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SITING OF APPROPRIATED FUND ENLISTED DINING FACILITIES

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<p>Dining facilities have historically been constructed in dormitory areas because of the convenience for Subsistence-in-Kind (SIK) personnel under the assumption that utilization rates would be higher if facilities were located in their immediate living area. However, time constraints due to mission changes, the proliferation of other food outlets on and near installations with more immediate access, and inconvenience experienced by potential customers due to traffic and parking have decreased utilization of dining facilities. The effects of these and other factors must be considered for future construction projects in order to provide the required level of service. Thus, there is an urgent need to identify the prime location for siting these facilities because many of the dining facilities constructed in 1950's will be replaced in the next few years.</p> <p>(Continued)</p>					
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The general purpose of this study is to design a Decision Support System (DDS) for identifying and evaluating siting locations for dining services on Air Force bases. The main characteristics of this DSS are that it is hierarchical in nature, it relies on an integrated data base for decision making at the different planning levels, and it features an interactive graphics user-interface with a corresponding mathematical optimization algorithm to assist the decision maker throughout the entire siting process.

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NRDEC^{≡1} AF⁸⁸⁻⁴ Siting of Appropriated Fund Enlisted Dining Facilities

Chapter I: INTRODUCTION

A. Purpose

Dining facilities have historically been constructed in dormitory areas because of the convenience for Subsistence-in-Kind (SIK) personnel under the assumption that utilization rates would be higher if facilities were located in their immediate living area. However, time constraints due to mission changes, the proliferation of other food outlets on and near installations with more convenient access, and inconvenience experienced by potential customers due to traffic, parking, etc. have decreased utilization of dining facilities. The effects of these and other factors must be considered for future construction projects, in order to provide the required level of service. Thus, there is an urgent need to identify the prime location for siting these facilities, since many of the dining facilities constructed in the 1950's will be programmed for MCP replacement in the next few years.

The general purpose of this study is to design a Decision Support System (DSS) for identifying and evaluating siting locations for Dining Services on Air Force Bases. The main characteristics of this DSS are that it is hierarchical in nature, relies on an integrated data base for decision making at the different planning levels, and features an interactive graphics user-interface and corresponding mathematical optimization algorithm to assist the decision maker throughout the entire siting process.

B. Assumptions

Below are some of the critical assumptions which have guided the design and development of the DSS.

- i) AFB's have specific mission categories [TAC, MAC, SAC, ATC, and USAFE] which tend to control the type and utilization characteristics of dining services. These mission categories are such that the DSS should be tuned to the mission of each major command.
- ii) The DSS should also be designed to respond to particular *qualitative* characteristics involving climate, cultural, geographic, topographic, ethnic, and life style factors which make each base unique.

^{≡1} U.S. Army Natick Research, Development, and Engineering Center

iii) Where possible *quantitative* standards common to AFB's should be incorporated into the DSS so that economic and financial considerations, travel distances, communication costs, security concerns and other measureable performance measures can assist in the location decision.

iv) The DSS will be designed to operate at the base level. The Base Engineer, Planner, Food Service Officer and Chief of Services staff would assemble the requisite data and mapping information to operate and utilize the DSS model.

C. Project Methodology

This project began with a site survey of four AFB's. These four bases represent each of four major commands (ATC, TAC, MAC, SAC) as well as a cross section of the number and type of appropriated fund food service facilities on base (Figure 1). The purpose of the site survey was to gather existing data in the form of base maps, reports and documents, forms, food services information, and squadron information. In addition, the site visits included meetings with the Chief of Services, Food Service Officer and Base Planners/Engineers, and a tour of food service facilities.

<i>Command</i>	<i>Base</i>	<i>ADH</i>	<i>FK</i>	<i>AK</i>	<i>SF</i>	<i>FS</i>	<i>CS</i>	<i>MS</i>
<i>ATC</i>	<i>Lowry</i>	5						
<i>TAC</i>	<i>Luke</i>	1				1		
<i>MAC</i>	<i>Travis</i>	3	1	1		1	1	
<i>SAC</i>	<i>Grand Forks</i>	1	1	1		1		15

ADH: Airmen's Dining Hall

FK: Flight Kitchen

AK: Alert Kitchen

SF: Satellite Facility

FS: Fire Station

CS: Carryout Service (Separate Facility)

MS: Missile Site

Figure 1: Site Survey

Specific data gathered during the site survey included:

- (1) Base maps at a scale of 1"=400' or 1"=800' (with building numbers)
- (2) Future Land Use Plan, Planning Assistance Team (PAT) Report, Air Installation Compatible Use Zone (AICUZ) Report, or other planning related reports or documents
- (3) Form AF-1785 Facilities Inventory Report/ Form AF-249 Food Service Operations Report
- (4) Location, hours of operation and daily headcount (by meal) of appropriated fund food service facilities
- (5) Location, hours of operation and total dollar sales of AAFES and non-appropriated fund food food service facilities
- (6) Strength, by squadron

Our analysis of this data focused on the relationship between the location of appropriated fund food service facilities and dormitory/work sites by squadron for Travis AFB, Grandforks AFB and Luke AFB. Lowry AFB was excluded from this analysis since we were unable to obtain the data by squadron (number (6) above) needed for this analysis. This data was not available due to the nature of ATC bases where squadrons come and go throughout the year for training.

Initially, the distance from each dormitory and work site (by squadron) to each ADH at Travis AFB, Grandforks AFB and Luke AFB were measured from base maps. Weighted distances were then computed by weighting the distance from each dormitory or work site by the number of SIK personnel travelling that distance. We assumed that the total number of SIK personnel in each squadron is uniformly distributed among dormitory/work sites for that squadron. The weighted average distance (miles) from dormitory and work sites to each ADH at Travis AFB, Grandforks AFB and Luke AFB are shown in the following table:

Table 1: Weighted Average Distance from Dormitory \iff Worksites

	<i>Weighted Average Dormitory - ADH Distance (miles)</i>	<i>Weighted Average Work - ADH Distance (miles)</i>
<i>Travis-Galazy (Bldg 247)</i>	<i>.9197</i>	<i>.8175</i>
<i>Travis-Starlifter (Bldg 1315)</i>	<i>.5363</i>	<i>1.2231</i>
<i>Travis-Ranch House (Bldg 861)</i>	<i>2.1424</i>	<i>1.4726</i>
<i>Grandforks-Red River Inn (Bldg 220)</i>	<i>.1193</i>	<i>.5629</i>
<i>Luke-Thunderbird Inn (Bldg 543)</i>	<i>.1416</i>	<i>.9835</i>

In addition, histograms illustrating the distribution of SIK personnel by distance from dormitory and work sites to each ADH were generated. For example, the following histogram illustrates the distribution of SIK personnel by distance to the Ranch House ADH (Building 861) at Travis AFB:

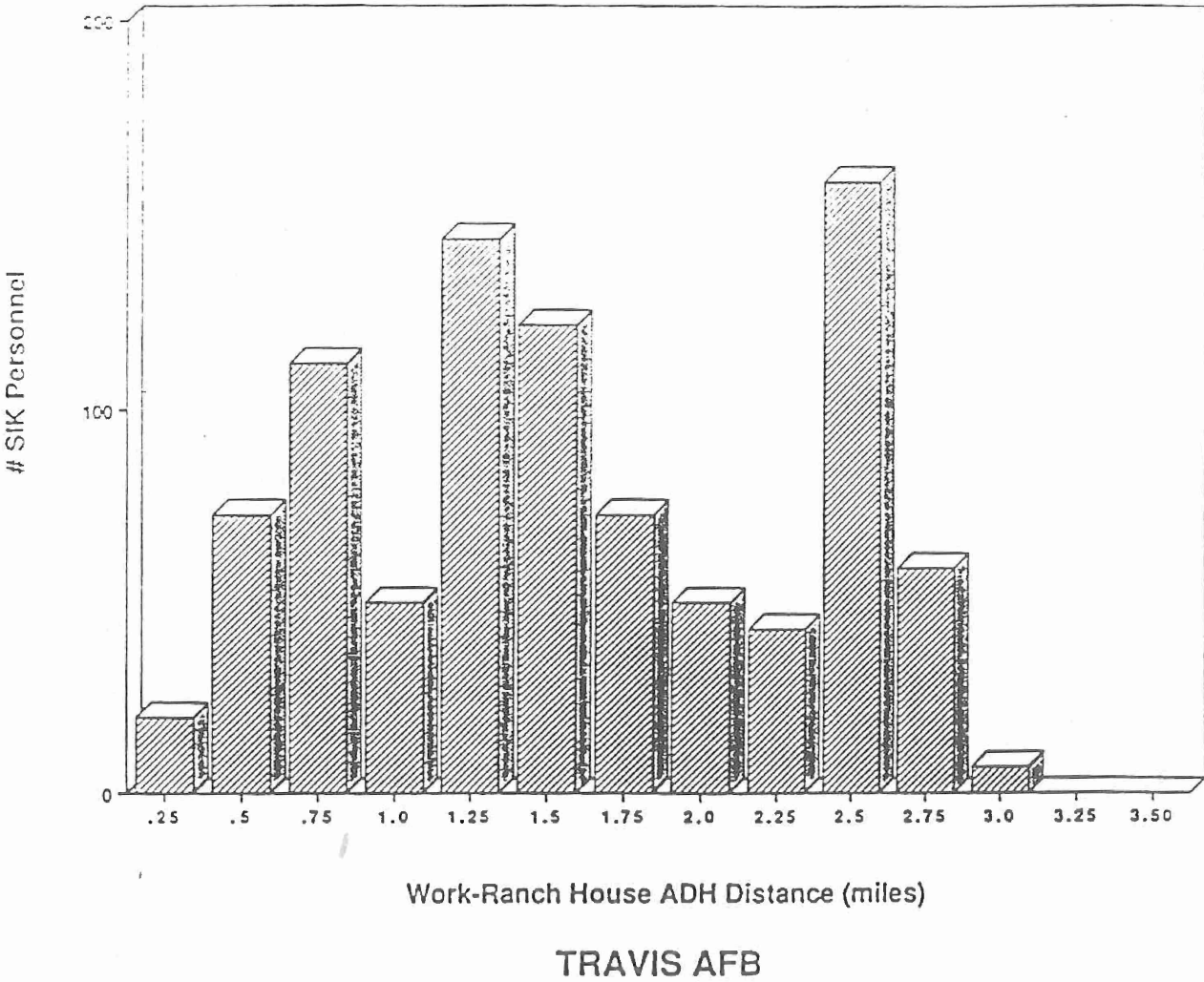


Figure 2: Histogram of SIK Personnel by Distance to Building 861 on Travis AFB

We were unable to draw any specific conclusions about the relationship between location of SIK dormitory and work sites and utilization of dining facilities by SIK personnel from existing data. This was primarily because there is minimal data that indicates where SIK personnel eat *breakfast, lunch or dinner* by squadron. Section III of the survey questionnaire was designed to capture this more detailed information.

A detailed summary of existing data and data analysis for each base in the site survey is presented in Appendix 1. Blank entries in the tables presented in Appendix 1 indicate that no information was either available or obtained from the base.

Hierarchical Planning Process

After our initial site survey visits to four AFB's, it became apparent that the fundamental siting problem is hierarchical in nature evolving from the typical length of time and funding process of acquiring new facilities or remodeling existing ones. This hierarchical planning process can be modelled as a three stage process guided by the time necessary to realize a facility siting decision:

Stage I.0: Base Comprehensive Plan (BCP) Level (1-5 year planning horizon)

Stage II.0: Area Development Plan (ADP) Level (6 months-1 year planning horizon)

Stage III.0: Site/Parcel Plan (SPP) Level (1 month-6 months planning horizon)

Stage I.0 Base Comprehensive Plan (BCP) Level

Generally speaking, the hierarchical planning process stems from an initial need at the Base Comprehensive Planning level to design or remodel a dining facility because of increased demand or deterioration in existing facilities. A number of different persons might trigger such a need. Normally this first stage results in a capital fund drive to acquire funds to build the new facility in relation to existing dining services. This capital fund drive may result in an MCP provision which requires congressional approval and takes around five years to realize. The long-term nature of this MCP planning process necessitates the siting problem as a Base-wide phenomenon.

