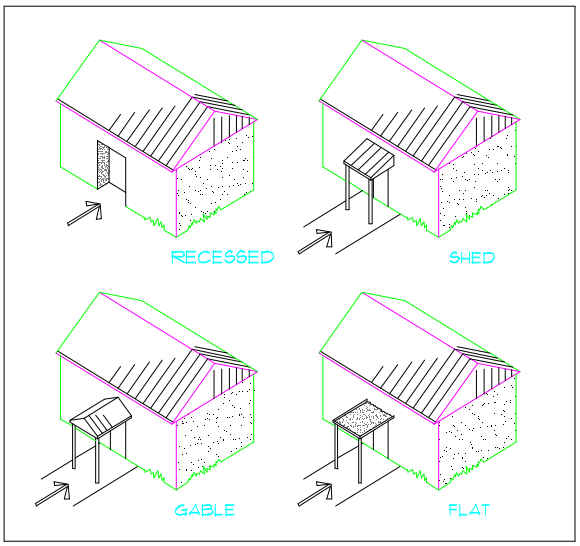
#### 3.15.3.1.2 Concepts and Future Directions

Following your review of the significant architectural assets and liabilities of the installation, present the concepts and guidelines that have been established for the future. Briefly discuss those attributes that will guide future design efforts on the installation.

The guidelines set forth in this section should take into account all elements of the environment and establish consistency in the architecture throughout the installation. In addition, this section of the plan should provide you the basis on which to evaluate proposed architectural schemes for renovated and new facilities.

*Sources of Data*

- Comprehensive Plan
- Departmental and Command Design Guides
- Facilities Excellence Plan
- Architectural Compatibility Studies

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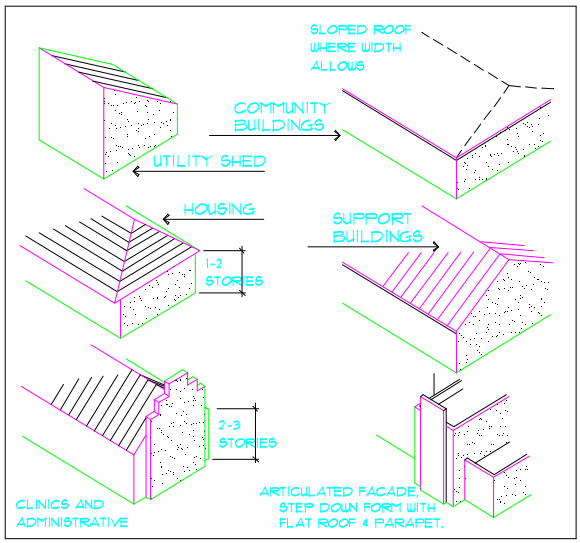
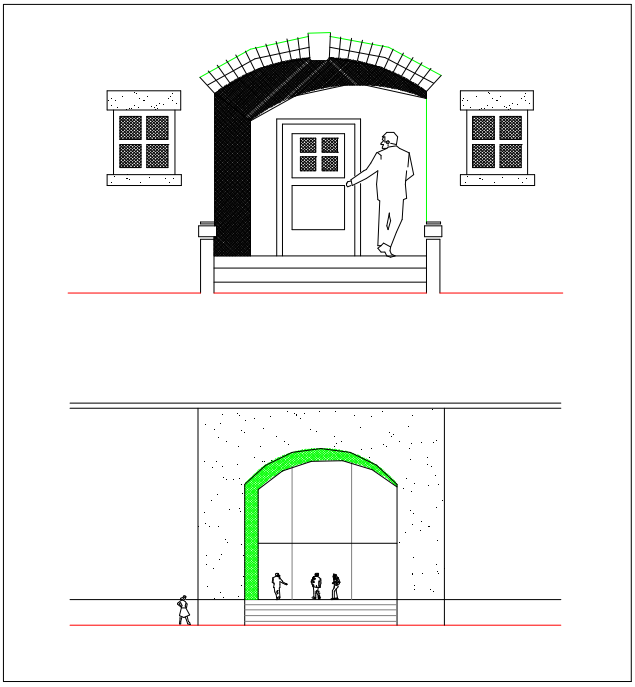



*Roof Configurations*

*Helpful Hints*

- Review *Architectural Compatibility Guidelines* and *Facilities Excellence Plans.*
- Tour the installation. Take plenty of color photographs. When in doubt if a photograph is relevant, take it. It might show background items you failed to notice at the time.
- Use a video camera to capture the full range of the built environment by panning 360 degrees.

