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NO. 86-4A

DEPARTMENT OF THE AIR FORCE
WASHINGTON, 24 SEPTEMBER 1951

INSTALLATION PLANNING AND DEVELOPMENT

Master Planning

AFR 86-4, 23 March 1951, is changed as follows:

* * *
4. **Criteria.** The master plan must be predicated on certain criteria by which realistic and correct judgment can be formed. Criteria to be used are as follows:
* * *

e. Ammunition storage as indicated in "Quantity-Distance Standards for Mass Detonating Military Explosives and Ammunition." (This publication may be obtained from Director of Installations, DCS/M, Headquarters, USAF, Washington 25, D. C.)
* * *

BY ORDER OF THE SECRETARY OF THE AIR FORCE:

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INSTALLATION PLANNING AND DEVELOPMENT

Master Planning

Paragraph

SECTION I. GENERAL.

Purpose	1
Scope	2
Definitions	3
Criteria	4
Status	5
Procedure	6
Selection of Areas	7
Revision of Plans	8

SECTION II. MASTER PLAN.

Component Parts	9
Basic Information Folder	10
Preliminary Master Plan	11
General Master Plan	12

SECTION III. PLANNING PROCEDURES AND PRINCIPLES.

Planning Principles	13
Regional Plan	14
Planning Technique	15
General Arrangement of Functional Areas	16
Planning the Airfield	17
The All-Over Field	18
Layout of Building and Utility Areas	19
Safety Provisions	20
Land Area Requirements	21
Fire Protection	22

SECTION IV. PREPARATION OF THE MASTER PLAN.

Basic Information Folder	23
Analysis of Existing Facilities	24
Preliminary Master Plan	25
General Master Plan	26

SECTION I—GENERAL

1. Purpose. This Regulation correlates existing instructions and implements AFR 85-10 by specifying procedures to be followed when preparing master plans for installation planning and development.

2. Scope. This Regulation is applicable to all Air Force installations in the Zone of Interior and overseas designated to be master planned.

3. Definitions:

a. *Master Plan.* The master plan of an installation is defined as a document which presents in graphic, narrative, and tabular form the present composition of an installation and its orderly and comprehensive development to perform its ultimate mission in the most efficient and economical manner. The purpose of a master plan is to insure that future development is sound, that existing facilities are adapted to the most efficient use, and that additional permanent facilities are provided in the order of priority

dictated by the needs of the installation and applicable Air Force policy. As such, a master plan must be developed progressively, remain flexible and be revised periodically to meet changing conditions. It is not a construction plan and nothing is constructed directly from it.

b. *Other Terms.* Terms commonly used in reference to:

- (1) Airfield zoning, see AFR 86-3.
- (2) Aircraft movement and approach areas, see AFRs 86-5 and 85-1.

4. Criteria. The master plan must be predicated on certain criteria by which realistic and correct judgment can be formed. Criteria to be used are as follows:

- a. Lateral airfield clearance as prescribed in AFR 86-1.
- b. Zoning and airspace surrounding an installation as prescribed in AFR 86-3.
- c. Aircraft approach and ground run areas as prescribed in AFR 86-5.

d. Fire protection as indicated in paragraph 29 below.

~~e. Ammunition storage as indicated in "Quantity Distance Standards for Mass Detonating Military Explosives and Ammunition."~~
(This may be obtained from Armed Services Explosive Safety Board, Washington, D. C.)

f. Wind coverage as indicated in paragraph 17.

5. Status. The master plan of an installation, upon approval by Headquarters USAF, will serve as a guide to the orderly development of the installation without deviation, alteration, or modification. Exceptions may be made by submission of requests through channels to Headquarters USAF, when as a result of directives from higher authority, altered mission, revised strength, or other changed conditions, the approved plan is considered inadequate or in need of modification. Upon approval by Headquarters USAF, the revised or modified plans for future development are reconstituted as the official master plan for the installation.

6. Procedure. In addition to the procedures established in correlated directives the following procedures are applicable to master planning.

a. Primary consideration will be given to the active Air Force installations that directives from Headquarters USAF indicate will unquestionably be retained for use of the Air Force in the continental United States and in overseas areas to bases which are sovereign possessions of the United States or on which the United States has long term right of use.

b. The installation will be master planned to insure its orderly and comprehensive development to perform its ultimate mission. The master plan must provide for complete flexibility of use of the installation including adequate provisions essential to provide adaptability to the continuing technological advances in aircraft design.

c. Accommodations for airmen will be kept at the same stage of development as accommodations for families.

d. Family quarters for noncommissioned officers and company grade officers will be provided before family quarters for field and higher grade officers.

e. In developing the master plan, facilities to meet the requirements of the current mobilization plans will be provided in the form of a mobilization overlay of the master plan.

f. All construction contemplated, whether to be performed with appropriated or nonappropriated funds, will be taken into consideration by the installation planning boards and will be shown on plans for future development.

printed funds, will be taken into consideration by the installation planning boards and will be shown on plans for future development.

7. Selection of Areas. To insure maximum economy in providing facilities to enable an installation to perform its ultimate mission, master plans will be studied carefully in the selection of sites and areas to assure that:

a. Maximum use is made of existing utilities to include roads, railroad spurs, sewers, water, and power systems.

b. Maximum advantage is gained by the use of existing structures and airfield pavements.

8. Revision of Plans. Subsequent to approval by Headquarters USAF, the master plan of an installation will not be revised unless the necessity for revision is within the purview of the provisions contained in paragraph 6. However, to keep the basic information folder current, revision sheets will be submitted annually in accordance with the provisions contained in paragraph 10.

SECTION II—MASTER PLAN

9. Component Parts. The component parts of a master plan are:

- The basic information folder.
- The preliminary master plan.
- The general master plan.

10. Basic Information Folder. The basic information folder will contain an accurate and complete record of the existing facilities at the installation. It will be accompanied by a written review, analysis, and plan of all existing facilities and physical features of the installation regarding their suitability for continued use, alternative use, or disposal. For proposed new installations, the analysis will comprise a review of the available terrain and the recommended location of the various functions and activities of the installation. Revision sheets, which show the current existing facilities as of 1 January, will be submitted annually through channels with sufficient copies to provide one copy of each revised sheet to Headquarters USAF not later than 1 March.

11. Preliminary Master Plan. A preliminary master plan will be prepared prior to the inception and preparation of the complete plans for future development and will include:

- Zoning and approximate allocation of areas to the various functions and activities.
- Circulation between these areas.

e. Capabilities of expansion of the installation.

Normally the preliminary master plan will *not* show the detailed location of structures. However, important special buildings, the locations of which are important in motivating the size and shape of the area or in determining their location and relationship with other areas may be shown.

12. General Master Plan. The general master plan is a further development of the approved preliminary master plan and presents the complete, orderly, and comprehensive development of an installation. It provides such detail as road systems, outlines for important structures and groups of structures, pavement areas, foliage outlines, and other pertinent information. The general master plan will include a supplement in the form of a written analysis of the proposed development of the installation and a program of the phasing and estimated cost for each phase of future construction.

SECTION III—PLANNING PROCEDURES AND PRINCIPLES

13. Planning Principles. The preparation of any comprehensive plan for future development must follow the process of analysis of existing conditions and future requirements and their organization into a unified whole.

a. Sound Planning. The preliminary site layout of a new installation, or the general site plan of a master plan of an existing installation, must be based primarily upon the principles of sound land planning. These embrace the allotment, arrangement, and efficient correlation of both land areas and structures to serve the mission of the installation. Such planning demands complete knowledge of the function of the installation, broad vision, thorough knowledge of terrain and its adaptability and use, and the proper functional adjustment of structures and groups of structures to the land and to each other. Complete knowledge of the function or mission of an installation before planning is begun is desirable, however, in many cases this will be impossible. Frequent changes in size, operating characteristics, and function of the airplane make it mandatory that in addition to fulfilling immediate program requirements for area to be allotted to troop housing, family housing, training facilities, and other functions, the installation must be planned with the goal of maximum flexibility of use and future expansion. The difficulty of inadequate plans and lack of allowance for future needs can best be circumvented

in the preliminary stages of planning. At this stage the controls for the future are set by establishing:

- (1) The uses to which different land areas may best be utilized to produce a thoroughly coordinated, economical, and efficiently operative installation.
- (2) The alternative land uses which change of mission or other eventualities may dictate, which would still produce the same results.

b. Relationship of Layout to Topography and Physical Characteristics of Site. The optimum layout is often required to be modified because of operational requirements, sound engineering, and economic considerations. Among these considerations may be listed the topography of the site, poor soil conditions, topography of the approach zones and flight zones in the vicinity of the field, structures or other flight hazards in approach zones, existing highways, railroads, or other costly improvements in the area and similar factors. Quite often the wind rose is such that the orientation of the runways may be changed materially without serious effect. Under such circumstances, modification of the optimum lay out to fit the topography can result in large savings in grading and drainage costs.