The existence of a BCP land use plan document guides the siting and configuration of dining services at this planning stage, so it is natural that the first stage be at this level of detail. For example, at Travis AFB, they have decided to construct a new ADH to replace an existing one. Congressional approval seems imminent and so they have defined a set of 3 - 4 parcels for possible construction at the ADP planning level for the Travis facility. At this level of the planning process, one must choose which of the three or four alternative sites "maximizes utilization" for the planned facility. As an example of the siting process of the model(s) developed in this report, we will study in more detail the Travis site selection process in Chapter IV.

In Figure 3 is a typical BCP land-use plan with key land use activities indicated on the map. The initial siting and configuration of dining services should occur on a scale of (1" = 800'; 1" = 400'; 1" = 200'), whichever is appropriate for the AFB under study.

Hometown Air Force Base Future Land Use Plan

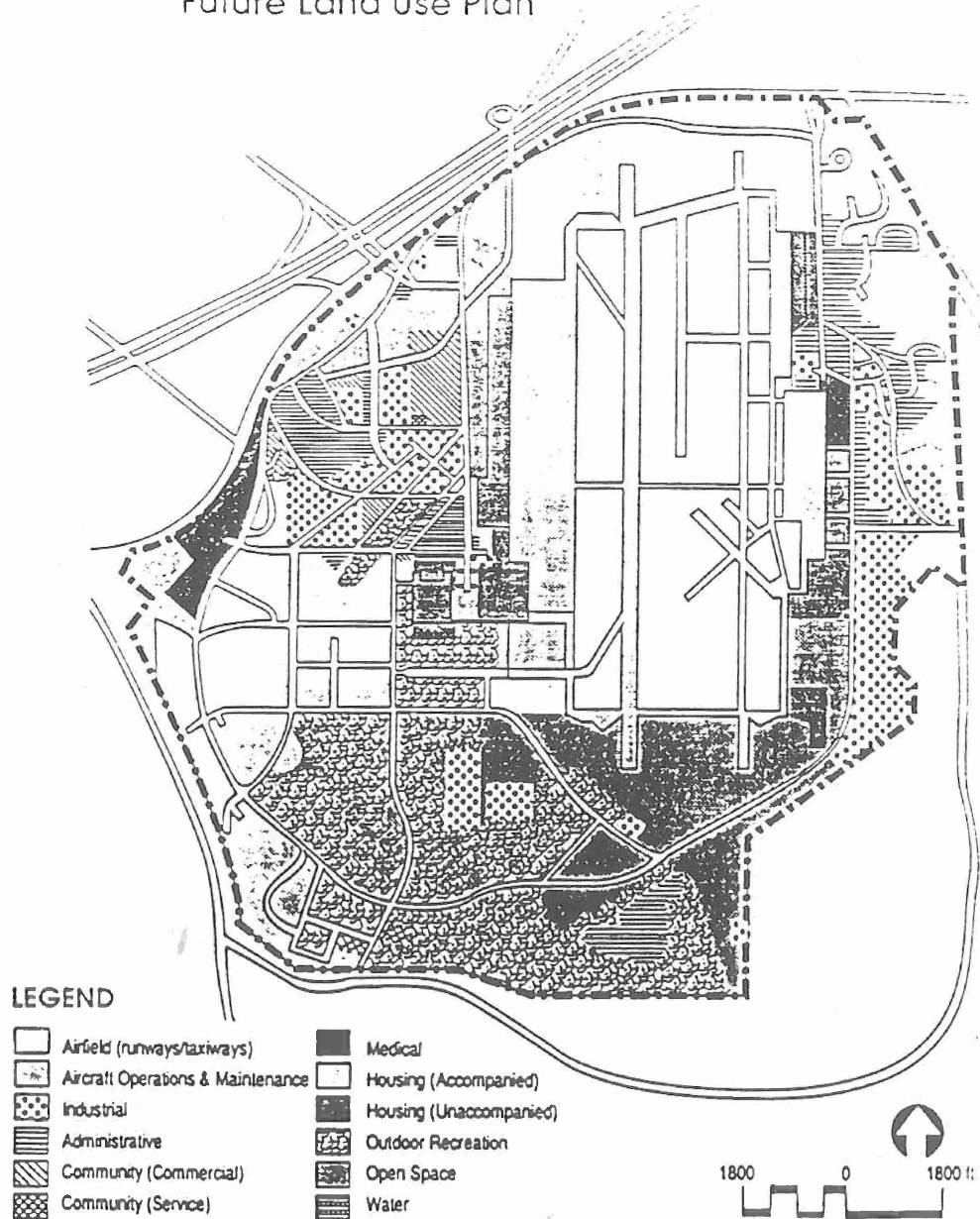


Figure 3*: Base Comprehensive Planning (BCP) Level of Detail

(* After: Land Use Planning Bulletin: Base Comprehensive Planning, HQ USAF/LEEVX, p.B-13)

Stage II.0 Area Development Plan (ADP) Level

As the planning process telescopes past Stage I.0, the particular site(s) or parcels within an area or neighborhood of the base becomes critical. At this stage the relationship between the proposed facility, adjoining land uses, traffic flow, exterior open space and neighborhood become more well-defined and articulated.

Below is a representative example of siting at this planning level on a hypothetical base.

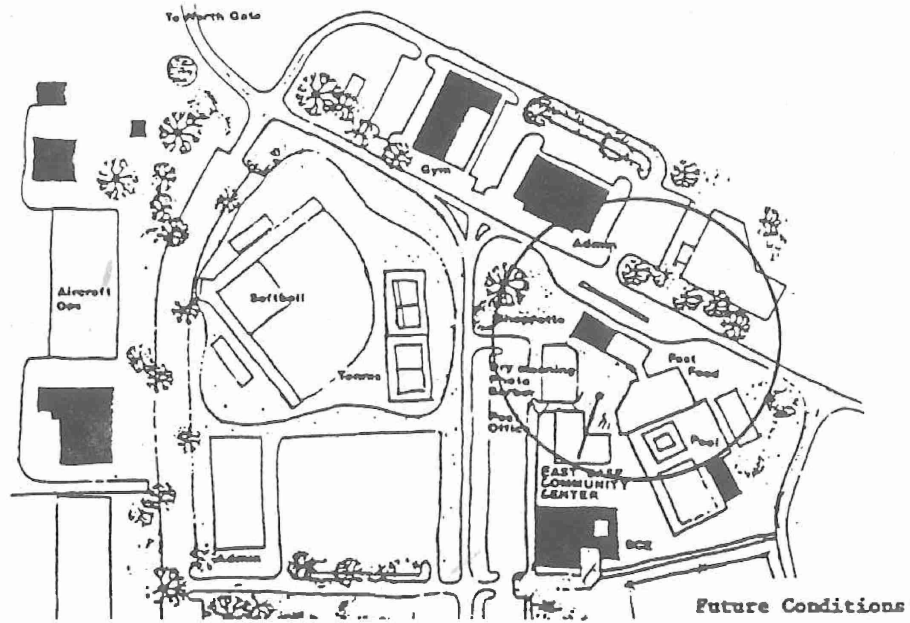
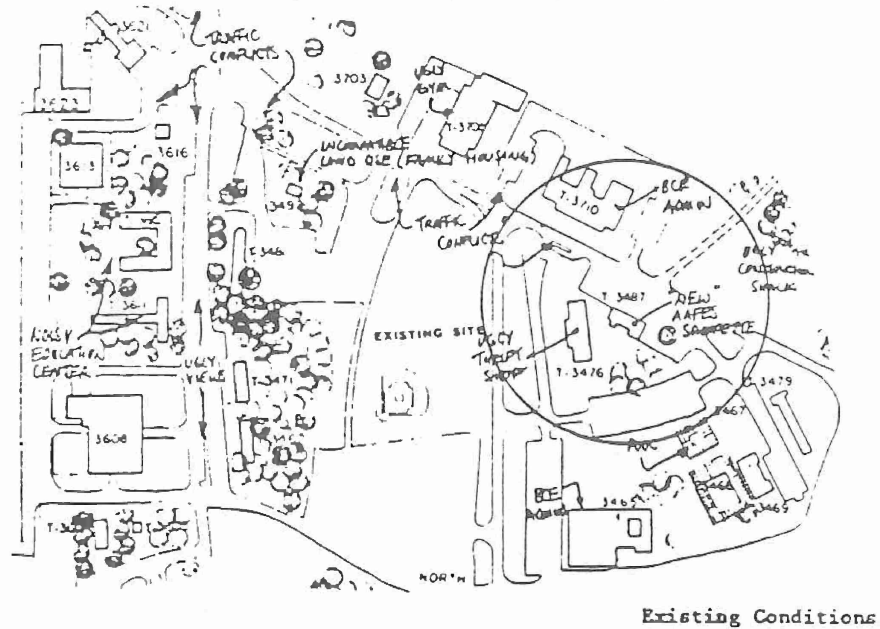


Figure 4: Area Development Planning (ADP) Level of Detail (ibid. p.1-19)

Stage III.0 Site/Parcel Plan (SPP) Level

At this final level, the actual orientation of the building(s), access roads, parking, pedestrian walkways, handicap accessibility, landscaping, and square footage capacity of the dining service become critical decision variables for the parcel or site actually chosen at the previous ADP stage. Effects of sun, wind, and climate as well as geology, soils, slopes and related environmental factors on the base become important contextual variables affecting the siting decision on the chosen parcel.

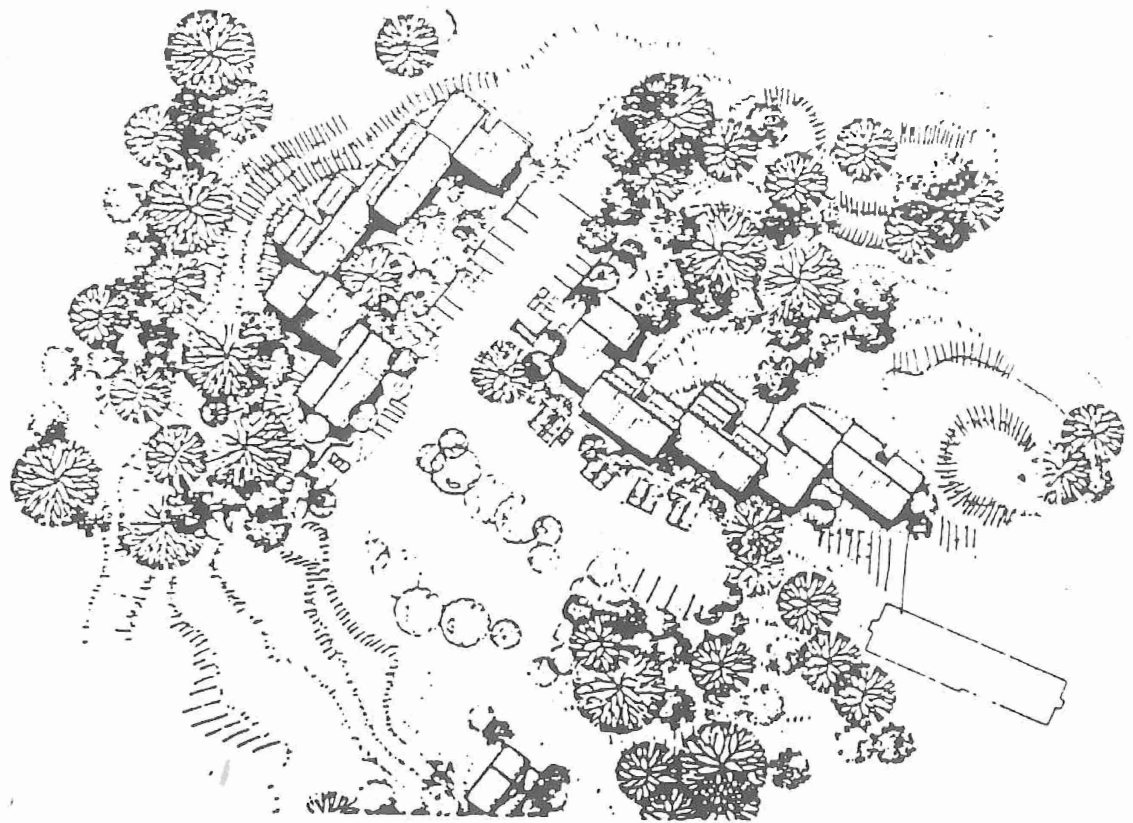


Figure 5: Site/Parcel Plan (SPP) Level of Detail (*ibid.* p.1-20)

Beyond the SPP level of the planning process, one could become interested in the actual design and layout of the facility itself: i.e. where the service lines, kitchen, food storage, and so on should be located; however, the third planning stage, SPP Level, defined above is viewed as a natural stopping boundary of our problem.