- Ensure design guidelines are consistent with local government restrictive covenants and zoning regulations. This makes them relatively easy to understand and apply, and provides a measurable standard for consistent application over time.
- Don't use the *General Plan* to develop original detailed *Architectural Compatibility Guidelines*.



*Personal Scale - Monumental Scale*

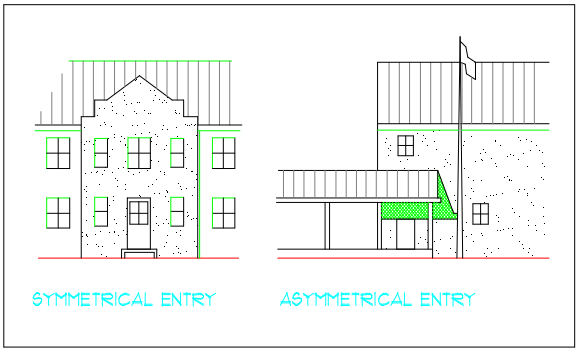
*Suggested Graphics/Photos*

- Map K, *Architectural Compatibility*. Use to produce a graphic depicting existing areas of distinct architectural character.
- Photographs to illustrate existing assets and, occasionally, liabilities.
- Graphics to portray the basic concepts formulated for the installation.
- "Before and after" photographs or renderings of existing buildings to illustrate how building guidelines can be applied to actual projects.

*References*

a. U.S. Air Force. HQ USAF/LEEX. 1987. *Architectural Compatibility Bulletin*. Provides guidance on analyzing current architectural compatibility, preparing compatibility guidelines, and implementing the compatibility program.

b. U.S. Air Force. HQ AFCESA/EN. 1981. *AFM 88-43, Installation Design*. Discusses and illustrates an analytical process similar to the one described for architectural compatibility in this document. In addition to discussing buildings, the book looks at landscaping and site furniture in parallel, helping to synthesize all parts of the built environment.




*Exterior Elevation Treatment*

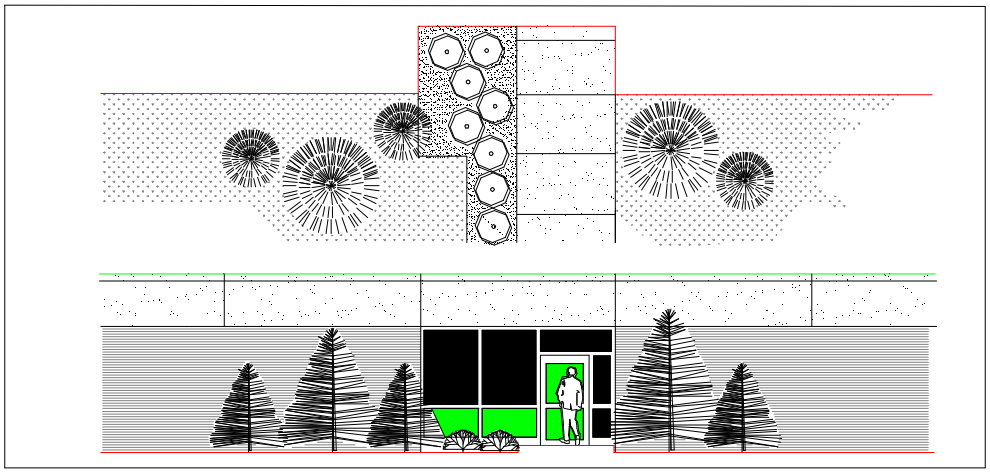
## 3.15.3.2 Landscape Development

The primary goal of landscaping on an Air Force installation is to accomplish orderly physical development through the comprehensive planning process. In this part of the CIP, present a summary of the significant findings from your installation's *Landscape Development Plan*.