14. Regional Plan. A military installation is physically, socially, and to a degree, administratively an integral part of the region in which it is located and upon which it depends for many necessary services and facilities. The planning board, therefore, must confer with Federal, State, county, and local planning authorities on all matters of mutual regional interest, such as traffic, transportation, supply routes between the installation and nearby cities and towns, railroad centers and airports, and recreation facilities (Federal, State, county, and municipal parks and forests, and county, municipal or other local amusement centers). The board will record their recommendations for improvements of regional facilities, such as new or improved means of access, new or improved recreation or amusement projects, and so forth, upon a regional map, and in an accompanying report will indicate their recommendation for improvements by local, State, or Federal means. The purpose of the regional plan is to record the advantages which may accrue to the neighboring communities and the region as a result of the improvement work undertaken by the Federal Government and to the Air Force installation as a result of improvement work undertaken by local, State or other means, and to assure that such improvements increase the safety, health, and morale of both military personnel and civilian population in the vicinity.

15. Planning Technique. The development of a "plan for future development" may be divided into four stages:

a. *Stage 1.* Rough studies are made on tracing paper over a print of the topographic survey to produce a desirable relationship of elements of the installation plan. (See attachment 1.) These elements are shown by simple curvilinear outlines, representing areas of different land usage. At this stage the areas are not necessarily in proper relative size, for this stage of study aims only to produce efficient relationships of areas one to another and to the topography. The layout produced, if dictated by the topography to the optimum extent, will not only meet the requirements of housing, training, administration, operation, and service, in a functional and economical manner, but also will produce more attractive living conditions than if topography were disregarded in favor of some arbitrary pattern of development, such as a gridiron layout or other stiffly rectilinear design. At this stage, it is opportune to assure the basic planning requirements, for example, that access from the airmen housing areas to training areas is adequate and that traffic between airmen housing areas and nearby cities and towns is bypassed around the family housing areas. Essentially the same principles, relationships of elements, and study procedures apply in the conversion of existing temporary cantonments to permanent installations. In such instances, the study is influenced to a marked degree by the advisability and economy of saving former or existing roads and utilities so far as practical resulting in more rectangular and definitive outlines because of the existing road and block layout.

b. *Stage 2.* The second step in the evolution of the installation plan develops the size and shape of the curvilinear outlines. (See attachment 2.) Certain criteria for allocation of space such as: airmen housing, 100 men per acre; airmen recreational areas, 12 acres per 1,000-man complement; officer family housing, 4 to 5 families per acre; noncommissioned officer family housing, 6 to 7 families per acre, are applied to the original outlines. Through the use of these space allocation criteria applied to land use areas, the curvilinear outlines of stage 1 become more definitive in stage 2.

c. *Stage 3.* The third stage transmutes the irregular curving area outlines of stage 2 into the various types of housing "blocks" and other use areas and defines the street circulation between them. (See attachment 3.) The organizational area relationship remain as in the preceding studies to a large extent, but the sizes and shapes of the outlines take a more realistic form.

d. *Stage 4.* The final stage (attachment 4) refines the road alignments; locates and defines outlines for important structures and groups of structures such as the commercial area, warehouse area, administrative area, and so forth; and gives foliage outlines to define open areas for recreation, privacy, or protection.

16. General Arrangement of Functional Areas:

a. *Area Planning.* Efficiency and safety of operations as well as economy of construction are the prime considerations in planning an installation. The landing field, and technical, housing, utility and other functional areas, should be arranged to attain a maximum degree of convenience and operational effectiveness. Consideration should also be given in the planning of Air Force installations to the possibility of future changes in the use of the facilities. The allowance for expansion will depend upon such considerations as type of installation, location, topographic limitations, economics, etc. In planning the areas for the different activities, the individual areas should be located and planned to provide for expansion of facilities without encroaching on areas required for the expansion of other facilities. Particular attention should be given to such items as runways, aprons, aircraft service and maintenance areas, aircraft ordinance facilities, and air cargo facilities to provide for future expansion to accord with the trend toward larger aircraft, carrying heavier cargoes greater distances.

b. *Modifications to Minimize Construction Costs.* It may be necessary to modify an ideal layout to eliminate an excessive amount of grading, highway or railroad relocation, or other costly construction. Construction costs can be kept to a minimum by care and foresight in selection of the site and in locating the individual facilities to fit the natural topography with the least amount of grading. It is often necessary to deviate from the ideal alignment and arrangement of runways, taxiways, and aprons to hold the grading quantities within reasonable limits. Good judgment must be exercised in balancing the economic factors against operational efficiency in determining the final layout.

17. Planning the Airfield. The airfield proper consists principally of an all-over landing area or a system of runways, or both; parking areas for the servicing, maintenance, and storage of aircraft; and taxiways connecting apron and runways or landing areas. Closely related to the airfield proper are certain appurtenant facilities such as airfield lighting and landing aids. Intended use, the economics of the site, soil conditions, grading, drainage, approaches, etc.,

as well as meteorological considerations, determine whether the airfield is to be an all-over field, a runway field, or a combination of both.

a. *Runway Systems:*

- (1) *Layout of Runways.* The total number of runways at a particular site will be determined by the operational characteristics of aircraft to use the field, the type or types of operations contemplated, the anticipated volume of traffic, and the velocity and direction of surface winds prevailing at the site.
- (2) *Wind Analysis.* The number of runway directions required from a wind standpoint is based on the maximum cross wind in which aircraft may be safely operated which has been established as 13 mph. This is measured by the beam wind component (BWC), which is that component of any wind which acts perpendicular to the runway axis. For all purpose use, the runway system must have a total minimum wind coverage of approximately 95 percent. Within the selected runway arrangement for all purpose use, the runway or runways should provide, minimum wind coverage of approximately 90 percent for medium bomber; minimum wind coverage of approximately 75 percent for heavy bomber.

b. *Taxiways.* Taxiways will be provided for the movement of aircraft between parking areas and the various runways. Taxiways should be located to provide access to the apron area from both the take-off and the landing end of runways without crossing the active runway or using it for taxiing. Generally the use of temporarily or permanently inactive runways for taxiing is acceptable and may often result in worthwhile savings in taxiway construction costs. Cut-off taxiways should be provided at intermediate points, determined by the type of operations and the layout of the airfield to facilitate the clearing of runways as rapidly as possible.

c. *Shoulders and Graded Areas.* Shoulders, turfed or otherwise treated, will be provided immediately adjacent to and parallel to runway and taxiway pavements (AFR 86-5). Graded areas are strips, usually earth and turfed, provided adjacent to runway and taxiway shoulders for additional safety.

d. *Aprons and Hardstands.* Paved areas are required for parking aircraft while they are being serviced, inspected, repaired, or stored.

These areas may be classified as operational, maintenance, or storage aprons. Operational aprons are those on which the aircraft in operation are parked, usually under their own power. Maintenance aprons are used to park aircraft undergoing repair or maintenance and are located adjacent to shops and other repair facilities. Storage aprons are used for parking aircraft in "dead storage," the aircraft ordinarily being moved into place by hand or towing vehicles. The operational portion of the apron should be located parallel to the runway upon which the greatest amount of traffic is anticipated to minimize taxiing and to permit the most complete observation from the control tower. Expansion should be feasible on at least one side, preferably on both sides. Taxiways should be planned to provide for future apron expansion.

e. *Warm-Up Pads.* A warm-up pad is a paved area adjacent to the take-off end of a runway used while checking engines prior to and awaiting clearance for take-off. Warm-up pads should be located so as not to interfere with aircraft using adjacent taxiways and runways.

f. *Dimensions.* Dimensions and criteria pertaining to runways, parking areas, taxiways, and other elements in the airfield proper will be as prescribed in AFR 86-5.

18. The All-Over Field. An all-over field should permit operations in all principal wind directions; however, approach zone obstructions, topography, flight patterns, and so forth, may limit the number of directions in which operations are feasible. The landing area may be a well-graded and turfed area, a mechanically or chemically stabilized area, or a paved area. A graded and turfed field is the most economical type of construction, and should be used whenever climatic and soil conditions and the nature of the aircraft traffic are such that a landing area of suitable load-bearing value and a sufficiently durable turf can be maintained. Generally aircraft parking areas adjoining the landing areas and taxiways are not required in training fields of this type.