Characteristics of the Hierarchical Planning Process

From the above description of the planning process for siting dining services, one should begin to realize that the Stages of the planning process are naturally inter-linked and highly dependent. While in an ideal sense, one would naturally proceed from Stage I.0 on through Stage III.0, in reality, projects seldom follow a linear process due mainly to personnel changes and the natural dynamics of planning over time. Planning decisions and siting criteria involved in the site selection process need to be integrated and passed back and forth between levels during the siting process. There is much feedback and alteration of the siting plans as time evolves. There needs to be a decision trail as planning evolves over time.

Therefore, a carefully defined data-base as a natural part of the DSS should guide and control the planning process at the different levels.

In order to provide a framework for constructing this integrated data base, a mail survey was sent to selected AFB's within each mission category. The major benefits of this survey were to first build a statistical foundation for measuring utilization of current dining services, and, secondly, become the structural framework of the data base for guiding the hierarchical siting process for new dining facilities.

D. Questionnaire Design

The primary purpose of our survey was to identify and quantify those factors underlying the siting of appropriated fund dining facilities. In particular, a questionnaire was designed to capture information related to the siting and location of the following Dining Service facilities on Air Force Bases (AFB's): Airmen's Dining Hall (ADH), Carry-out Service (CS), Flight Kitchen (FK), Alert Kitchen (AK), Fire Station (FS), and Satellite Facilities (SF).

The questionnaire (see appendix II) is organized into five parts. The first part includes a discussion of the purpose and organization of the questionnaire. The second part, *Base Maps and Existing Data*, is designed to capture existing data on the location and utilization of all types of food service outlets on base. This information on dining service operations can be assembled from existing maps and forms data presently compiled by base personnel: current numbers and composition of dining facilities (ADH, FK, CS, etc.), their location on the base map, their capacity, SIK utilization, hours of operation, average distance to dormitory and other housing accommodations, as well as the physical condition of current dining services. The third part, *Trip / Flow Matrix*, requests information, at the squadron level, on the daily trips made between housing, the workplace or classrooms, and dining services, how personnel travel on the base and the distances implied by this travel.

The fourth part, *Ideal Relationship Matrix*, requests data on the "ideal" relationship that should exist between dining services and other critical land use activities on the base. (Figure 6 illustrates the matrix of flow relationships desired from this portion of the survey data.) Finally, the fifth part requests data on future siting and location of dining service facility decisions.

Completed questionnaires were received from the following SAC bases: Beale Air Force Base, Blytheville Air Force Base, Bolling Air Force Base, Hill Air Force Base, Pease Air Force Base and Peterson Air Force Base. The questionnaire responses for each of these bases are contained in Appendix II.

Base Maps & Existing Data

With the completed questionnaire, each respondent included a base map at a scale of 1"=400', copies of AF-1785 Facilities Inventory Report for all dining services on base, and copies of AF-249 Food Service Operations Report for the reporting periods of March 1-31 and April 1-30, 1987.

Tables in the questionnaire captured remaining existing data on the three categories of food service outlets on base: Dining Services (ADH, CS, FK, FS, SF), AAFES Food Services (BX, Burger King, etc.) and Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.). The tables were completed by the Food Services Officer and requested for each type/name of facility: the building number, hours of operation, number of parking spaces, total daily headcount by meal (breakfast, lunch, dinner, midnight), and total daily headcount for all meals. In addition, the percent SIK by meal and the total percent SIK for all meals was requested for the dining services facilities.

The maps along with the existing data were used to determine the location of all dining facilities on the base. Distances from the dining facilities to the dorm areas and the worksites were measured and analyzed to aid in the construction of model parameters.

Trip/Flow Matrix

The actual distance from the dining facilities to the dorm areas or the worksites should be weighted by the flow (number of person-trips) across that arc. The trip/flow matrix captures this information. The trip/flow questionnaire was administered at the squadron level. A questionnaire was completed by each squadron. It requested for each squadron number: the strength (total number of personnel), the percent of total listed who are SIK, the percent of total listed who are BAS, the percent of total listed who have cars, and the primary mode of transportation on base (walk, car, bus, taxi, etc.). The squadron was partitioned into the various dorm/work site combinations and for each dorm/work site combination the number of personnel who lived in that dorm and worked at that worksite was requested along with the location where each meal (Breakfast, Lunch, and Dinner) was typically eaten. The data is given in appendix II.

Ideal Relationship Matrix

The remaining necessary piece of information for the model is the "value" of locating a dining service facility adjacent to various land use activities on the base. In general there are 12 basic types of land use activities normally found on Air Force

bases. Dining Services exists as a separate category of interest for which it is necessary to determine its relationship to each of the other major land use categories: Airfield, Aircraft Operation and Maintenance, Industrial, Administrative, Community (Commercial), Community (Service), Medical, Housing (Accompanied), Housing (Unaccompanied), Outdoor Recreation, Open Space, and Water. A series of six questionnaires (one for each type of dining facility - ADH, CS, FS, FK, AK, and SF) solicited the desired relationship between each type of dining facility and the twelve land uses. Specifically, a desired degree of proximity was requested ranging from -3 (Absolute Separation Required, i.e. no functional linkage) to +3 (Absolute Closeness Essential, i.e. Direct adjacency). The questionnaires were completed by each of the three administrative components involved in siting decisions concerning dining facilities: Command, Food Services, and Engineering/Planning. The data collected is contained in appendix II in two formats: *disaggregated*, i.e. aggregated for each administrative component separately; and *aggregated*, i.e. aggregated across all three administrative components.

Figure 6 represents a sample page from our questionnaire which was designed to capture the ideal relationships between the individual dining service activities and all other land use activities on the base.

The plan of the rest of the report is to present the underlying mathematical model in Chapter II which forms the foundation of the DSS. In Chapter III, we present the integrated software models which comprise the DSS and finally in Chapter IV, we present the application and verification of the DSS to Travis and Beale AFB's.

C.1 Airmen's Dining Hall (ADH)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Airmen's Dining Hall (ADH)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Airmen's Dining Hall (ADH)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*.)

Score Value	Degree of Proximity
-3:	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2:	<i>Close whenever possible.</i>
-1:	<i>Compatible but not essential.</i>
0:	<i>Indifference or no relationship.</i>
+1:	<i>Separate whenever possible.</i>
+2:	<i>Incompatible and should definitely be separated.</i>
+3:	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of AIRMEN'S DINING HALL (ADH) to:

+3	-2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	-2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

Figure 6: Ideal Relationship Matrix Question

Chapter II: MODELING APPROACH

A. Overview

While the previous description of the hierarchical planning process could be construed as a very complicated, time dependent situation, we shall propose a deterministic optimization model which begins to capture much of the structure just discussed. The plan of this report section revolves around a discussion of the decision variables of the DSS model and the performance measures used to evaluate alternative siting locations. Finally, we present the formal mathematical model underlying the heart of the DSS.

B. Decision Variables

The model which is developed below is designed to optimize the siting and location of the following Dining Service facilities on Air Force Bases (AFB's):

- Airmen's Dining Hall (ADH)
- Carry-out Service (CS)
- Flight Kitchen (FK)
- Alert Kitchen (AK)
- Fire Station (FS)
- Satellite Facilities (SF) or consolidated services with food provisioning.

The above facilities represent the key dining service operations found on most AFB's. Additional facilities exist on some AFB's such as a Central Preparation Facility or a Pastry Kitchen but these are support operations for the Dining facilities which is our main concern. Each base will have a different number and composition of these facilities with perhaps certain combinations of the above and occasional commercial outlet's such as *Burger Kings* located on or nearby the base. The questionnaire in Appendix II sought to identify and quantify the key factors related to the siting of the above dining service operations.

Let us define the following decision variables:

x_{kt}^{ℓ} which represents a facility of type k ($k = 1, 2, \dots, K$), allocated to alternative site t ($t = 1, 2, \dots, T$) at planning level(stage) ℓ and where ($\ell = 1, 2, 3$).
 $x_{kt}^{\ell} = 1$ if the k^{th} dining service is assigned the t^{th} site alternative at planning level ℓ ; and $x_{kt}^{\ell} = 0$ otherwise.

The discrete nature of the siting decision variable is consistent with the normal siting decision on the bases in that typically one, two or three dining service facilities may be under consideration during any one stage of the planning process. In general, the number of facilities is likely to never exceed ten so that large scale programming concerns are considered unimportant. Therefore, optimal siting solutions will be possible.

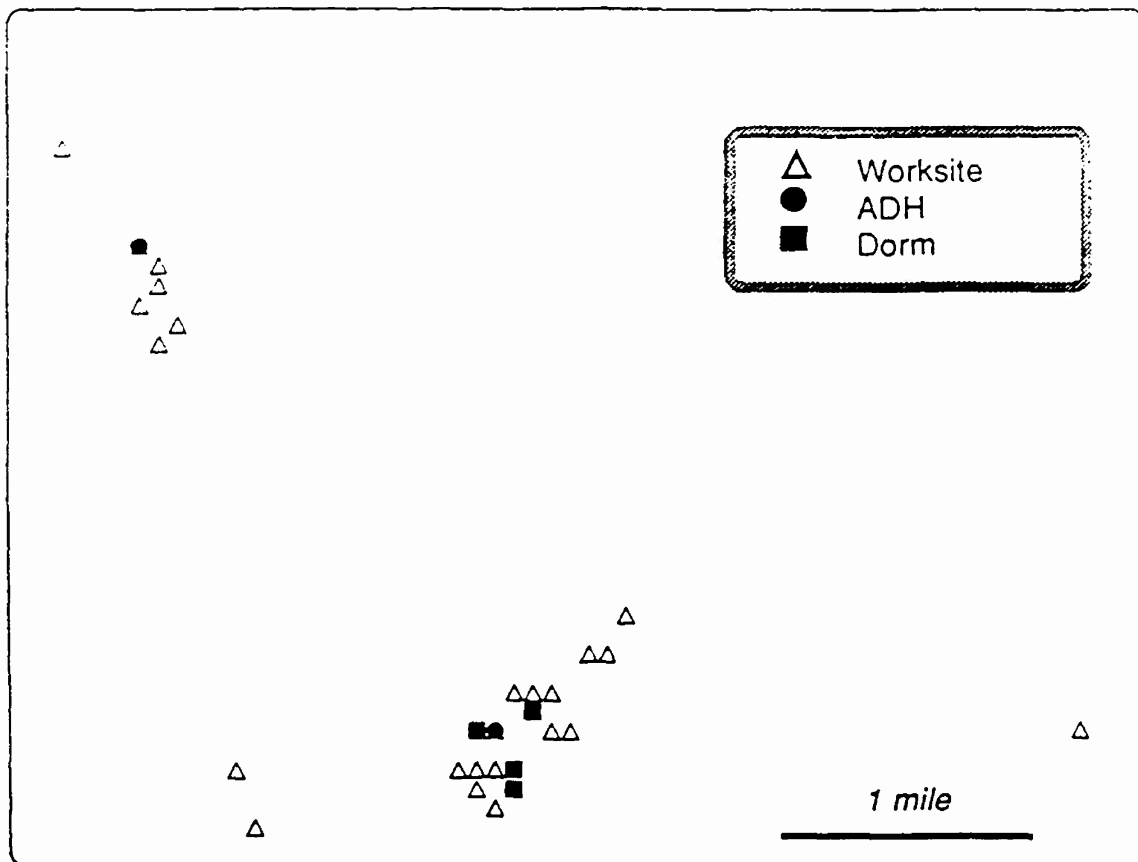
For each of the planning stages, the number of alternative sites T would be dependent on alternatives provided by the Base Engineer, Planner, and Food Service staff which are logical and reasonable siting alternatives. That the array of alternatives should be generated by the staff on the base was felt to be the most reasonable approach and most parsimonious from a data collection standpoint. Thus T is specific to the planning stage, environmental and siting criteria unique to the AFB, and relevant facility purpose.