**Well Planned Landscaping Can Conserve Resources and Save Money**

You should also note that the success of landscape development on the installation can only be accomplished through careful, objective landscape planning, design, installation, and maintenance. Landscaping should be incorporated in facility planning not only to make for a more attractive environment, but also to conserve resources and save money. For example, in many situations, well planned and effective landscaping can reduce the demand for water.

If a *Landscape Development Plan* has not been accomplished on your installation, you should point out the need for one in this section.

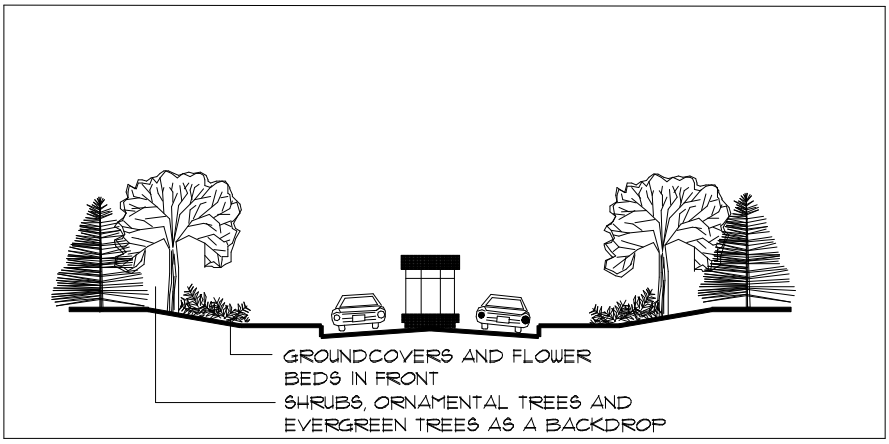


*Landscape Development Plan*

### 3.15.3.2.1 Existing Conditions

In this section, provide a brief description of the overall character of the landscaping on your installation As with the section on Architectural Compatibility, include an assessment of existing conditions.

Highlight areas of particular concern. One example may be your main gate. Since this gives a new visitor a first impression of the installation, particular effort should go into ensuring it is a positive one.




*Main Gate Landscaping Plan*

### 3.15.3.2.2 Concepts and Future Directions

Here you will present a summary of the landscaping concepts and guidelines established in the *Landscape Development Plan.* Briefly describe the most significant aspects of the plan and what actions are on-going or planned to enhance the installation's landscaping and eliminate or minimize the identified liabilities.

Be sure to point out efforts to comply with the President's April 1994 Memo that called for conserving water and reducing the use of fertilizers and pesticides on federal installations through the use of environmentally and economically beneficial landscaping practices.

**President's Memo On Landscaping**

<u>*Sources of Data*</u>

- *Comprehensive Plan*
- *Landscape Development Plan*
- BCE grounds maintenance personnel
- Local and regional nurseries

<u>*Helpful Hints*</u>

- Review installation *Landscape Development Plan.*
- Tour the installation to identify existing landscaping schemes and areas where new or additional landscaping is required.
- Tour the off-base region to identify workable solutions for landscape design problems.

<u>Suggested Graphics/Photos</u>

- Photographs and graphics to portray existing assets and liabilities and proposed solutions
- Map L, *Landscape Development*, to produce a graphic delineating the extent and intensity of the existing adequately landscaped areas and areas where additional landscaping is required

- "Before and after" photographs or renderings of existing landscaping to illustrate important requirements contained in the landscape design guidelines

*References*

a. Presidential Memo. 1994. *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds.* Directs that federal installations implement landscaping practices that conserve water and reduce the use of fertilizers and pesticides.

b. U.S. Air Force. AFCEE/DGP. 1995. *Landscape Design Guide.* Provides guidance for Air Force Civil Engineering personnel responsible for landscape planning and design and for consulting firms that prepare *Landscape Development Plans.* It describes the products needed to make long-term landscape development decisions.

c. U.S. Air Force. HQ USAF/LEEVX. 1983. *Landscape Planning and Design Bulletin.* This bulletin serves as an installation guide to landscape design and provides a methodology for developing a *Base Landscape Development Plan.*

d. U.S. Air Force. AFCESA/EN. 1981. *AFM 88-43, Installation Design.* Discusses and illustrates an analytical process similar to the one described for architectural compatibility elsewhere in this document.