19. Layout of Building and Utility Areas:

a. *Building Area.* The building area should be planned to minimize the distance traveled by personnel in performance of their duties. Housing areas for school troops should be located as conveniently as practicable to the school structures and technical area, and base personnel should be housed close to industrial, utility, and administrative areas. The relative location of transient aircraft service areas, base operations office, transient messing facilities, recreation buildings, exchange, and post office should be

carefully studied. Consideration will be given to the maintenance of required fire breaks and building separations in all planning.

b. *Technical Area.* The technical area contains the buildings and facilities required for the direction, control, maintenance, and repair of aircraft. It is located immediately adjacent to the apron or operations "line." This area should contain the operation building, hangars, shops, main crash and fire station, school buildings, training aids buildings, and so forth, and should be kept free of all other structures and facilities. This area will also include the buildings, shops, and so forth, of the air installation officer in those instances where base maintenance facilities are consolidated with other maintenance facilities. The functioning of the control tower is an important factor in the relative locations of technical buildings, particularly hangars. The control tower will be located so that aircraft on all runways, taxi lanes, and in the immediate vicinity of the airfield are visible under normal atmospheric conditions. The unobstructed vision will be predicated on a line of sight on a plane five feet above the control room floor. No construction which would interfere with the unobstructed vision from the control tower will be permitted.

c. *Warehouse Area.* Warehouse and storage areas should be located to minimize the amount of construction required for railroad spurs and access roads. Locations should be such that the railroad spurs and access roads will bypass built-up areas and avoid passage through runway clear and approach zones and any other aircraft safety zones. In many instances, it is advisable to locate the warehousing area adjacent to, or as an integral part of aircraft maintenance and repair shops and within the prescribed distance from main crash and fire station to avoid the need for additional fire stations.

d. *Aircraft Gasoline Storage Area.* Bulk storage areas for aircraft gasoline should be located sufficiently distant from other areas to provide for expansion in the storage facilities and to provide fire safety zones. This area should be adjacent to the railroad spur or access road over which the gasoline is supplied. Truck fill stands should be located as conveniently as practicable to parking areas for the aircraft fueling units, but should maintain prescribed fire safety clearances.

e. *Ordnance Area.* The buildings, magazines, and so forth, required for the storage of high explosives should, if possible, be located to be accessible without crossing runway approach zones. Details of the layout of ordnance areas and required minimum distance from habitable buildings and other facilities are contained in Ordnance Safety Manual, O. O. Form 7224,

which may be requested from Department of the Army, Chief of Ordnance.

f. *Headquarters and Communal Area.* The headquarters and other public facilities area should be located as close as practicable to the centers of the technical and housing areas.

g. *Housing Area.* Separate housing groups should be provided for airmen, officers, civilians, and transients. In dispersed layouts, location of the squadron housing areas close to the aircraft hardstands is essential. Part II, chapter 7, Engineering Manual for War Department Construction, March 1947, contains criteria and standards for the layout of family housing.

h. *Hospital Area.* Hospital areas should be kept as far away as practicable from sources of noise, such as aprons, shops, and motor pools. The area should be located so that the prevailing winds do not carry objectionable odors, noise, or dust into the hospital area and, if feasible, should be accessible to fire protection within specified distances without requiring additional fire stations.

20. Safety Provisions. The safety provisions applying to approach zones, clear zones, lateral clearances, and building restrictions are found in AFRs 86-1, 86-3, and 86-5. Existing conditions at Air Force installations which do not conform to these prescribed conditions will be changed only in instances specifically requested through channels and approved by Headquarters USAF.

21. Land Area Requirements. Criteria for land area requirements for master planning purposes will be found in attachment 2.

22. Fire Protection. The following considerations should be reflected in the planning effort, to assure maximum attainment of fire protection standards with minimum facilities:

a. *Fire Breaks.* Fire break clear spaces should be provided at intervals to subdivide extended areas of combustible construction and to guard effectively against the extended spread of fire through such areas. Fire break intervals and extent should be in accordance with requirements of paragraph 1-04, part XI, "Fire Prevention," Engineering Manual for War Department Construction.

b. *Separation of Buildings.* Planning layout should provide for the maintenance of required space separation between individual buildings to guard against the extended spread of fire by exposure between buildings. Normal allowances for space separation, consistent with the nature of construction and combustibility, should be in accordance with paragraph 1-03, part XI, "Fire

Prevention," Engineering Manual for War Department Construction.

c. *Special Hazard Areas.* Areas specifically designated for the storage or processing of materials of exceptional fire hazard, including liquid and gaseous fuels, explosives, ammunition, flammable solvents, hazardous chemicals, and lumber, should be located after careful consideration of topography, relationship to other areas, exposures, drainage, and so forth, to minimize the introduction of severe hazard, exposure to other facilities.

d. *Fire and Crash Stations.* Initial planning should anticipate requirements for maximum effectiveness in location of fire and crash stations to eliminate unnecessary duplication. Every effort should be made to plan a single combined fire and crash station in a strategic location to serve the entire installation, including the airfield proper and built-up areas, within prescribed distance criteria. This station should be located along the building line of the main apron, preferably in the general vicinity of the operations section of the technical area. Maximum visibility of the runway, taxiway, hardstand, warm-up, pads, and parking aprons is highly desirable, and affords unobstructed response to both the airfield and building areas. Additional fire and crash stations should be planned only in extraordinary circumstances involving irregular runway layouts or excessive distances to appreciable building areas. For planning purposes, the following distances are established as a guide to maximum fire response from fire stations:

- (1) Hangars, shops and other technical facilities and warehouses—maximum distance of one mile; may be increased to two miles if buildings are of completely fire-resistive construction, or are equipped with complete automatic sprinkler systems.
- (2) Hospitals, except incidental infirmary type facilities—maximum distance of two miles, to be reduced to one mile if buildings are of other than completely fire-resistive construction or are not equipped with complete automatic sprinkler systems.
- (3) Service, recreation, assembly and housing facilities with individual capacities exceeding 75 persons—maximum distance two miles.
- (4) Housing, including barracks and multifamily quarters with capacity less than 75 persons—maximum distance three miles.
- (5) Housing consisting of individual family dwellings—maximum distance five miles.

- (6) Individual isolated buildings—maximum distance unlimited.

e. *Accessibility.* All built-up areas should be served by access roads which will permit unobstructed emergency response of fire apparatus. Special consideration should be afforded to appreciable areas which because of topography or other natural features might be isolated because of flood, storm, high-frequency railroad traffic, or extended road or bridge repair.

SECTION IV—PREPARATION OF THE MASTER PLAN

23. Basic Information Folder. The basic information folder will contain an accurate and complete record of the existing facilities at the installation and will be kept current in accordance with instructions contained in paragraph 10. A title, graphic scale, legend and north point will be placed on each sheet, and, when sectional sheets are included, a key map will be provided. The folder will be prepared as follows:

a. *Contents.* The folder will consist of sheets of standard size paper, 15½ inches by 22 inches, which will be prepared in the form of reproducible prints and inclosed in a cover. The folder will be subdivided and the initial sheet of each division will be tabbed in alphabetical sequence attached to the right hand edge. Additional sheets of each division will be marked in numerical order.

b. *Cover.* The cover will be of thin cardboard or other similar material. It will have a hinged flap (held with adjustable prong loose-leaf fasteners) which will be turned inside when bound. The dimensions of the cover will be 16 inches by 23 inches exclusive of the hinged flap. The following information will appear on the front cover:

- (1) Basic information for master planning.
- (2) Name of Air Force base.
- (3) Location of Air Force base.

In addition to the above the front cover will contain a signature panel as follows:

Approved, Headquarters USAF.
Approved, Headquarters of Major Air Command.
Approved, President, Installation Planning Board.

c. *Index Sheet.* An index sheet indicating the contents of each division of the folder by tab identification will be placed immediately after the front cover.

d. *Tab A, Regional Base Map.* The regional base map will be presented at adequate scale so that a 50-mile radius will approximately equal the width of the sheet. The following items will be included on the map: all cities, towns, major highway systems, and access highways, military and naval installations, military and civil airfields, railroads, dock facilities public recreation facilities such as National State, or county parks and forests, major streams, and water bodies (natural and artificial), important ground forms (mountain, swamps, etc.) and all airways and radio ranges affecting aircraft operations from that station. A circle will be drawn on the map indicating the 50-mile radius from the installation.

e. *Tab B, Real Estate Map.* The real estate map will show metes and bounds (bearings and distances) of all parcels of real estate and acreage contained in each parcel owned in fee simple by the United States Government, or, if under lease, the corresponding lease number and owner. Information on the zoning ordinance as required by AFR 86-3 also will be included.

f. *Tab C, Basic Layout Plan.* The basic layout plan, at a scale of $1'' = 400'$, will show the existing construction of the installation. This plan will indicate the runways, base facilities area, and the boundaries of the airfield. The building schedule will not be shown. The true bearing of each runway will be indicated. Contours at five feet interval, of that portion of the installation which will be involved in the development of the master plan will be shown when preparing the basic layout plan, as a basis for a master plan study. If topographical data is not available, a request for funds should be made through channels to Headquarters USAF, indicating the total acreage required to be surveyed and the estimated cost.

- (1) *Detail Plan of Building Area.* A detail plan of the building area will be included as part of Tab C and will show the built-up base facilities area. This plan will be on one sheet. The use of one fold in either direction is acceptable. A scale larger than $1'' = 200'$ normally will not be necessary. Plans which have been prepared at a scale not smaller than $1'' = 400'$ will be acceptable if the building numbers, building use, and type of construction are clearly indicated. A copy of the building schedule will be placed opposite the layout plan in the folder. Appropriate delineation and color will be used to show each building type and present use, and a suitable legend will be included. Where groups of

buildings are located in widely separated areas which would require a scale of less than $1'' = 400'$ to show them satisfactorily on a standard size sheet, the use of sectional sheets, showing the several built-up areas, may be adopted.