C. Performance Measures

As we found from our site visits and questionnaire survey on the *Trip/Flow* section, utilization of dining services is a function of distance from the dormitories, workplaces, mode of travel, geographic location, disposition of facilities, local climate and many other contextual and related factors. Of primary significance is *distance* since we found an obvious correlation between the facility utilized for the three main meals of the day and the general location of the squadron population on the AFB during the *breakfast, lunch, and dinner* hours.

In our analysis of the six responding bases, the Beale situation was the most dramatic in indicating that distance was the key factor in ADH utilization. Sample data from Beale AFB is illustrated by the graphs given as Figure 7: *Beale Building Locations*; Figure 8: *SIK Distribution by Dorm/Worksite*; and Figure 9: *ADH Utilization by Meal*. This information was analyzed to determine, at the squadron level, the number of daily trips made between dorm areas, dining facilities and work sites. As an example consider the pattern observed at Beale Air Force Base. Beale has two ADH's. One is located in the dorm area and the other is located near the flight line. Figure 9 illustrates the pattern of ADH utilization by meal. For the breakfast and dinner meals the ADH in the dorm area is heavily utilized. However for the lunch meal the ADH near the flight line is utilized by those with flight line worksites. It is clear from the Beale analysis that *distance* is a key factor in ADH utilization.

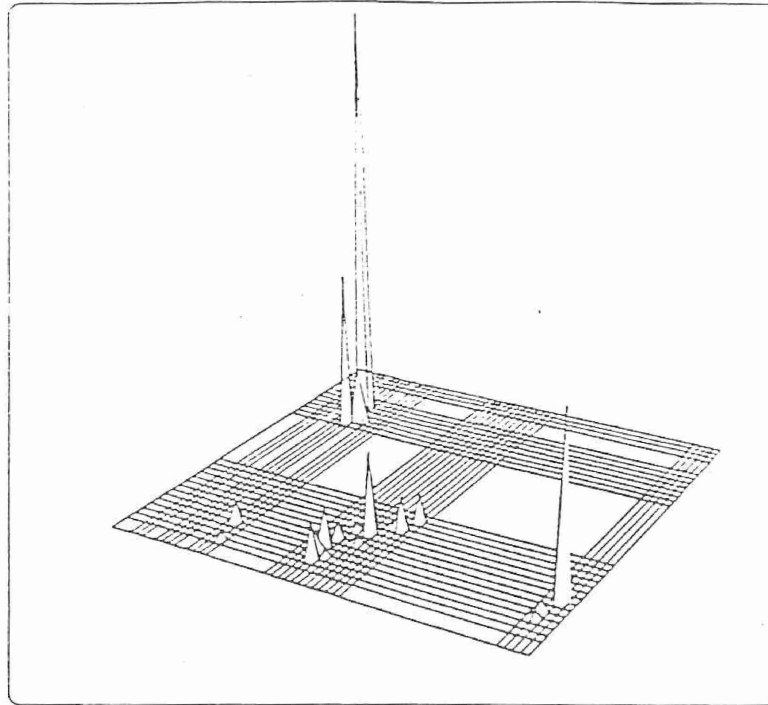
The other six bases had one predominant ADH so the analysis was not so conclusive as in the BEALE AFB case where there are two competing ADH facilities on a single



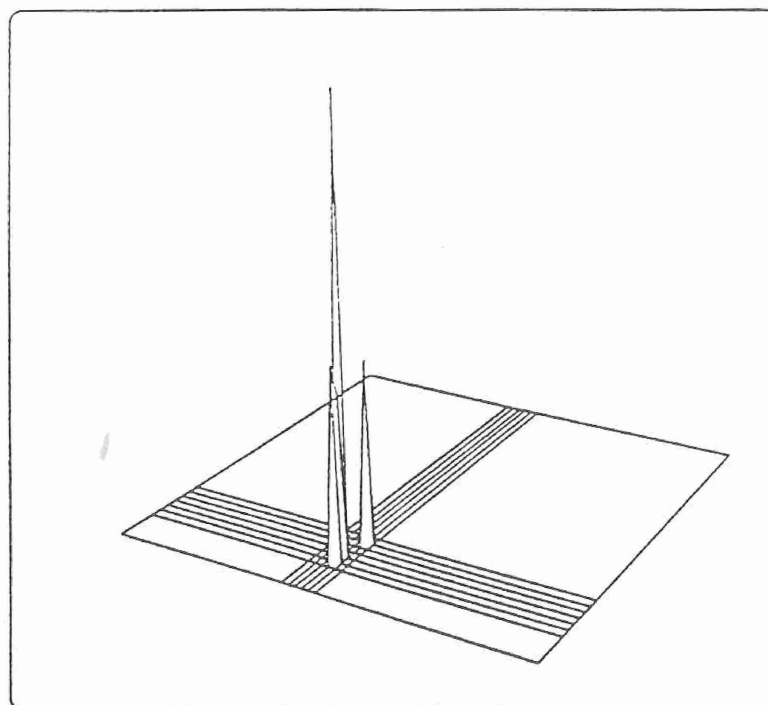
Beale Building Locations

(SOURCE: BEALE AFB MAP)

Figure 7: Beale Building Locations

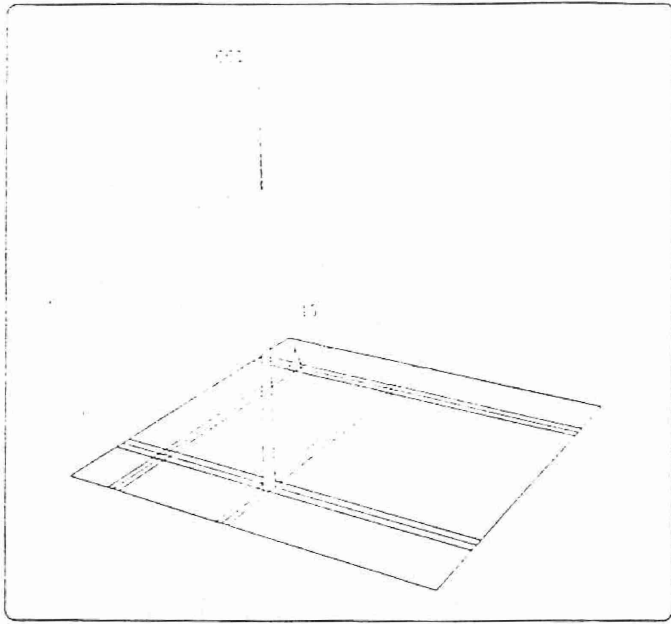


SIK DISTRIBUTION BY WORKSITE
 (SOURCE: BEALE AFB QUESTIONNAIRE)

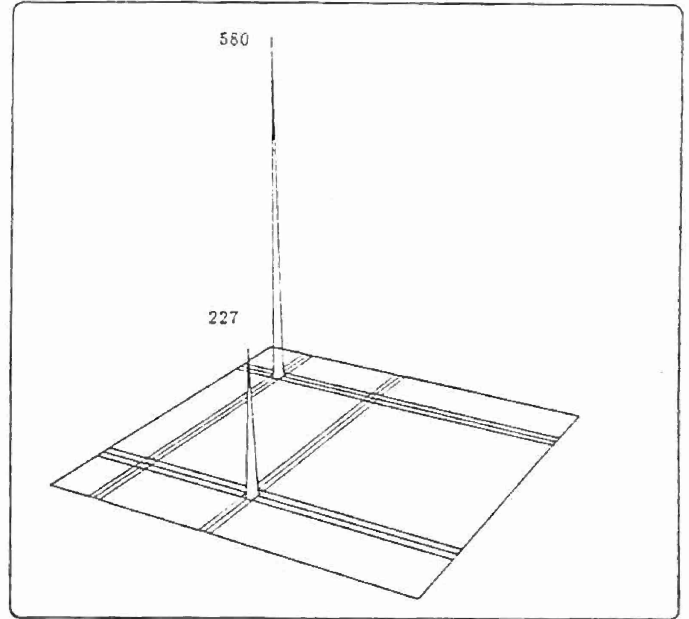


SIK DISTRIBUTION BY DORM
 (SOURCE: BEALE AFB QUESTIONNAIRE)

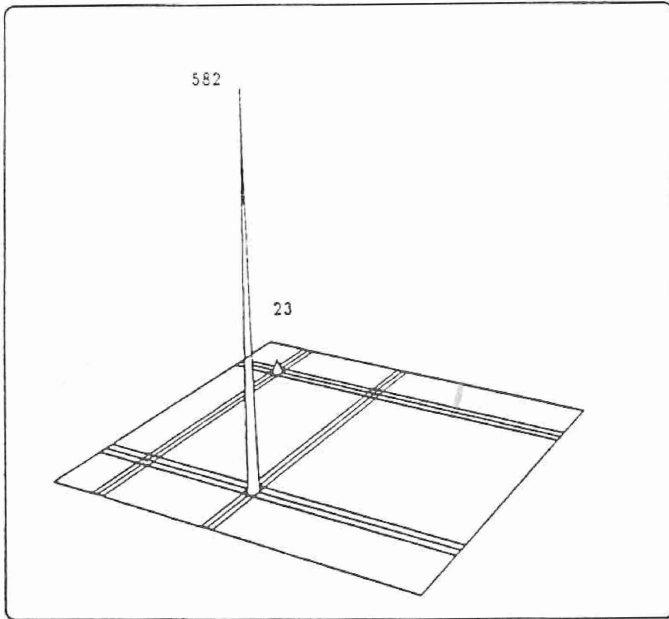
Figure 8: SIK Distribution by Dorm/Worksite



ADH UTILIZATION - BREAKFAST
 (SOURCE: BEALE AFB QUESTIONNAIRE)



ADH UTILIZATION - LUNCH
 (SOURCE: BEALE AFB QUESTIONNAIRE)



ADH UTILIZATION - DINNER
 (SOURCE: BEALE AFB QUESTIONNAIRE)

Figure 9: ADH Utilization by Meal

base and distance from the workplace and residence were clearly the key factors affecting ADH utilization. Inspection of the tables in Appendix II further substantiates this claim.

In conclusion, from our on-site surveys and questionnaire analysis, minimizing distance for the user population, maximizing accessibility and ultimately maximizing utilization of the dining facilities are synonymous objectives. However, we want a single common performance measure that affords the optimization model a unique way to select the best alternative site from the possible alternatives on the AFB. In order to do this, we have chosen a single performance measure *maximizing utility* as the performance measure for our model.

Thus, utilization of dining services will be measured by *maximizing utility*, since this is a dimensionless quantity and a well-chosen surrogate for maximizing ADH and other dining service activity utilization. If we did not use "utility", we would have to use a performance measure such as *minimizing the costs* which would force us to quantify utilization in terms of "dollars" which is not really appropriate for our siting problem.

Due to the nature of the hierarchical planning process and the complexity of the base itself, it makes sense to view the DSS problem in terms of two key performance measures: 1) Site Utility and 2) Flow Utility. This dichotomy is due to the nature of the siting decision in that firstly there is a certain fixed Utility associated with each site alternative. Site Utility is a function of its acquisition costs, facility development costs, accessibility, utility, and associated environmental costs and benefits. Figure 10 represents a complete listing of the major criteria, denoted as Ω , relevant to the siting of facilities on Air Force bases.

Secondly, utilization of a dining facility is dependent on what type of housing, commercial, employment, educational and administrative activities are located nearby besides how personnel move between their work and living quarters. At Travis AFB, for example, lunchtime utilization of the dining hall is greatly affected by the fact that mail pickup and delivery is directly adjacent to one ADH. This second aspect of utilization is due to the intensity of traffic or flow movement between the locations where personnel live, work and eat. We like to characterize this movement process as a "flow" process which can be represented quantitatively by a *matrix of flow utilities* between all pairs of critical activities and their site locations on the AFB.

We are seeking to define the "ideal" relationship that should exist between Dining Services and the other land use activities on the base. This "flow" type of information is crucial to future siting of Dining facilities.

In general there are 12 basic types of land use activities normally found on AFB's.* Dining Services as we have defined them exists as a separate category of interest for which we need to define its relationship to all of the other major land use categories. Below is a brief description of each of the twelve major categories including the type of facility included within the category.