### 3.15.3.3 Area Development Plans

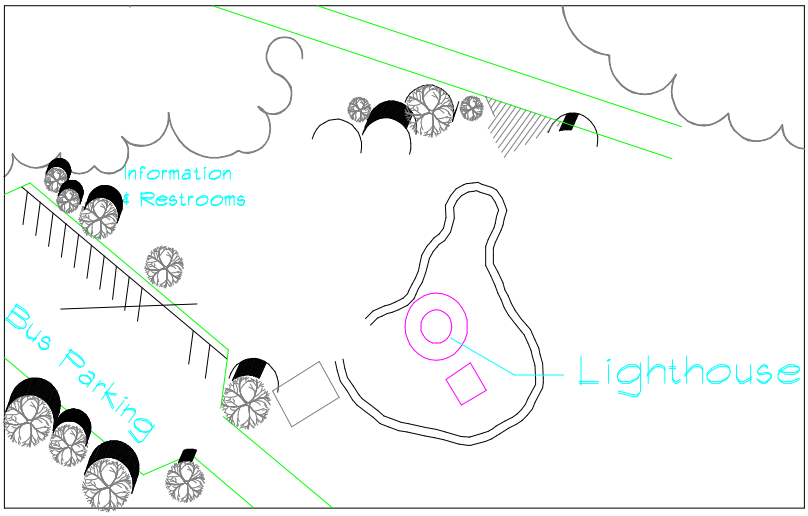
As part of the Urban Design process, you can use *Area Development Plans* (ADPs) to depict the portions of an installation proposed for redevelopment. ADPs are conceptual, pre-design plans that address facility planning issues at the small-area or sub-area level. Their scope is between the installation-wide (comprehensive) and site planning (individual building) scales. An ADP can present solutions to small area-specific problems in greater detail than considered in the installation *Comprehensive Plan* and its component planning documents. It also includes a strategy that contains implementation and phasing schedules.

**"Be concise and to the point--heavy on graphics and light on text."**

Be concise and to the point--heavy on graphics and light on text. A few hard-hitting paragraphs should be sufficient. Use graphics as the main means of communicating the design intent and planning principles suitable to the area. As a minimum, you are required to address land use, functional relationships, and transportation planning in the project area. Summarize or expand, as you determine appropriate, the salient aspects of other portions of the *General Plan* (or existing *Comprehensive Plan* component plans). Cross-reference source material, and use appendices at the rear of the *General Plan*. The idea is to keep narrative sharply focused on the project area.

Discuss the following as applicable:

- Relationship of the ADP with the installation-wide *Land Use Plan*;
- Proposed facility projects;
- Recommended transportation improvements;
- Recommended infrastructure improvements to meet facility requirements;
- Architectural design guidelines and recommendations;
- Landscape architectural recommendations and guidelines; and
- Time phasing and funding sources for these projects.




*Area Development Plan*

Use graphics and sketches to illustrate the important features of the ADP, including conceptual facility layouts, architectural character, recommended solutions to circulation and parking requirements, and architectural character through use of perspectives or 3-D modeling.

### 3.15.3.3.1 Goals and Objectives

Goals target the desired end-state, that is, what the project area will be in the future. Use precisely defined objectives to measure progress against a specific goal (or goals). The Installation Commander should approve the goals and objectives before proceeding with planning activities.

### 3.15.3.3.2 Facilities

In effect, this is a mini land use and functional relationships analysis that centers on the facilities that presently or in the future may comprise the ADP planning area. Here you should:

- Describe neighboring land use areas if they will significantly impact development within the ADP planning area.
- Briefly describe analyses of existing facilities, functional relationships, issues, and constraints and opportunities.
- Discuss proposed future facility development that will achieve the ADP goals and objectives.