- (2) *Key Map.* The inclusion of a key map on each sheet is desirable in such instances. If more than one sheet is used for this purpose, a building schedule will be placed opposite each sectional plan, showing the buildings on that specific sheet. The number, type of construction, plan number, size, use, estimated value, and indication as to life expectancy will be shown for each building. The type of construction of each building will be delineated as follows:

PERMANENT—(25 year life)—solid black.

MOBILIZATION—(10 year life)—diagonal hatched in black.

THEATER OF OPERATION—(5 year life)—outlined only in black.

The following colors will be used to provide uniformity in area use:

Red—hangars, maintenance shops, and supply.

Light blue—operation buildings.

Dark blue—administration and training.

Purple—community buildings.

Light brown—airmen housing.

Orange—NCO housing.

Yellow—officers' housing.

Light green—recreation facilities.

Dark green—hospital.

Gray—ordnance, ranges, and butts.

g. *Tab D, Airfield Pavement Survey.* This tab will show the layout of the airfield including runways, taxiways, aprons, hardstandings, shoulders, clearzones, etc., with all principal dimensions. The runways, taxiways, and aprons will be delineated with cross hatching or by use of colors. A tabulation will be included and placed on the opposite sheet showing pavement evaluations.

h. *Tab D-1, Meteorological Data and Airfield Traffic Survey.* This tab will include meteorological data relative to the prevailing winds and a recapitulation of traffic data for each runway direction by weight group classification of aircraft. Wind data will represent as long a period as is available.

i. *Tab E, Road and Railroad Layout Plan.* The road layout plan will show the existing sys-

tem of primary, secondary, and tertiary roads, paved and graded parking areas, and access to highway and other major use areas. This plan will be prepared at the same scale as the detail plan of building area, tab C. Railroad access and trackage will also be shown on this plan. In those instances where major roads exist in areas other than where the build-up facilities are located, a basic layout plan will be included in this tab indicating such roads, showing paved and unpaved roads by the use of color or other appropriate denotation.

j. *Tab F, Flight Hazard.* A plan and profile will be prepared along the center line of each runway extended for a distance of at least 25,000 feet and preferably 50,000 feet beyond the end of each clear zone. The profile will show a 1 on 50 glide angle beginning at the outer limit of the clear zone at the elevation of the end of the runway and rising over the approach zone for a horizontal distance of 10,000 feet. The tab will also contain a listing, by symbols, of all obstacles in the approach area (clear zone and approach zone) that violate airfield clearance standards. The listing will include a description of each obstacle, the elevation of its highest point above sea level and above the surface of the ground, and its distance from easily identified reference points. All obstacles will be included regardless of whether their removal has been previously waived. When waivers have been granted such information will be noted.

k. *Tab G, General Utilities Plan.* The general utilities plan will show:

- (1) Location and size or capacity of all lines for the various utility systems such as water, gas, aviation gasoline, oil, electric power, steam, telephone main lines, fire alarm systems, and signal communications existing on the base and immediately adjacent.
- (2) Sources of supply with approximate capacity and distances to each.
- (3) Location and capacity of sewage and water treatment plants.
- (4) Location of, or direction toward outfall for sanitary sewage effluent and approximate distance to outfall. To insure that the components of each system are clearly presented, each system will be shown on a separate sheet by use of color or other delineation. A scale of 1" = 400' will be satisfactory in most instances although a scale of 1" = 600' may be used if the various components are properly accentuated and clearly legible. Where necessary to use sectional maps, as might be the case on

dispersed or large installations, larger scale maps will be acceptable, but a key plan will be provided in each sectional map showing the relative location of that area with respect to the general installation plan.

l. *Tab G-1, Storm Drainage Plan.* Storm drainage plans at the same scale as the basic layout plan (tab C) will show the general drainage features including drainage divides, natural water courses, and major drainage ditches. Underground storm drains, location of or direction toward outfall for storm drainage effluent, and approximate distance to outfall will also be shown.

m. *Tab G-2, Airfield Lighting Plan.* This plan will show the layout of airfield and approach lighting systems and the location of the transformer vault and control panels. The types of permanent lighting systems for each runway and the location and type of the instrument landing system and/or the ground controlled approach system will be included in this plan.

n. *Tab H, General Recreation Plan.* This plan will show the location and approximate area of all facilities for organized recreation such as baseball, football, soccer, basketball, track, boxing, softball, volleyball, tennis, swimming, golf, etc. Where facilities are grouped in one location, only the total area need be noted. Normally the scale will be that used for the basic layout plan.

o. *Tab I, General Tree Cover Plan.* The basic layout plan may be used as a basis for preparation of this plan. The foliage outline of the major tree cover areas on the installation and the prevailing species of trees will be shown. An indication of the density of tree or ground cover adjacent to the landing field area, particularly in the approach zones, will be included, although information regarding the species of the trees in this instance will not be necessary.

p. *Tab J, Aerial Photographs.* Two 15½ inches by 22 inches controlled mosaics, if available, based on the following requirements, will be included in the folder:

- (1) One mosaic at sufficient scale to include the runway system and all base facilities. If a mosaic is not available, a clear detail pinpoint photograph may be used for this purpose.
- (2) One mosaic at sufficient scale to include the outer limits of the standard approach zone for each runway.
- (3) Four 15½ inches by 22 inches oblique aerial photographs will be included in this tab, with one view from each of the principal compass directions.

These oblique photographs should be taken at an angle of about 45 degrees and at an altitude which will provide full coverage of the runway system and base facilities.

- (4) If the mosaics indicated in (1) and (2) above are not available at the installation, a request for the mosaics will be submitted to Air General, Headquarters USAF, ATTENTION: Photographic Records and Services Division, Washington 25, D. C.

q. Detailed Basic Information Maps. Additional basic information maps, details, in nature, may be required at a larger scale than the general plans described in d through o above, in those cases when the smaller scale drawings do not provide an adequate representation of existing conditions. Such additional maps should be retained for use by the installation planning board and will be submitted to Headquarters USAF only when requested. Detailed plans of utilities, drainage, roads, signal communications, etc., for areas of congested development will be provided whenever they are considered necessary by the installation planning board.

r. Topographic Information. The basic Information plans will include all available topographic maps previously prepared. In addition, a reconnaissance survey will be made as the basis for general study for the master planning of new installations as a basis to determine the suitability of areas for different uses, and for preliminary master plan studies. normally the survey is prepared at a scale of 1" = 400', unless the project is of limited size in which case a scale of 1" = 200' may be used. Contour intervals of 5 feet or 10 feet may be used. For such detailed master plan studies as may be necessary, detailed topographic surveys will be required at a scale of 1" = 50' or 1" = 100' and with contour intervals of 2 feet. Master plans for existing installations are not construction plans and therefore do not require the degree or extent of topographic information required for construction plans. New topographic surveys will be confined to the minimum necessary for the preparation of the master plan. For the preliminary stages of planning and for preliminary recommendation of facilities to be disposed of and facilities to be retained, normally it will be sufficient to show only such contours as are available from original surveys for original construction of the installation. Where contours are available showing "as built" grading, they will be added as evidence of the present condition of the ground. Other topographic requirement guides are as follows:

- (1) Normally no new topographic data

will be required in areas where permanent- or mobilization-type construction is to be retained.

- (2) If the proposed plan of development as indicated on the master plan, contemplates the ultimate utilization of unoccupied land (as in a new family housing area) the preliminary recommendations of over-all areas to be allocated for certain facilities can usually be made without contours, provided that the terrain involved is relatively flat, and not swamp or marsh.
- (3) Where new construction is proposed on areas previously occupied by temporary housing (for example, where T/O housing, hutments, or tents are to be replaced by permanent housing), no new topographic data will be needed unless the areas to be so occupied have been regraded since the original survey was prepared, in which case reconnaissance topography will be required for preliminary recommendation.
- (4) On drawings to which topographic information is added, the source and adequacy of the information should be indicated by notes, such as "Contours from original reconnaissance survey, not corrected for 'as built' grading," "Contours from original survey, corrected to show construction grading."

24. Analysis of Existing Facilities. An efficient study for future development of an existing installation or the proposed development of a new installation will not be possible until the analysis of existing facilities are ready for study and use. The conclusions reached in this analysis will be far reaching in their effect upon the preliminary and general master plans. The analysis will not be submitted with the basic information folder for approval but will be retained as a guide and reference for the installation planning board. It will include:

a. Land and Water Areas. The planning board will make an analysis, on the basis of the installation boundary and land use map, describing the land and water areas of the installation in sufficient detail to permit the evaluation of the several areas for continuing permanent use, the economy or extravagance of retaining areas in their present uses, and alternate uses to which areas might be better adapted. The land use analysis should also describe those areas of which no use has ever been made, of which no

use is made at present, as well as those areas of which no use is intended and which the planning board might therefore recommend for disposal. For efficient use and ready reference, the land use analysis should be referenced by number or letter to the land use map.

b. *Buildings.* The planning board will make an analysis, on the basis of the general site plan and building use map, describing the buildings, to include the types of fire protection such as sprinkler or automatic alarm, in sufficient detail to enumerate:

- (1) The values of the several building types for continuing permanent use.
- (2) The economy or extravagance of retaining buildings in their present uses.
- (3) Alternate uses to which buildings might be better adapted.
- (4) Buildings or groups of buildings which the board would recommend for disposal or retention on a standby basis.

c. *Roads, Airfield Pavements, Utilities, Signal Communications, and Drainage Facilities.* The planning board will make an analysis, on the basis of the general roads, airfield pavements, utilities, signal communications, and drainage maps, describing:

- (1) The value of present facilities and the economy of retaining them.
- (2) The reasons for improving, modifying, or removing any part of them.