* After: *Land Use Planning Bulletin: Base Comprehensive Planning, HQ USAF/LEEVX, p.4-6)*

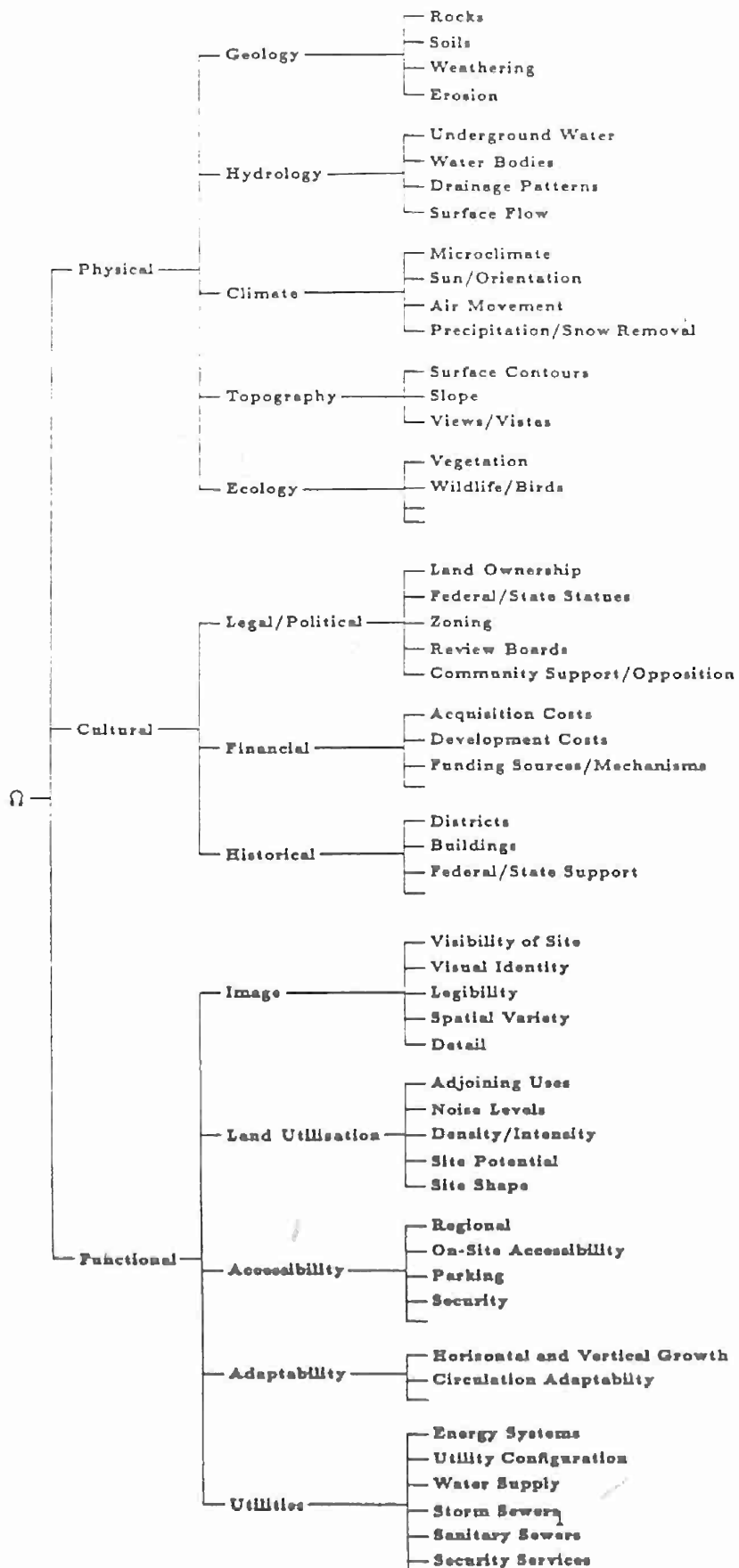


Figure 10: General Site Attribute Structure

- **Airfield:** Airfield, runway, taxiway, apron and related open space.
- **Aircraft Operations & Maintenance:** Hangars, shops, and adjoining terminals.
- **Industrial:** Warehouses. Base maintenance and utility functions, and industrial services such as those belonging to transportation, communications, and civil engineering.
- **Administrative:** Military command and tenant activity, management, wing group headquarters, classrooms and lecture halls, civilian administrative activities, security operations, gate/visitor management, and military operations security.
- **Community (Commercial):** Shopping, gas stations, recreation, base exchange, commissary, clubs, and other personal services such as barber shops, bowling alleys and other indoor recreational facilities.
- **Community (Service):** Non-commercial activities important in day-to-day living such as schools, adult education facilities, post office, library, day care centers, chapel and other religious education facilities.
- **Medical:** Hospital, clinics, optometry, dental care, and related medical facilities.
- **Housing (Accompanied):** Attached and detached residential units occupied by enlisted and officer families.
- **Housing (Unaccompanied):** Bachelor officer housing, airmen's dormitories, and visiting officer and airman's quarters.
- **Outdoor Recreation:** Parks, playgrounds, picnic areas, running tracks, golf courses, swimming pools, and tennis courts.
- **Open Space:** Greenbelts or undeveloped buffer space, airfield's AICUZ, railroad rights-of-way, utility easements, hazardous waste safety limits, and security buffers.
- **Water:** Ponds, streams, lakes, and shorefronts.

These categories may overlap in certain aspects, but at the base-wide planning levels, these categories are useful ways of guiding the facility planner in his/her siting decision process.

In Figure 11, we have arrayed the results from the questionnaire regarding the ideal flow relationships between the major land use activities on an Air Force Base and the dining service facilities we wish to optimally locate. The values in the flow matrix were derived from the questionnaire included in Appendix II of this report. In interpreting the matrix, values a scale of [1, 7] was utilized where a 7 represents the strongest affinity between activities while a 1 represents the weakest affinity or (strongest separation) between activities.

Since overall Utilization (*Utility*) is the key performance measure which is the precipitating motive for our study in the first place, we should naturally seek to Maximize the sum of the Site Utilities and Flow Utilities so that overall Utility is optimized.

	ADH	CS	FS	FK	AK	SF
Airman's Dining Hall (ADH)	-	5.50	5.21	5.08	4.90	4.43
Carry-Out Service (CS)	5.31	-	5.14	5.08	4.40	4.14
Fire Station (FS)	5.21	5.14	-	4.08	3.80	3.00
Flight Kitchen (FK)	5.08	5.08	3.50	-	4.60	4.14
Alert Kitchen (AK)	4.90	4.40	2.93	2.67	-	2.00
Satellite Facility (SF)	4.43	4.14	2.43	2.50	2.30	-
Commercial Outlet	1.75	1.68	2.21	1.33	1.60	2.43
Fleet Services	2.31	2.19	2.64	2.42	2.00	2.29
Troop Issue (Perishable)	4.94	4.06	3.86	4.25	4.00	3.29
Troop Issue (Semi-perishable)	4.94	4.06	3.86	4.25	4.70	3.29
Central Preparation Facility	2.94	2.75	2.07	3.25	3.80	3.43
Airfield	3.44	3.50	4.43	4.42	4.40	3.14
Aircraft Operations & Maint.	3.56	4.06	3.79	4.17	4.30	3.14
Industrial	3.25	3.75	4.00	3.58	3.80	3.14
Administrative	3.94	3.75	3.79	3.17	3.60	3.00
Community (Commercial)	2.81	3.50	3.50	3.25	3.20	3.00
Community (Service)	3.13	3.44	3.43	3.17	3.10	3.00
Medical	3.56	3.56	3.79	3.50	3.50	3.00
Housing (Accompanied)	2.94	3.13	4.00	3.25	3.10	3.00
Housing (Unaccompanied)	5.81	5.06	5.00	4.42	4.50	4.00
Outdoor Recreation	3.44	3.56	3.21	3.25	3.10	3.00
Open Space	3.06	3.06	3.13	2.75	2.80	3.00
Water	2.44	2.50	2.57	2.33	2.40	3.00

Figure 11: Matrix of Flow Relationships

We also make a fundamental distinction here in the total set of Attributes Ω by using the objective function to characterize Ω into two subsets: Ω_1 and Ω_2 . Ω_1 is generally related to the linear terms or *site utility* attributes in our objective function while Ω_2 relates to the nonlinear *flow utility* terms. To treat all the attributes simultaneously appears to be folly simply because there are too many of them as witnessed by Figure 10. If we further restrict the attributes to those which can be measured on a distance scale, we can facilitate the construction process of the utility functions since *distance* is a fairly easy attribute to grasp in the layout context. Costs can be mapped onto a distance function as they relate to site placement and most certainly as they relate to flows and material handling distances.

Further, let's make a distinction for our attributes list (Figure 10) between those variables which are monotonically decreasing and those which are monotonically increasing with distance from the realization point. Therefore, let's define:

x_+^i := a positive attribute which is monotonically decreasing (increasing slope) with distance from the realization point.

$x'_i :=$ a *negative* attribute which is monotonically increasing (decreasing slope) with distance from the realization point.

Figure 12 represents a further decomposition of Ω along the lines of the above argument.

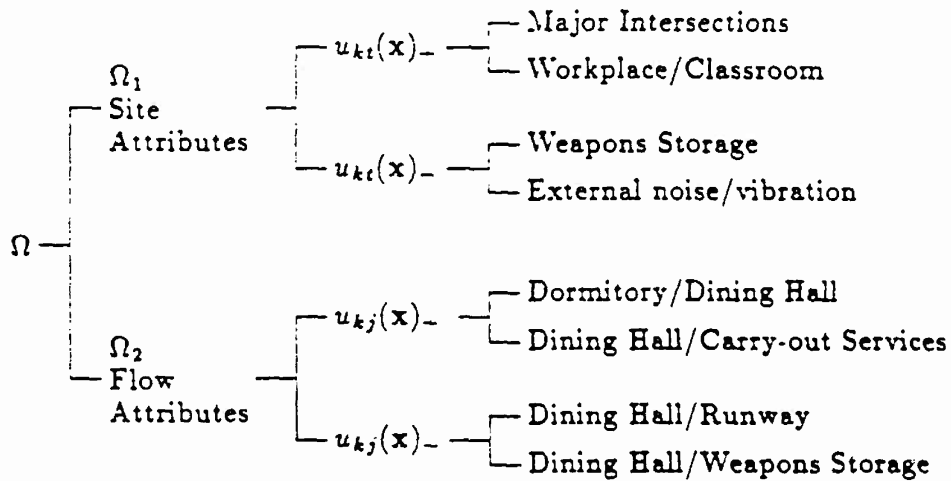


Figure 12 : Attribute Decomposition

In location problems on the base, it is assumed that the utility function for an activity is either monotonically increasing or decreasing. It is further assumed that this consists of some well-behaved function (*e.g linear or exponential*) that is either convex, concave, or linear. For the most part, we assume deterministic utility functions, although in some applications, probabilistic functions may be appropriate.

D. Mathematical Model

The mathematical model of our DSS is based on a Quadratic Set Packing QSP* formulation of the siting decision problem. Thus, for each planning level ℓ :

We wish to :

$$\text{Maximize } Z = \sum_k \sum_t u_{kt}^{\ell} x_{kt}^{\ell} - \sum_k \sum_j f_{kj}^{\ell} \left(\sum_{mn \in A} \frac{1}{d_{mn}} x_{km}^{\ell} x_{jn}^{\ell} \right)$$

such that

$$\sum_k \sum_t \alpha_{ikt}^{\ell} x_{kt}^{\ell} \leq 1 \quad i = 1, \dots, I \quad \text{alternative sites} \quad (1)$$

$$\sum_t x_{kt}^{\ell} = 1 \quad k = 1, \dots, K \quad \text{activities} \quad (2)$$

$$x_{kt}^{\ell} = 0, 1 \quad k = 1, \dots, K \quad t = 1, \dots, T \quad (3)$$

where

x_{kt}^{ℓ} denotes the t^{th} site alternative to which the k^{th} dining service activity can be assigned at the ℓ^{th} planning level and : $x_{kt}^{\ell} = 1$ if the k^{th} activity is assigned to the site alternative designated by t , and $x_{kt}^{\ell} = 0$ otherwise.

α_{ikt}^{ℓ} is 1 if the site alternative is occupied by the t^{th} combination of site parcels of the k^{th} activity alternative at planning level ℓ , and 0 otherwise.