### 3.15.3.3.3 Infrastructure

Summarize utility and transportation systems that are needed to support the proposed development. Highlight existing conditions, constraints, and recommended infrastructure improvements. Treat these in more detail here than in other parts of the *General Plan*

### 3.15.3.3.4 Architecture/Landscape

Apply the guidelines established in the installation's *Architectural Compatibility Guidelines* and *Landscape Development Plans* to the development area.

*Sources of Data*

- *Installation Strategic Plan*
- *Comprehensive Plan*
- Interviews with key personnel
- CE Engineering Flight
- Facility Excellence plans
- Architectural Compatibility Guidelines

*Helpful Hints*

Three dimensional computer generated renderings are very useful in presenting a conceptual view of a proposed development area.

*Suggested Graphics/Photos*

- Include site maps and sketches of existing architectural character and special landscape features and proposed improvements.
- Photographs of the site and existing facilities will enhance visual interest and comprehension.

*References*

a. U.S. Air Force. HQ USAF/Office of the Civil Engineer. 1991. *Air Force Installation Comprehensive Planning Area Development Planning Bulletin*. Provides guidance for preparing an *Area Development Plan* (ADP).

b. U.S. Air Force. HQ USAF/LEEVX. 1986. *Land Use Planning Bulletin*. Explains the concept of land use planning and describes a process for developing the Land Use component of the installation *Comprehensive Plan*.

c. U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Long Range Facilities Development Planning Bulletin*. Provides guidance for the preparation of the *Long Range Facilities Development Plan* element of the installation *Comprehensive Plan*.

### 3.15.3.4 Housing Community Plans

Because of the presence of accompanied housing areas on many Air Force installations,*Housing Community Plans* (HCPs) must be integrated into the overall urban design of the installation.

An HCP is the installation's long range Family Housing planning document. It contains the planning, programming, design strategy, and justification for Family Housing and whole neighborhood improvement and construction. Air Force installations, except those where there are fewer than 100 units, are required to have a HCP. TheHCPs are updated at least every three years, and sometimes more frequently depending on mission requirements. The HCP is divided into six sections:

- *Housing Requirements Analysis:*Validates demand for Family Housing.
- *Community Improvements:* Contains master plans for each Family Housing neighborhood with designs for circulation, streetscape, infrastructure, and recreational areas.
- *Unit Improvements:* Addresses each type of housing unit, by neighborhood, with designs for floor plans, building exteriors, yards, patios, and building systems (HVAC, plumbing, electrical, etc.).
- *Phasing Plan and Cost Estimate:* Summarizes Family Housing community and unit improvements and provides cost estimates for the improvements by neighborhood and phase. Each phase becomes the basis for programming documentation submitted through the major command (MAJCOM) to HQ USAF for inclusion in the Air Force Family Housing budget submission to DOD and Congress.
- *Existing Conditions:* Provides assessment of existing housing facilities, identifies shortfalls, and describes improvements in progress.
- *Planning for the Future:* Contains the HCPmulti-year phasing plan and cost estimate.

When summarizing the HCP in the*General Plan,*limit your narrative to a few hard-hitting paragraphs, using graphics and photographs to communicate. It's not necessary to repeat the HCP verbatim -- cross-reference to the current plan where appropriate. Highlight key issues.

*Sources of Data*
Your primary source is the Base Housing Office. A copy of the current HCP should be on file, along with related documentation. Other activities within the Civil Engineering Squadron, such as the engineering and installation development functions, will have useful information as well.

*Helpful Hint*
Include HCP programmed projects in the*Facilities Development Plan.*

*Suggested Graphics/Photos*

- Photographs to illustrate major HCP elements. Show the good and the bad. As a minimum, you should have one photo for each Family Housing sub-area.
- A graphic that depicts locations of Family Housing and proposed future development.
- Tables to present and compare tabular information such as the number of Family Housing units existing, vs. required-by category and time-phased project lists.

*References*

U.S. Air Force. HQ USAF/CE. 1995. *Air Force Family Housing Guide (DRAFT)*. Provides guidance for the preparation of *Housing Community Plans* (HCP).