25. Preliminary Master Plan. The preliminary master plan will be a skeleton layout of the installation.

a. *Scope.* Area requirements for the peacetime development of an installation will be predicated on the number of planned personnel and aircraft necessary to accomplish the maximum peacetime mission as announced by Headquarters USAF. A transparent overlay will be provided showing the area requirements and land acquisition, if required, for the wartime mission, as announced by Headquarters USAF. The following master items will be considered in the preparation of the preliminary master plan:

- (1) *Runways.* The minimum number of runways which will adequately serve the peacetime mission, giving full consideration to the utilization of existing runways.
- (2) *Functional Relationship of Areas.* The areas allocated to the various activities of the installation will be located in functional relationship to each other, and show the actual re-

quired area necessary for the accomplishment of the mission.

- (3) *Land Acquisition and Disposition.* Analysis of total area requirement (by purchase, by lease, or easement and/or zoning) in relation to the existing property of the installation with consideration of proposed land acquisition and disposition.
- (4) *Roads.* Primary roads will be located to serve the installation efficiently giving full consideration to the utilization of existing roads.
- (5) *Railroads.* The location of railroad spurs will be in relation to the proposed maintenance and supply area and any consideration of required relocation or expansion of this facility.
- (6) *Buildings.* Utilization of existing permanent and mobilization type buildings for their normal life expectancy.

b. *Preparation.* The preliminary master plan will be classified "restricted" unless a higher classification is required. The folder will be prepared as prescribed for the basic information folder in paragraph 23, except that all titles and notations will refer to the preliminary master plan. The following tabs will be included:

(1) *Tab A. Vicinity Map:*

(a) All existing man-made or natural geographic features within a 50,000 foot or approximately 10-mile radius of the installation, particularly those which might affect the future expansion possibilities of the installation, will be shown. All information will be presented as clearly as possible by means of suitable line. The following will also be shown:

1. All towns or cities outlined and delineated by a brown color tone. Standard United States Geological Survey maps having a scale of one inch equals one mile provide an excellent base map for this purpose.
2. Topography, if available. A 100-foot contour interval will be satisfactory for this purpose.
3. Major highways and railroads.
4. A north point, graphic scale, mean elevation of runway system, title and legend.
5. Radio range normally used during instrument conditions.

(b) *Runway System.* Those existing runways to be retained in the sys-

tem proposed for peacetime development will be indicated by a heavy solid outline and shaded in black. Proposed new runways or extensions of existing runways required for the peacetime development will be indicated by a heavy solid outline and shaded in red. Proposed new runways or extensions of existing runways required for wartime development will be indicated by a heavy dash line and shaded in red. The approach zones, of the same length as stated in paragraph 23 will be drawn and shaded in a light orange color tone. An indication will be made of the several runways extended to a distance believed practical, up to 15,000 feet, and delineated by red hatching.

- (c) *Base Facilities Area.* The area required to accommodate the base facilities for the present mission will be clearly outlined and indicated.
 - (d) *Installation Area.* The area or areas within the present installation boundaries will be outlined by the standard property boundary symbol (medium line with two dashes) and shaded in green color tone. Land acquisition required to provide adequate total area for the peacetime development will be outlined by heavy line and two dashes and shaded with a diagonal hatched yellow color tone. This will include the flying field area as well as the build-up facilities area. Land acquisition required to provide adequate total area for wartime development will be outlined by a heavy line and two dashes and shaded with a diagonal hatched blue color tone. Land not required for either peacetime or wartime development and recommended for disposal will be outlined by medium line and two dashes and shaded in cross hatched brown color tone.
- (2) *Tab B, Wind Analysis Sheet.* A wind analysis will be made of each existing runway, and will be indicated on the wind computer chart (Sheet MPI-A, "Master Planning Portfolio," May 46). Each runway will be clearly identified by runway direction numerals (e.g., runway 10-28) and the tabulated data for each runway will be shown in the

appropriate columns. A similar tabulation should be made for all possible combinations of existing runways. If new runways are proposed, the same procedure will be repeated for the proposed runways. Wind coverage criteria is given in paragraph 17a. A wind analysis will be submitted for each scheme. Each runway will be accurately oriented on the wind computer based on true north. The wind data are based on true north whereas the runway direction numerals are predicated on magnetic north (AFR 91-17). The true bearings of each runway, based on its azimuth from true north, will be included in the "Runway or Combination" column. Traffic survey data indicating percentage of runway usage will also be shown for each existing runway.

- (3) *Tab B-1, Runway Profiles.* A profile will be prepared for each runway shown in the preliminary master plan. The profile will be prepared in accordance with the provisions of paragraph 23.
- (4) *Tab C, First Phase Development (Peacetime).* Tab C will present the area development necessary to support the announced peacetime mission and will be prepared at the scale of 1" = 800' or 1000'. The major elements enumerated below will be given particular consideration in this first phase development.
 - (a) *Extent of Present Reservation.* Outlined by medium line and two dashes.
 - (b) *Proposed Land Acquisition.* Outlined in compliance with (1)(d) above.
 - (c) *Land Recommended for Disposal.* Outlined in compliance with (1)(d) above.
 - (d) *Base Facilities.* The total area necessary to accommodate base facilities for the peacetime development will be clearly outlined and shaded in red.
 - (e) *Airfield Facilities.* Runways, taxiways, aprons, hardstands, and other fixed airfield ground facilities will be shown.
 - 1. *Existing (not utilized).* Outlined by light dashed line.
 - 2. *Existing (utilized).* Outlined by heavy solid line and shaded in black.

3. *Proposed*. Outlined by heavy solid line and shaded in red.
4. The instrument runway will be properly designated.

(f) *Roads*:

1. *Existing Primary Roads (not utilized)*. Outlined by light dashed line.
2. *Existing Primary Roads (utilized)*. Outlined by solid line.
3. *Proposed Primary Roads*. Outlined by heavy dashed line.

- (g) *Buildings*. All existing permanent buildings to be retained will be indicated by outline and shaded black. Existing mobilization buildings to be retained will be indicated by outline and diagonal hatched. Buildings will be identified by name or by building groups (i.e., community center, headquarters, operations, maintenance shops, NCO family housing, etc.).

- (h) *Topography*. Existing topography will be indicated if available, preferably at a contour interval of 5 feet. Large existing tree masses will be outlined.

- (5) *Tab C-1, Second Phase Development (Wartime)*. Tab C-1 will indicate the additional development necessary to support the announced wartime mission based on wartime personnel and aircraft strengths, and will be prepared at the same scale and size as tab C. Proposed items will be presented on a transparent overlay and will be bound in the folder to be used as an overlay for tab C. All items specified to be included in tab C which are required for wartime mission should appear on tab C-1.

c. *Written Analysis*. A written analysis will be submitted with the preliminary master plan. It will present a study of the major elements of the proposed plan in the following order:

(1) *General*:

- (a) Location.
- (b) Mission (any other activities).
- (c) Area requirements.
- (d) Housing (off base).
- (e) Health.
- (f) Recreation.
- (g) Any other pertinent facts.

(2) *Runway Systems*:

- (a) Wind Analysis.
- (b) Runway Analysis (including taxiways, clear zones, approach zones, etc.).

(3) *Apron areas*:

- (a) Operational.
- (b) Maintenance.
- (c) Transient and base flight.

(4) *Operational area*.

(5) *Base maintenance area (hangars and shops)*.

(6) *Warehouse and supply area*.

(7) *Administration, schools, etc.*

(8) *Troop housing area*.

(9) *NCO housing area*.

(10) *Officer housing area*.

(11) *Community area*.

(12) *Recreational areas*.

(13) *Ordnance area*.

(14) *Hospital area*.

(15) *Transportation facilities*:

(a) *Roads*.

(b) *Railroads*.

(c) *Water*.

(16) *Utility systems*.

(17) *Fire and crash station*.

(18) *Any other major factors affecting the proposed plan*.

d. *Additional Drawings, Photographs, or Aerial Mosaics* (optional). Plans or drawings other than those indicated may be prepared when submission of such drawings, photographs, or aerial mosaics will make the preliminary master plan presentation more complete. In such instances, they will be appropriately identified by successive tabs.

e. *Submission of Preliminary Master Plan*:

- (1) Prior to final development of the preliminary master plan, tabs C and C-1 in study form will be submitted through channels to Headquarters USAF for review.

- (2) The completed preliminary master plan will be approved by the installation planning board, and the major air command, and one copy forwarded to Headquarters USAF for final approval.