A is a set of planar arcs indicating critical relationships between activity pairs x_k and x_j for each alternative $(x_{km}^{\ell}, x_{jn}^{\ell})$;

d_{mn} is the rectilinear distance between activity alternates x_{km}^{ℓ} and x_{jn}^{ℓ} ;

u_{kt}^{ℓ} is an expected utility-of-place coefficient for the t^{th} alternative location for activity x_k^{ℓ} ;

f_{kj}^{ℓ} is an expected utility-of-flows coefficient between activities x_k^{ℓ} and x_j^{ℓ} .

* Smith, J. MacGregor and R. Pelosi. "Conversational Optimization and Facility Layout Planning." *Environment and Planning B* (11), 63-86, 1984.

Our objective function is comprised of the essential performance measures we have previously discussed, viz.: the placement term $\sum_k \sum_t u_{kt}^l x_{kt}^l$ and the flow terms $\sum_k \sum_j f_{kj}^l \left(\sum_{mnc \in A} \frac{1}{d_{mn}} x_{km}^l x_{jn}^l \right)$ which capture the essence of the location problem.

Constraint set (1) insures that facilities being allocated to the cell layout or AFB do not share the same cell locations on the base, while constraint sets (2) and (3) insure one and only one of each type of dining service facility is allocated and that they are allocated in integer amounts.

In the next Chapter, we discuss how this mathematical model has been incorporated into a complex integrated set of software tools which form the foundation of our DSS.

Chapter III: INTEGRATED MODEL ENVIRONMENT

A. Overview

The Decision Support System (DSS) we have designed has three basic layers or *decision shells*. The three decision shells correspond to the Hierarchical Planning Process (HPP) described in Chapter I which guide the planning and development of facilities on AFB's. One of the unique ideas of the DSS is this correspondance between the decision shells and the planning process stages.

The inner shell is a Facility/Land-Use Information System (FIS) which incorporates the mathematical model described in the previous Chapter for optimally allocating the dining service facilities on AFB's. The second layer/shell is a Geographic Information System (GIS) which incorporates geometric and geographic features along with important data essential to the FIS decision making system. The GIS is necessary in light of the facility location decision affecting the widespread geographic nature of the AFB and the BCP planning process. Finally at the outer layer or shell, we have a Digitized Information System (DIS) which is designed to represent and easily capture the existing underlying land use, traffic flow, building and utility configuration plans of the GIS and FIS shells so that a proper working data base is provided.

At the present time, most of our research has concentrated on the development and integration of the inner shell, the FIS, while the integration of the DIS and GIS with the FIS is still in its developmental stages. We shall describe all the shells and the software products we have designed to effectuate them.

Figure 13 illustrates the eventual integrated model environment for our DSS with all the requisite software tools contemplated for its development. Let us briefly explain the individual models which make up the software environment.

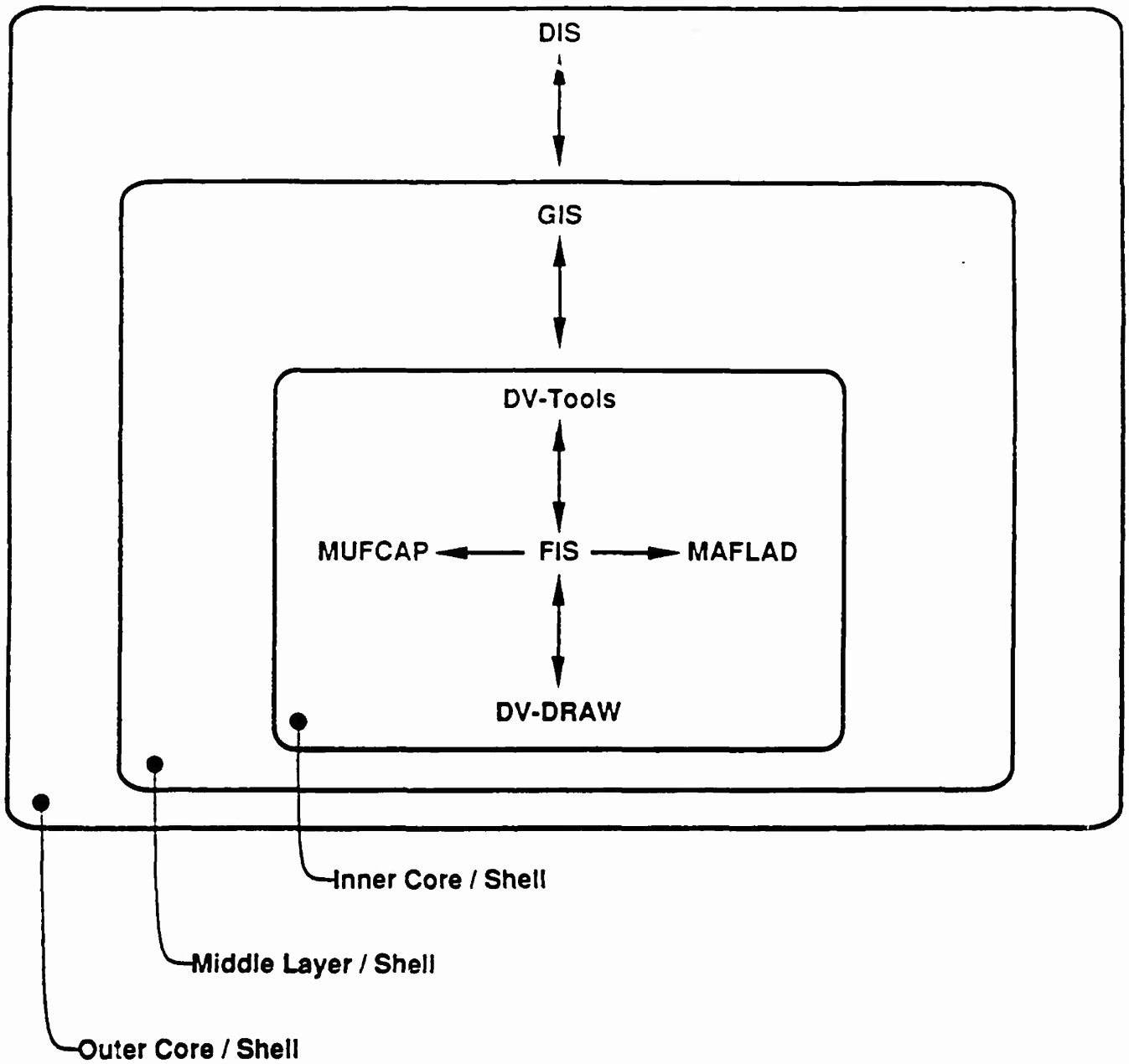


Figure 13: Integrated Model Environment

B. Facility/Land-Use Information System (FIS)

The FIS has a number of software programs which work together as an integrated model environment. There are two main modules or programs *MUFCAP* & *MAFLAD* which are described below which anchor the process of our FIS. Besides these two programs there are a number of related programs and files which effectuate the inter-communication process between the main modules and the user of the DSS.

The FIS is mainly written in the language **C** while the models that were integrated are mainly written in **FORTRAN**. **UNIX** on the **SUN** workstations provides the operating system for the DSS.

B.1 MUFCAP

*MUFCAP** stands for Multi-Attribute Utility Function Calculation and Assessment and is a multi-attribute software tool for assisting a decision maker in evaluating a finite set of alternatives across a multi-attribute set of criteria. *MUFCAP* is capable of rank ordering the set of alternative sites according to the following mathematical relationships on the attributes.**

$$E[u|a_j] = \int_{x_1} \int_{x_2} \dots \int_{x_p} u(x_1, x_2, \dots, x_p) p_j(x_1, x_2, \dots, x_p) d\bar{x}$$
$$E[u|a_j] = \sum_{x_1} \sum_{x_2} \dots \sum_{x_p} u(x_1, x_2, \dots, x_p) p(x_1, x_2, \dots, x_p) | a_j$$

choose

$$E(a^*) = \max E(u|a_1), \dots, E(u|a_r)$$

where:

$E[u|a_j]$:= Expected utility of site alternative a_j across a set of criteria $(1, 2, \dots, p)$ where the outcomes on each attribute are uncertain and drawn from continuous or discrete probability distributions.

$E(a^*)$:= Best site alternative for allocating a dining service facility from among all available site alternatives on the AFB.

The expected utility values generated from *MUFCAP* actually become the utility coefficients in the placement terms $\sum_k \sum_t u_{kt}^i x_{kt}^i$ of our mathematical model.

Typical multi-attribute criteria were those arrayed in Figure 10. We are using *MUFCAP* to generate the site utilities for the various siting alternatives according to the relevant site criteria selected by the base engineer, planner, and staff working with the DSS.

* Sichertman, A., 1975. "An interactive Computer Program for Assessing and Using Multiattribute Utility Functions." Technical Report no. 111, Cambridge, MA: Operations Research Center, MIT.

** Keeney, R. and H. Raiffa, 1976. *Decisions with Multiple Objectives*, Wiley.

We have developed one program called *MUFHELP* which is used to generate the input data for *MUFCAP*. *MUFHELP* interacts with the user to request the required data for the FIS interaction. One of the first software integrations was to combine *MUFHELP* and *MUFCAP* through a C interface. A model called *HELPCAP* was developed in C to integrate these two modules by using both UNIX and C Libraries. *HELPCAP* checks the file statistics of the operating system for the existence of required input files and makes sure they are not duplicated or unnecessarily removed. After *MUFHELP* is executed, *HELPCAP* executes *MUFCAP* which reads the input data files *MUFIN.DAT* created by the *MUFHELP* program and then creates the output file *MUFOUT.DAT*, see Figure 14.

B.2 MAFLAD

MAFLAD is our Multi-Attribute Facility Layout and Design optimization software tool used to locate the optimal dining service facilities.* *MAFLAD* is the computer program which incorporates the mathematical model from the previous Chapter for making siting decisions. It has a long history of development and the latest version is a very sophisticated branch and bound algorithm for constructing the optimal solution to various location and land-use planning decision problems. *MAFLAD* relies on *MUFCAP* to form the data base foundation for the location decision. Depending on the hierarchical level of the planning process which is being carried out, *MAFLAD* will take the input data at the corresponding geographical scale and optimize the location decision.

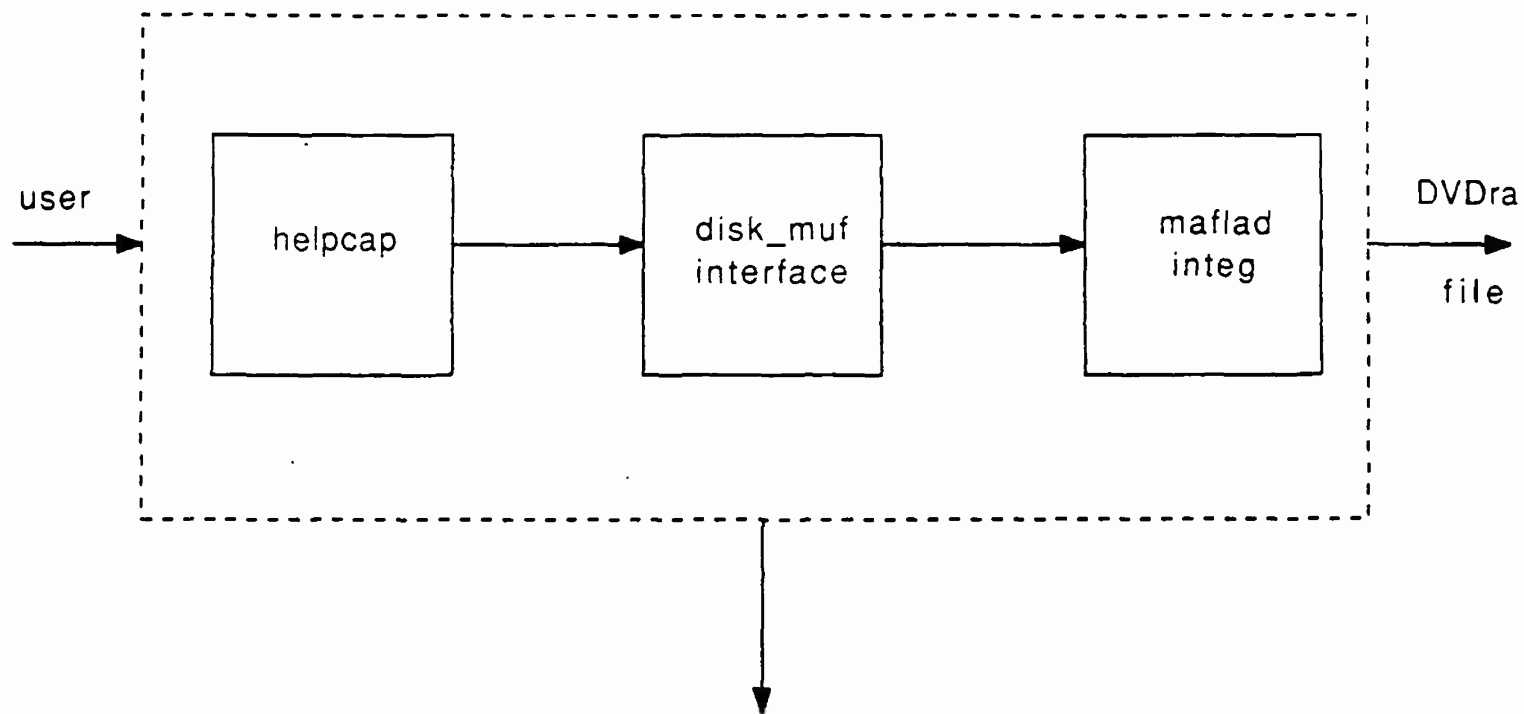
There are two FORTRAN programs which we developed which are used along with *MAFLAD* to generate a data file suitable for our graphics environment which is largely governed by the package *DV-Tools* and its drawing component *DV-Draw*. *DV-Tools* & *DV-Draw* are an interactive menu-driven software tool that allows one to create two and three-dimensional graphics. We have been working with *DV-Tools* & *DV-Draw* as a means of visually integrating the optimization and data-base tools that form the foundation of the location model in our entire FIS.