## 3.15.3.5 Quality of Life

Attaining and maintaining an acceptable quality of life (QOL) on an installation is an overall goal of the *General Plan.* However, it is most directly addressed in the elements of urban design. Each element previously summarized in this section, *Architectural Compatibility*, *Landscape Development, Area Development Plans*, and *Housing Community Plans*, contributes to achieving this goal through the improvement and maintenance of the living and working environment on an installation.

The generally accepted factors that affect QOL on an installation are:

- economic well-being
- social well-being
- educational opportunities
- health care
- housing and neighborhood environment
- environmental quality
- leisure activity
- community support
- aesthetics and installation appearance

You may not have control over many of the factors that affect QOL, such as economic well-being, health care, and education. However, you can play a role in improving the environmental quality, housing and neighborhood environment, as well as the aesthetics and appearance of your installation.

In this part of the *General Plan,* you should focus on the overall QOL on the installation and provide an assessment of the existing conditions. Identify opportunities that may exist to improve QOL. Through the use of urban design elements, particularly architecture and landscaping recommend how the installation can take advantage of these opportunities.

Examples of opportunities may include additional recreational facilities or wildlife viewing if your installation encompasses suitable habitat. Another example maybe the landscaping of an employee break area adjacent to a building.

*Sources of Data*

- The Services Squadron is a particularly valuable source because its mission is QOL oriented. Consult with Services Squadron personnel to determine the range of programs, who is responsible for what, and where the facilities are. Ask for copies of any current QOL surveys (installation, Air Force, DOD).
- Interview the Installation Commander and key staff for their views on existing QOL programs, and what is needed to enhance quality of life on the installation.
- The Base Development Office in the Civil Engineering Squadron should have useful information on planned construction (MILCON and NAF) and operations and maintenance (O&M) projects that affect the quality of life.

*Helpful Hint*

Work closely with the installation Morale, Welfare, and Recreation office. In most cases, they will have data on the QOL needs of installation personnel based on surveys they have conducted.

*Suggested Graphics/Photos*

- Photographs to show facilities that contribute to or detract from QOL. Include photos of people engaged in QOL activities.
- Maps that depict the location of existing and future QOL facilities.

*References*

U.S. Air Force. HQ USAF/Directorate of Engineering and Services. 1989. *Quality of Life Planning Bulletin* Provides guidance and methodology for preparing a *Quality of Life Plan*.

# Section E. Plan Maintenance, Revision, and Implementation

## 3.16 Introduction

The currency and accuracy of the *General Plan* is essential to its usefulness and success. Decision makers on the installation as well as at higher headquarters must have confidence that the plan they are reviewing reflects actual conditions on the installation. An out-of-date plan which leads, for example, to a poor facility siting decision that results in added costs and construction delays will undermine the overall confidence in that plan.

The success you have in implementing the plan will depend largely on the support you receive from the Commander and other key installation decision makers. Probably the best method of obtaining and retaining support is keeping them involved. Continual education is important. Periodically brief them as well as the Facilities Board on the status of the plan and seek their inputs on decisions.

## 3.17 Responsibilities

The Installation Commander is responsible for ensuring the installation has a *General Plan*. It is your responsibility to maintain it and keep it current and accurate. You must stay abreast of changing conditions on and off the installation and ensure that these changes are reflected in the *General Plan*.

For activities on the installation, the Facilities Board (FB) should be your primary source of information on proposed changes. You should review each proposed change with reference to its possible impact on the existing *General Plan*. For off-installation activities, you must maintain close contact with local planning agencies. Authorization to change proposed facility sitings may require higher headquarter approval depending on the level of authority that has been delegated to the Installation Commander.

## 3.18 Procedures

Review procedures should be established by your major command and/or installation. At a minimum, you should review the plan in conjunction with each meeting of the FB. A complete review of the plan should be accomplished annually and it should be updated as necessary. The extent of updates annually may range from page changes to a complete re-accomplishment of the document. A total update of the plan will require approval of the FB. You must forward all changes to your major command point of contact as well as to others who have copies of the *General Plan*.