26. General Master Plan. The general master plan will be a further development of the approved preliminary master plan, and provide

such detail as road alignments, outlines of important structures and groups of structures, pavement areas, and other pertinent information to include the principal components of proposed utilities.

a. *Preparation of the General Master Plan.* The general master plan will be classified "restricted" unless a higher classification is required. The folder will be prepared as prescribed for the basic information folder in paragraph 23 except that all titles and notations will refer to the general master plan.

- (1) *Tab A, Vicinity Map.* This tab will include the same information and be delineated as required for tab A of the approved preliminary master plan. It may be a copy or multilith print of such tab with the required corrections or additions.
- (2) *Tab B, Wind Analysis Sheet.* This tab will be similar to tab B of the approved preliminary master plan. It may be a copy or multilith print of such tab but will include any additional wind coverage or traffic data available.
- (3) *Tab C, General Site Plan, Phase I.* This plan will present the development necessary to support the peacetime mission and will be prepared at a scale not less than 1" = 400' but preferably 1" = 300' on a sheet not to exceed 31" x 44" folded to 15½" x 22" for binding in the folder. If it is not possible to prepare the tab C on one sheet within the scale and size limitations specified above, it will be prepared on a minimum number of sheets based upon the same scale and sheet size limitations. The first sheet will indicate the airfield facilities and the second sheet will indicate the base facilities. Where it is not practicable to indicate all of the base facilities on a single sheet, additional sheets may be used. A small key map will be provided where more than one sheet is used. The following items will be indicated on tab C and delineated as specified:
 - (a) Permanent existing buildings to be retained—solid black.
 - (b) Permanent existing buildings to be eliminated—heavy outline and diagonal lines to opposite corners.
 - (c) All proposed structures—heavy outline.

- (d) Principal temporary buildings proposed for retention during interim period—lighter weight solid line and single hatching.
- (e) Runways, taxiways, parking aprons or hardstands proposed for development—heavy solid line and distinctively colored. Those presently existing will be indicated by a lighter weight solid line. Each major activity will be identified by the color tones indicated in paragraph 23f(2) except that roads will not be colored. Additional areas will be identified by other color tones. A color "key" will be included on each sheet.
- (4) *Tab C-1, General Site Plan, Phase II.* This tab will present the additional development, beyond that contained in tab C, necessary to support the wartime mission. It will be prepared at the same scale and size as tab C and be in the form of a transparent overlay.
- (5) *Tab D, Facilities Plan, Phase I.* This plan will present the facilities development necessary to support the peacetime development as prescribed in the tab C. It will be prepared at a scale not less than 1" = 400' but preferably 1" = 300' on sheets not to exceed 31" x 44" folded to 15½" x 22" for binding in the folder. The number of sheets will be kept to the minimum necessary for clarity. Existing facilities will be indicated only to the extent necessary to show clearly how proposed facilities will tie into existing systems. The following facilities will be included in this plan:
 - (a) *Water.* Locations and sizes of principal water mains, control valves, storage tanks, pumping stations, treatment, plants, etc.
 - (b) *Storm Drainage.* Locations, sizes and capacities of the principal lines of drainage (both covered and open type).
 - (c) *Gas.* Sizes and locations of principal feeder and distribution mains, operating pressures and capacities.
 - (d) *Electrical Power.* Sizes, load capacity, operating voltages, frequencies and locations of principal feeder lines and load capacities and

- location of substations and transformer vaults.
- (e) *Heating Systems.* Location and size of distribution mains, and capacity and location of central heating plants.
 - (f) *Underground Utilities.* Elevations and horizontal distances from a well defined above-ground point.
 - (g) *Visual Aids to Air Navigation.* The type of proposed lighting for each existing or proposed runway and/or taxiway.
 - (h) *Roads and Streets.* Proposed roads and streets showing relative widths between retained and proposed thoroughfares. Distances between curb, sidewalk, and nearest structure will be indicated and typical example of radii of curbs or full edge of pavement at intersections.
 - (i) *Liquid Fuel Facilities.* Proposed facilities for aircraft, motor and heating fuels and oils and lubricants facilities including the following:
 1. Bulk storage location and capacity.
 2. Operating storage and capacity.
 3. Dispensing system type and size.

NOTE: Where high speed fueling facilities are indicated, they will be shown on a separate sheet and classified "Secret."
 - (k) *Communication Facilities.* Locations, sizes, and gauges of proposed aerial and underground cables, in-

cluding information as to conduit and ultimate number of lines. Locations of proposed receiver and transmitter antenna sites will be included.

- (6) *Tab D-1, Facilities Plan, Phase II.* This plan will represent the additional development, beyond that contained in tab D, necessary to support the wartime mission. It will be prepared at the same scale and size as tab D and be in the form of a transparent overlay.
- (7) *Written Analysis.* A written analysis will be prepared as a supplement to the general master plan. It will present in narrative form an explanation of the base development as depicted in graphical form on the tabs contained in the general master plan. The analysis will include the personnel and aircraft strengths used when the requirements for phase I and phase II were determined and a suggested phasing of future construction and the estimated cost of each phase.
- (8) *Submission of General Master Plan:*
 - (a) Prior to final development of the general master plan, tabs C and C-1 in study form will be submitted to Headquarters USAF for review.
 - (b) The completed general master plan will be approved by the installation planning board and the major air command, and one copy forwarded to Headquarters USAF for final approval.

BY ORDER OF THE SECRETARY OF THE AIR FORCE:

OFFICIAL:

L. L. JUDGE
Colonel, USAF
Air Adjutant General

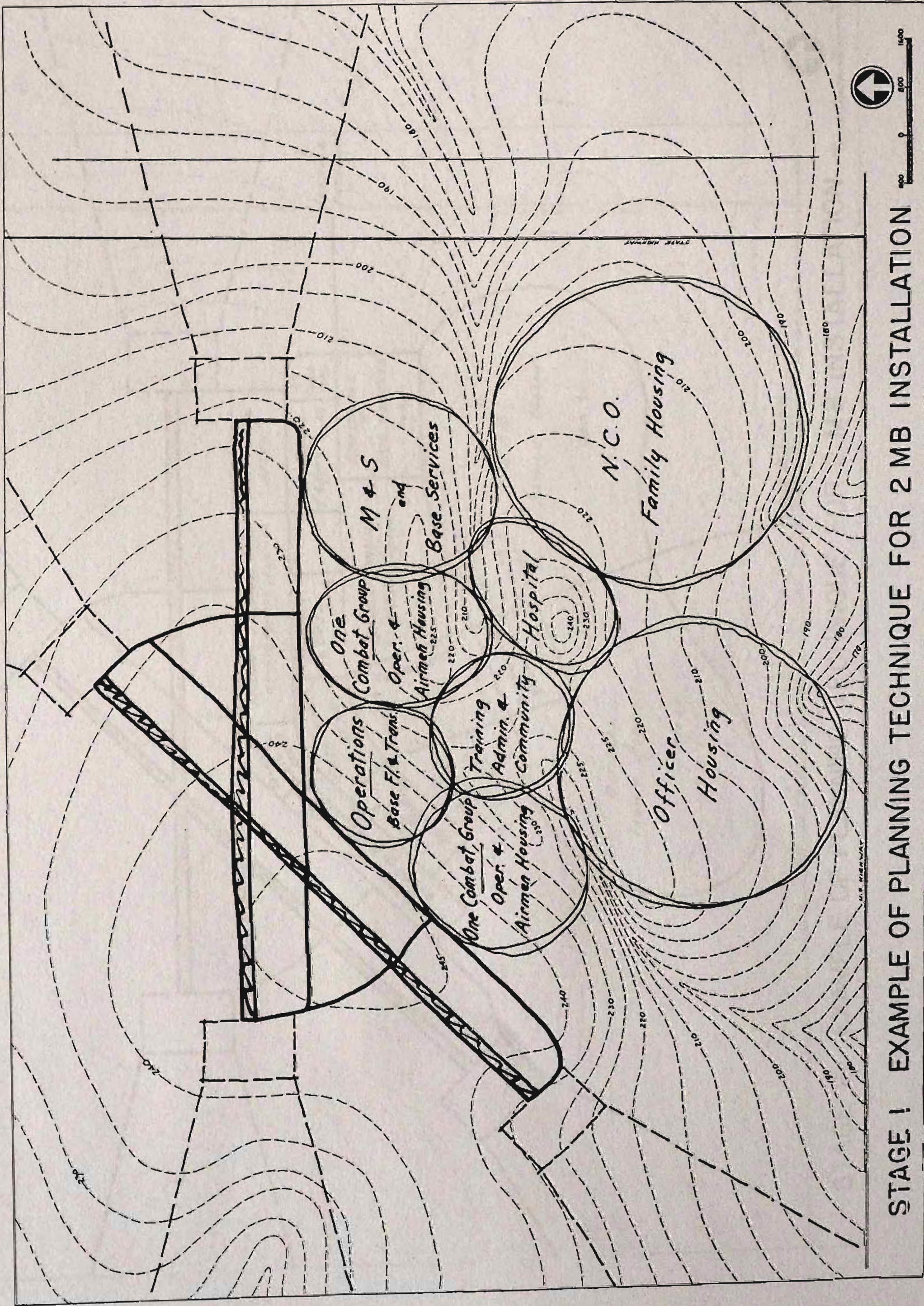
HOYT S. VANDENBERG
Chief of Staff, United States Air Force