Prog - 1file.out is the first program executed immediately after *MAFLAD*, which reads the original data file for *MAFLAD* and the Fort.90 file created by *MAFLAD*. *Prog - 1file.out* creates another data file which is read by the second program *Prog - 2file.out* to generate a suitable data file for DV-DRAW. *Prog - 1file.out* and *Prog - 2file.out* request variable file names as specified by the user. *MAFLAD* generates an output file named *MAFSOL*, see Figure 15.

The interprocess mechanism called *sockets* available in UNIX is the primary mechanism used to manage the traffic of data between the processes and to execute the processes in the required sequence. Our communication model called *MAFLAD - Integ* has one server and three clients. The server is the supervisor whereas the three clients represent the three processes: *MAFLAD*, *Prog - 1file.out* and *Prog - 2file.out* the server accepts connection from the first client and the client executes the first process

* Smith, J. MacGregor and R. MacLeod, 1988, "A Relaxed Assignment Algorithm for the Quadratic Assignment Problem," *INFOR* 26(3), 170-190.

Decision Shell

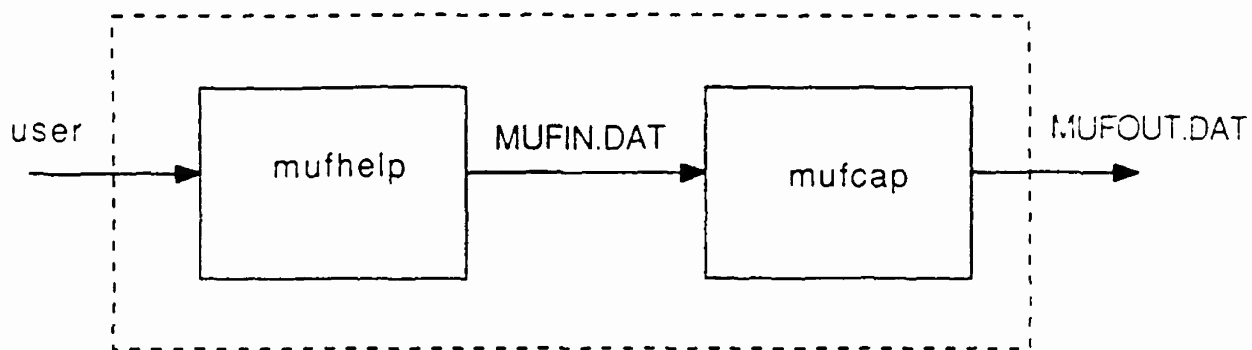


Files:

- (1) MUFIN.DAT
- (2) MUFOUT.DAT
- (3) MAFSOL
- (4) fort.90
- (5) fort.11
- (6) fort.12

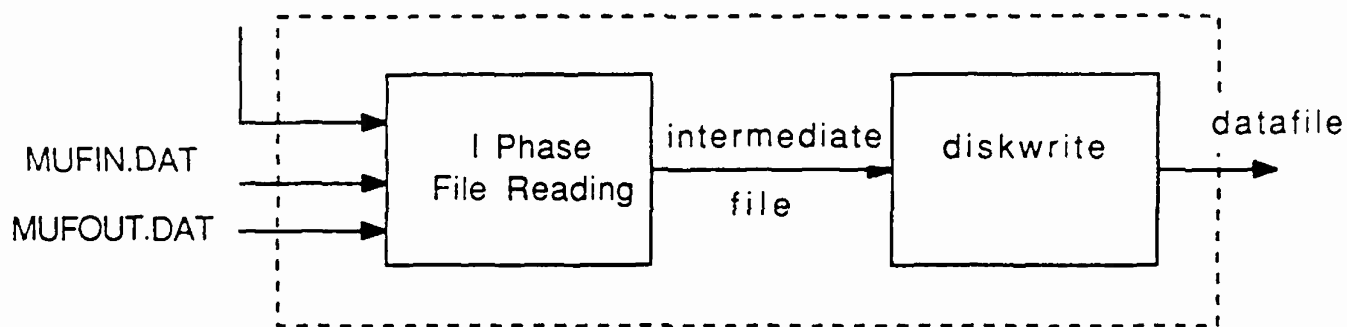
Figure 14: HELPCAP

helpcap



data from
helpcap

disk_muf_interface



maflad_integ

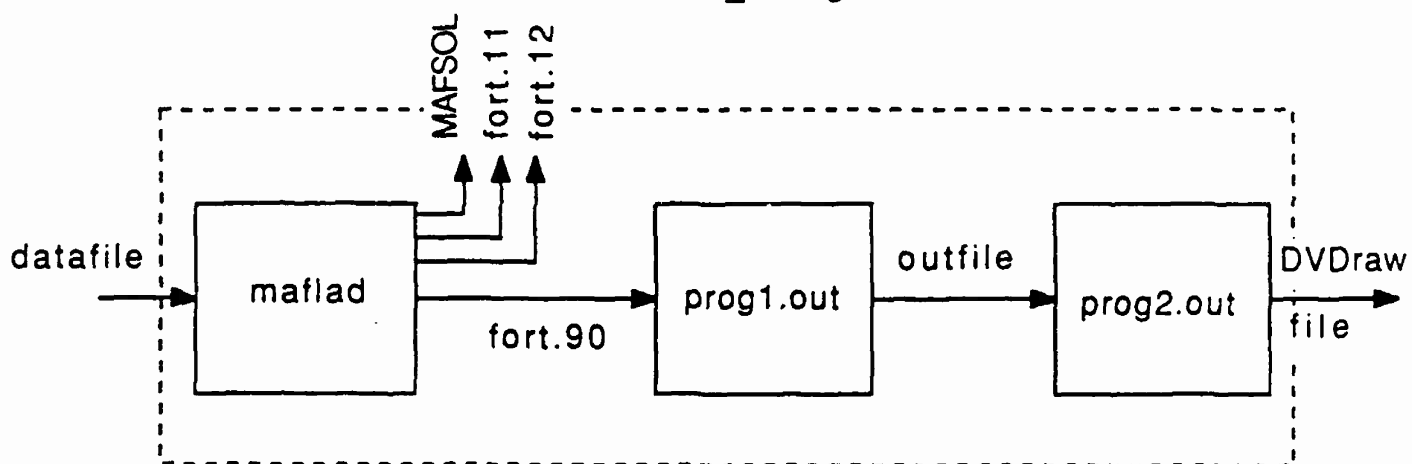


Figure 15: Program File Integration

MAFLAD. The server stores the data provided by the user into its memory. After the first client, the second client connects with the server and the process *Prog - 1file.out* is then executed. The required data file names for this process are sent to the server. After *Prog - 1file.out* the third client connects with the server and the process *Prog - 2file.out* is executed. The filename data for this process is provided by the server.

There is also another program called *DISKWRITE* which is used to generate the input data for *MAFLAD*. *DISKWRITE* interacts with the user to get details of the problem. Using the piping mechanism available under *UNIX*, another interface, *Disk-Muf-Interface*, models the interprocess communication between *MAFLAD* and *DISKWRITE*. *Disk-Muf-Interface* reads the *MUFIN.DAT* and *MUFOUT.DAT* files to get the total number of alternatives, their identifying names, their utility place values and sends them to *DISKWRITE*. Figure 16 illustrates the workings of the *Disk-Muf-Interface*.

Figure 17 represents an example image which our integrated *FIS* is capable of generating during the DSS process.

C. Geographic Information System (GIS)

The GIS is the next decision shell above the *FIS* and is designed to capture and represent the next level of planning information essential to the overall planning stage. The software tool we have utilized at the GIS level is entitled *ARCINFO* and is described below. Since we have spent most of our software development efforts at the *FIS* level, we have not formally integrated *ARCINFO* into the *SUN UNIX* integrated model environment. Instead we have executed *ARCINFO* on an IBM-AT machine and utilized its output for our example runs. The eventual integration of *ARCINFO* into the GIS portion of our DSS will occur at some later date.

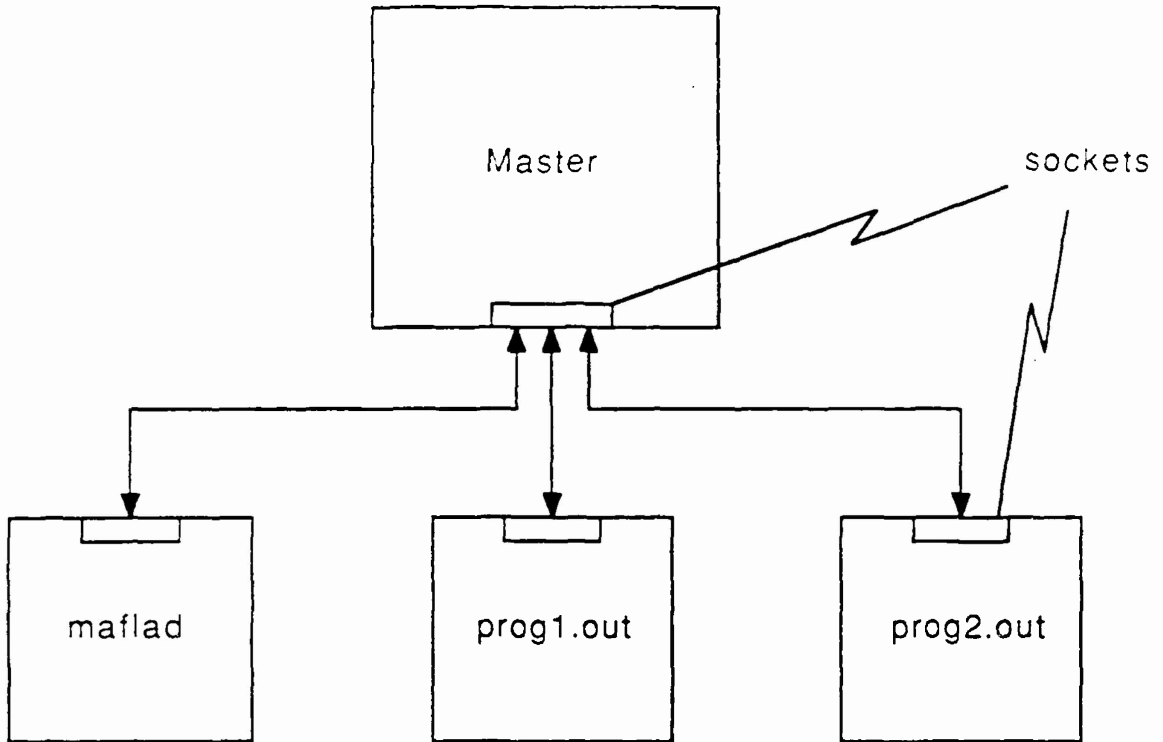
ARCINFO is a spatial data analysis system capable of encoding the digitized image of a base map and providing polygon and grid information for the data base required by our optimization software. *ARCINFO* allows us to capture the centroid location of the key land use information from the digitized image and pass this information onto a grid cell overlay which is needed by the optimization routine for calculating distances and siting the dining facilities.