5 Attachments

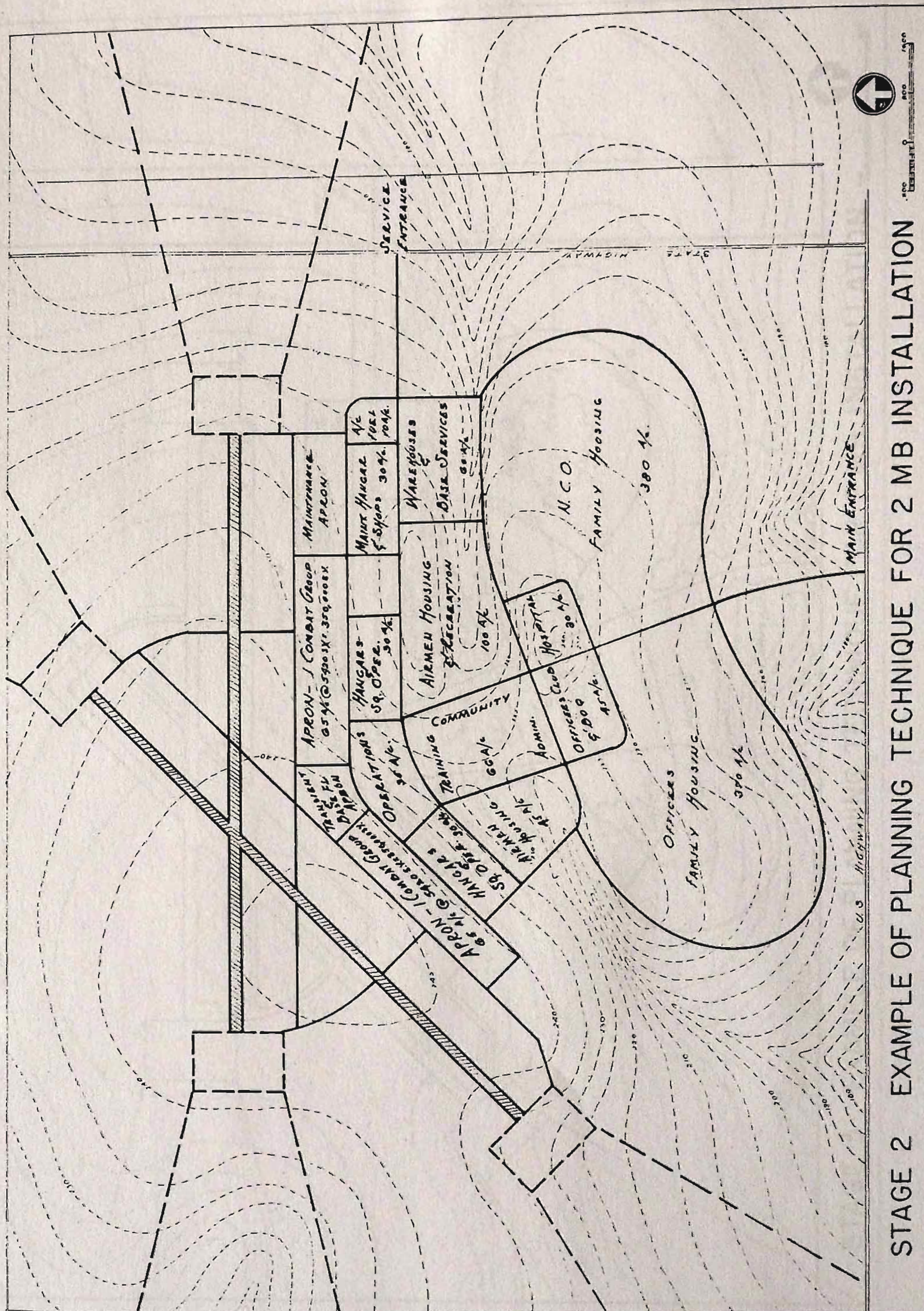
1. Stage 1
2. Stage 2
3. Stage 3
4. Stage 4
5. Land Area Requirements

DISTRIBUTION:

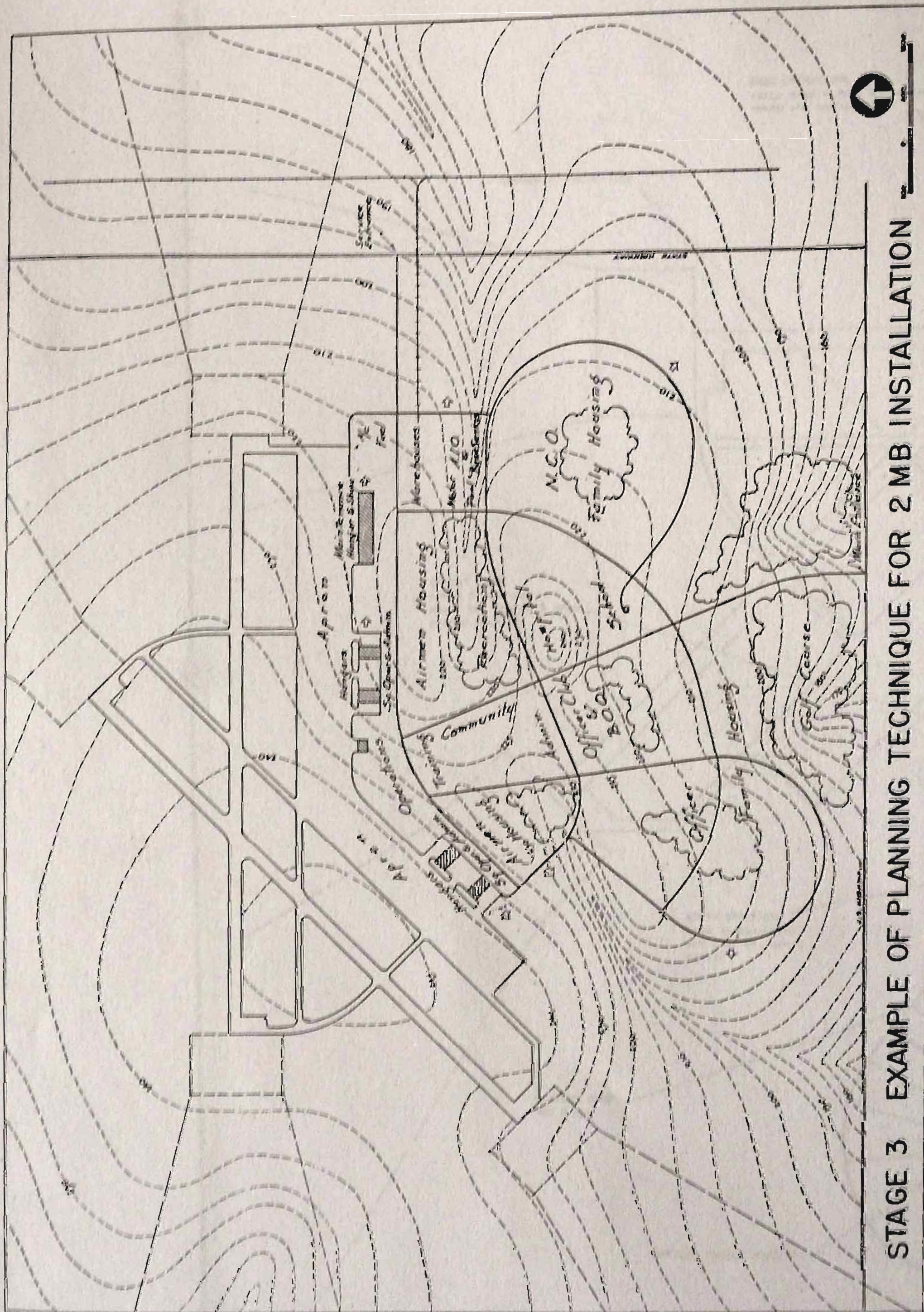
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STAGE I EXAMPLE OF PLANNING TECHNIQUE FOR 2 MB INSTALLATION



STAGE 2 EXAMPLE OF PLANNING TECHNIQUE FOR 2 MB INSTALLATION



STAGE 3 EXAMPLE OF PLANNING TECHNIQUE FOR 2 MB INSTALLATION

TRAINING

BASE OPERATIONS
INCL. BASE FLIGHT & TRANSIENT
APRON AND HANGAR

COMMUNITY FACILITIES

COMBAT GROUP
APRON & HANGARS
SQ. & GR. ADMIN. & OPER.
AIRMEN HOUSING

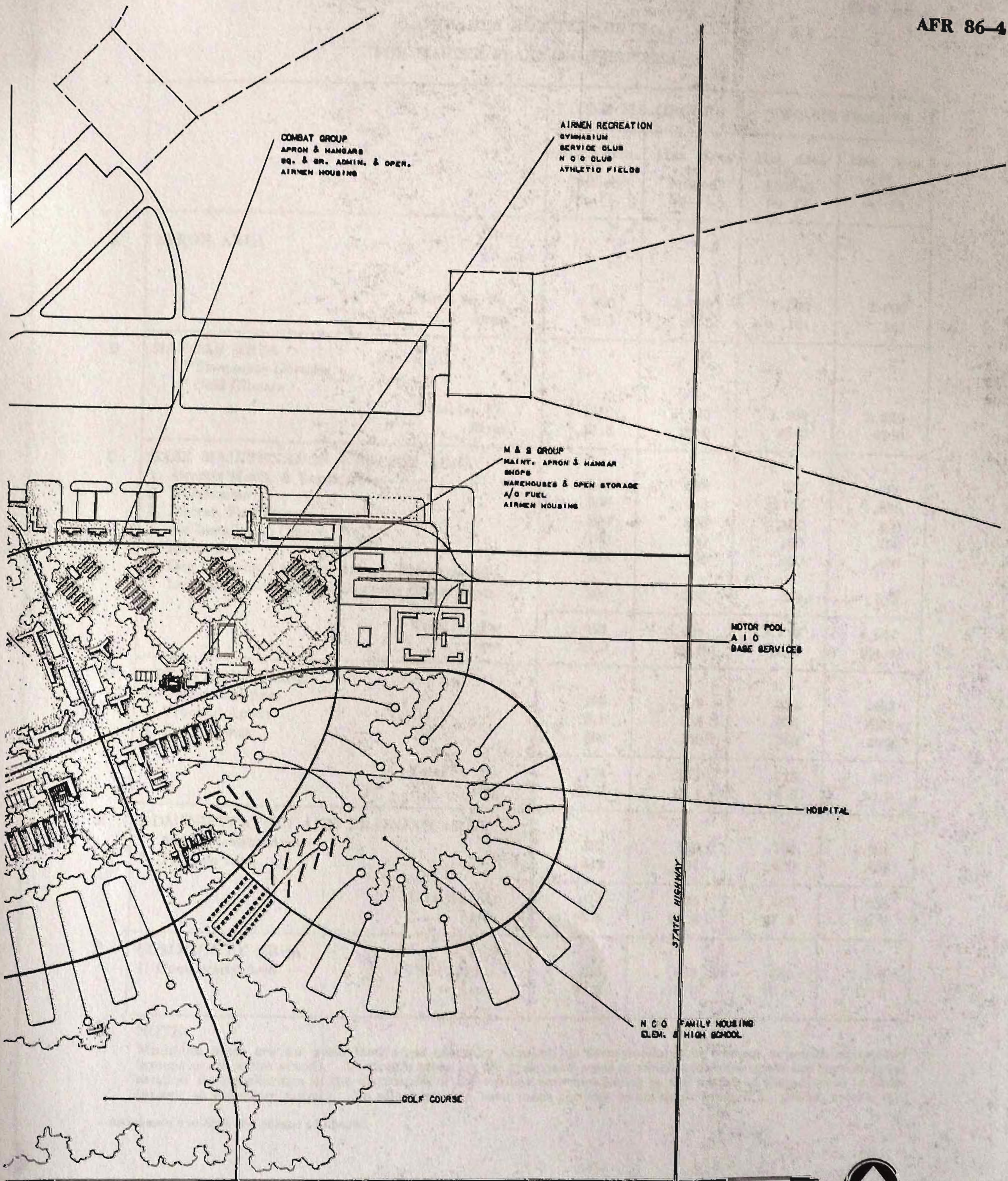
ADMINISTRATION
WING HEADQUARTERS
AIR BASE GR. ADMIN.
PARADE

OFFICER CLUB
AND B O Q

OFFICER FAMILY HOUSING

U. S. HIGHWAY

STAGE 4 EXAMPLE OF PLANNING TEC



HNIQUE FOR 2 MB INSTALLATION

**LAND AREA REQUIREMENTS
FOR MASTER PLANNING PURPOSES**

ITEM	ONE MB GROUP		TWO MB GROUPS	
	Min. Area in Million Sq. Ft.	Max. Area in Million Sq. Ft.	Min. Area in Million Sq. Ft.	Max. Area in Million Sq. Ft.
A APRON AREA				
Total Sq. Ft.	3.500	3.500	7.000	7.000
Acres	80.5	80.5	161	161
B HANGAR AREA	*	**	*	**
* Temperate Climate				
** Cold Climate				
Total Sq. Ft.	.750	1.125	1.500	2.250
Acres	17.5	26.0	35.0	52.0
C BASE MAINTENANCE & SUPPLY AREA				
1. Aircraft Maint. & Repair Shop	.518	.658	.970	1.200
2. Warehouses	.908	1.183	1.470	1.885
3. Aircraft Fuel Storage	.200	.200	.400	.400
4. Air Installation Officer	.100	.100	.150	.150
5. Motor Pool	.260	.260	.400	.400
6. Dry Cleaning, Laundry, Bakery, Refrigeration, Ice Plant, Clothing, and Equipage Repair Shop	.205	.293	.359	.512
Total Sq. Ft.	2.191	2.694	3.749	4.547
Acres	50.3	61.8	86.1	104.4
D OPERATIONAL AREA				
1. Operational Area	.196	.293	.322	.483
2. Truckfill Apron	.018	.018	.036	.036
3. Radio Range	.360	.360	.360	.360
Total Sq. Ft.	.574	.671	.718	.879
Acres	13.2	15.4	16.5	20.2
E ADMINISTRATION AND TRAINING AREA				
1. Administration Area	.432	.570	.750	1.000
2. Training Area	.242	.365	.439	.658
Total Sq. Ft.	.674	.935	1.189	1.658
Acres	15.5	21.4	27.3	38.0
F COMMUNITY AREA				
1. Community Area	.435	.653	.784	1.176
Total Sq. Ft.	.435	.653	.784	1.176
Acres	10.0	15.0	18.0	27.0

NOTE:

Minimum areas are the gross land areas normally required to accommodate the various activities adequately (except as otherwise noted). Maximum areas are the gross land areas in which additional space has been included to allow for peculiarities in the disposition of the various activities owing to the nature of the adjacent facilities (except as otherwise noted). No allowance has been made for any unbuildable land, i. e., gullies, creeks, etc.

	ITEM	ONE MB GROUP		TWO MB GROUPS	
		Min. Area in Million Sq. Ft.	Max. Area in Million Sq. Ft.	Min. Area in Million Sq. Ft.	Max. Area in Million Sq. Ft.
G	ENLISTED MEN'S AREA	*	**	*	**
	1. Barracks	1.177	1.815	2.354	3.636
	2. Service Men's Club & Branch Exchange	.129	.129	.235	.235
	3. Recreational Area & Gymnasium	1.378	1.378	2.094	2.094
	* 3-story bks. Total Sq. Ft. ** 2-story bks. Acres	2.684 62.0	3.322 76.0	4.683 108.0	5.959 137.0
H	N. C. O. AREA	*	**	*	**
	1. Housing Area	7.144	8.163	14.070	16.117
	2. N.C.O Club & Outdoor Pool	.192	.192	.343	.343
	* 4.0 Units/Acre Total Sq. Ft. ** 3.5 Units/Acre Acres	7.336 168.0	8.355 192.0	14.413 331.0	16.640 382.0
I	OFFICERS HOUSING AREA	*	**	*	**
	1. Family Housing	7.083	8.133	14.026	16.117
	2. BOQ, Off. Club & Recreational Areas	1.083	1.083	2.134	2.134
	* 3.1 Units/Acre Total Sq. Ft. ** 2.7 Units/Acre Acres	8.166 187.0	9.216 212.0	16.160 371.0	18.251 419.0
J	GOLF COURSE				
	1. Nine Holes Total Sq. Ft. Acres	2.396 55.0	2.833 65.0	2.396 55.0	2.833 65.0
	2. Eighteen Holes Total Sq. Ft. Acres	4.792 110.0	5.666 130.0	4.792 110.0	5.666 130.0
K	HOSPITAL AREA Total Sq. Ft. Acres	.523 12.0	.697 16.0	.784 18.0	1.045 24.0
L	POWER, HEAT AND WATER SUPPLY				
	1. Electric Power House & Storage	.035	.050	.063	.090
	2. Water Works	.150	.180	.225	.275
	3. Heating Plant & Fuel Storage	.706	.875	1.050	1.300
	Total Sq. Ft. Acres	.885 20.3	1.105 25.4	1.338 30.8	1.665 38.2
M	SEWAGE DISPOSAL & INCINERATION				
	1. Sewage Works	.218	.261	.392	.436
	2. Incineration	.035	.050	.063	.090
	Total Sq. Ft. Acres	.253 5.8	.311 7.1	.455 10.4	.526 12.0
N	ORDNANCE AREA Total Sq. Ft. Acres	1.786 41.0	1.786 41.0	2.614 60.6	2.614 60.0
O	RANGES AND BUTTS Total Sq. Ft. Acres	2.178 50.0	2.178 50.0	2.178 50.0	2.178 50.0
Grand Total—Square Feet		36.727	42.214	62.357	72.054
Grand Total—Acres		843.1	969.6	1433.1	1654.8

AIR MAIL (AIR FORCE)
 MAIL ROOM / ANNEX