Figure 18 represents the *ARCINFO* drawing of the land use activities of the ideal AFB land use plan as shown in the slide presentation.

D. Digitization Information System (DIS)

The highest level of our DSS is the DIS level which is designed to capture the regional or base-wide BCP level information necessary to effectuate the overall GIS and *FIS* planning stage activities. There are various software tools which we have experimented with to represent base maps, land-use plans, traffic circulation layouts, utility

Communication Model
for
maflad_integ



Communication Model
for
disk_muf_interface

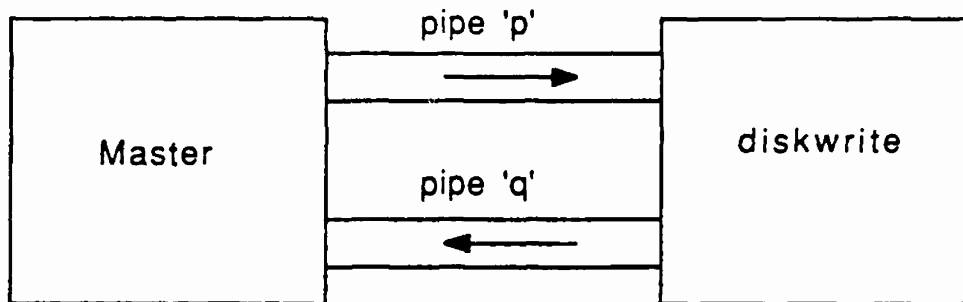


Figure 16: Communication Model

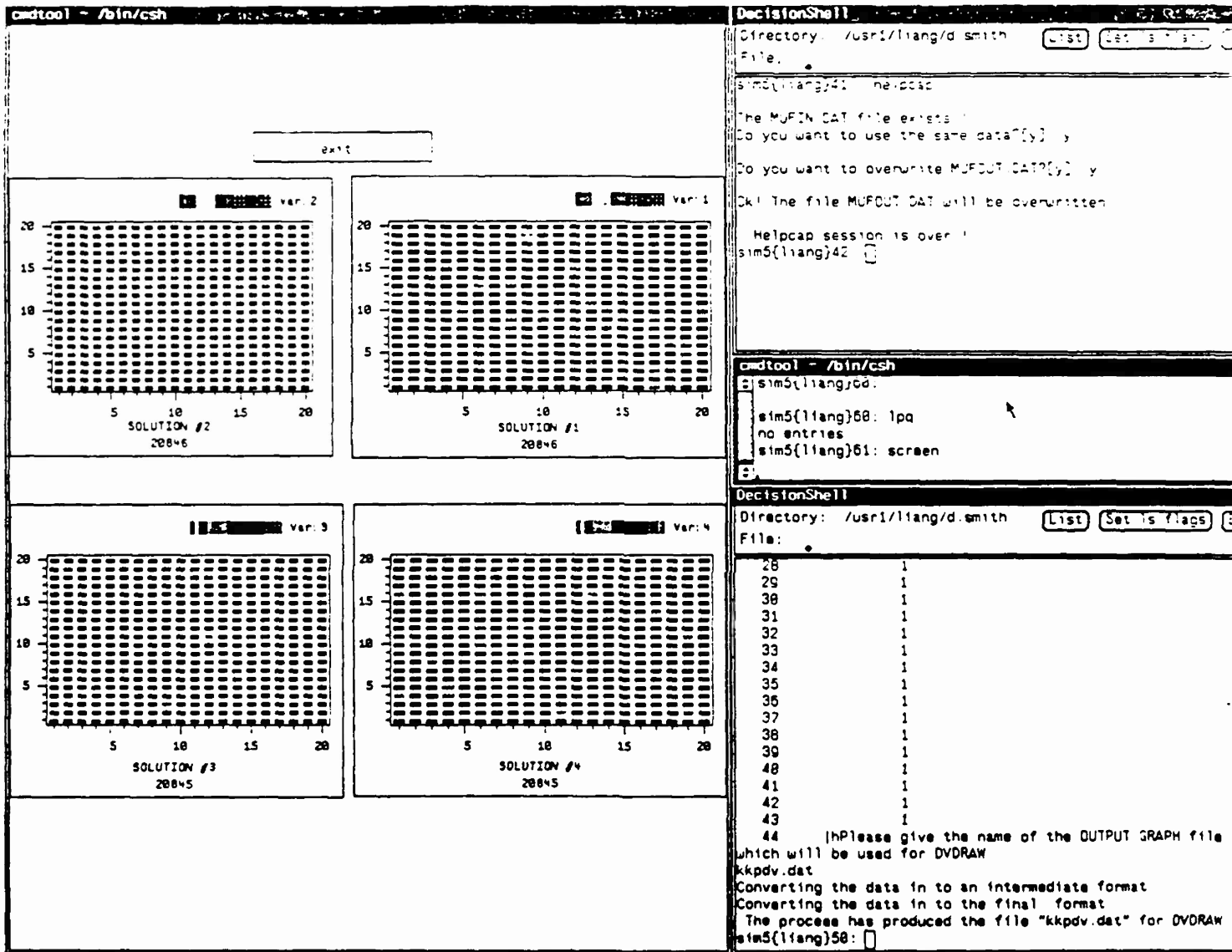


Figure 17: FIS Output



● Site Alternatives

Figure 18: ARCINFO Land Use Plan

networks, etc. One of the most practical and easily accessed tools has been a software package on the Apple Macintosh available from the University of Massachusetts. A sample illustration which was digitized on the Macintosh is represented in Figure 19.

In addition to the Macintosh software, we have utilized software from the Digital Image Analysis Laboratory *DIAL* at the University of Massachusetts which digitized the images that were presented in the slide presentation. Through the facilities at *DIAL* we can digitize and can represent with great accuracy and resolution base map information which forms the necessary backdrop for the site location decisions necessary in the DSS. We are currently porting these *DIAL* software tools into our SUN environments. Eventual integration with the FIS and GIS is in the future.

In this final Chapter we present an application and verification of our DSS as applied to current dining service location problems on Travis and Beale AFB.

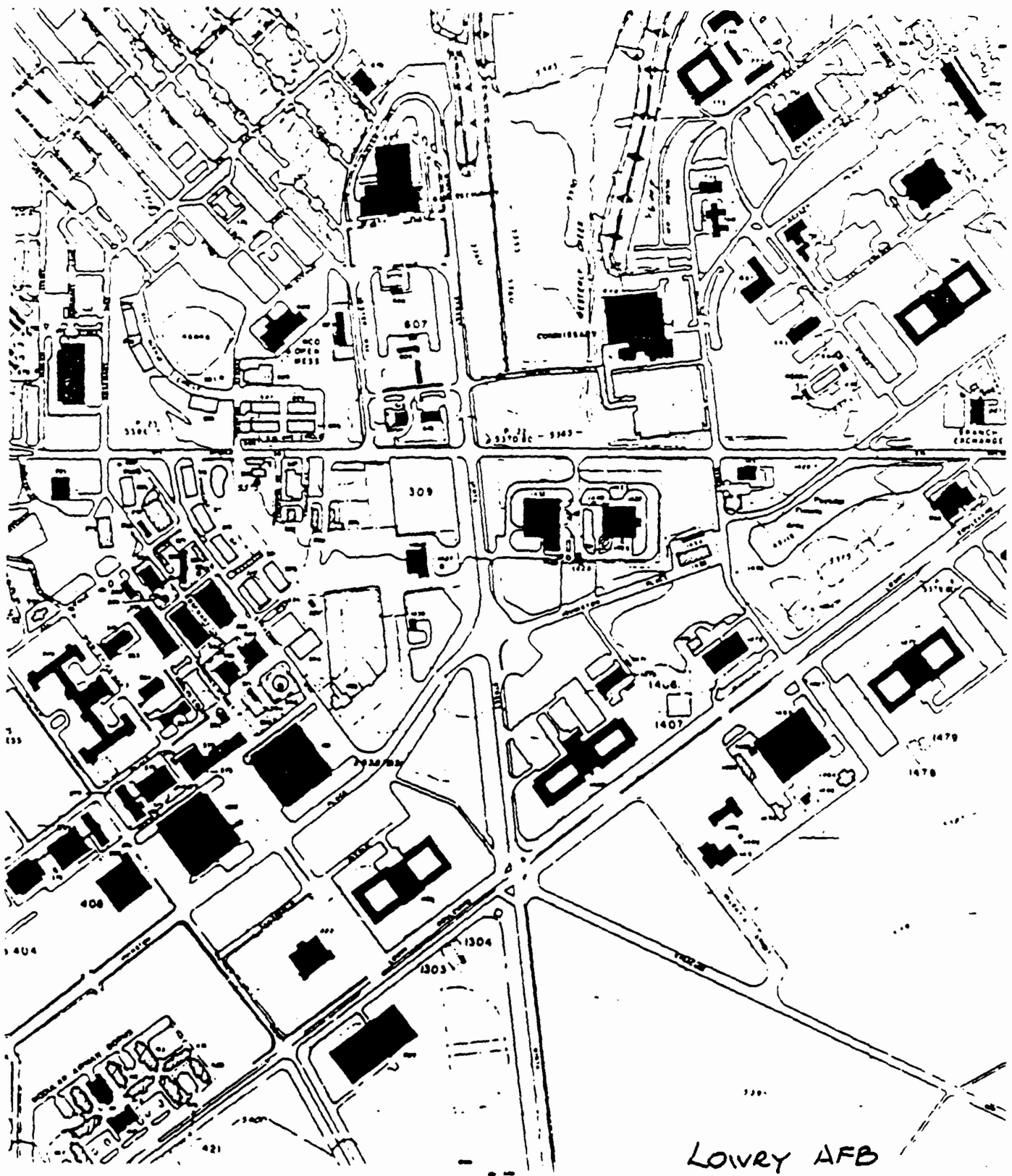


Figure 19: DIS Output

CHAPTER IV: MODEL VALIDATION

A. Overview

The DSS siting model was validated by solving two siting decision problems: selecting a site for an Airmen's Dining Hall (ADH) at Travis AFB and selecting a site for a Flight Kitchen (FK) at Beale AFB. This phase of the project included site visits to Travis AFB and Beale AFB to gather data and to meet with base personnel (Chief of Services and Planners/Engineers) to discuss the siting decision problem. This chapter presents a summary of the decision problem, input data and solution for each base.

B. Travis AFB

The recent closing of the Starlifter ADH (Building 1315) and MCP approval for a new ADH at Travis AFB made this an ideal base for validating the siting model. Although Travis personnel recently selected a site for the new ADH near the Building 1300 area, sites in the Building 100 area and the Building 200 area were also considered as possible locations for the new facility. Travis personnel indicated that the flow relationships, or interaction of the new facility with other existing and planned land use activities on the base were the dominant factors that influenced their siting decision. This is because their primary concern was to select a site that was compatible with Travis 2000, the comprehensive future land use plan for the base.

We used the siting model to select the optimal site for the new ADH among the three alternative locations described above. The location of the study area (approximately 1,000 acres of Travis AFB) and the three alternative sites within that study area are shown in Figure 20.

The linear term of the objective function (which represents the utility of each site based on site attribute data) was excluded from the model for this problem since site attributes had little or no impact on the siting decision made by Travis personnel. Thus, the performance measure of *Maximum Utility* was based solely on the interaction or flow term of the objective function for the siting problem at Travis AFB.

The following input data was required for solving the Travis siting problem with the *FIS*: the location of the three alternative sites for the new ADH, the location of each existing land use activity in the study area (represented by the location of the centroid of the activity), and the matrix of flow relationships between land use activities.

In order to generate the required location data, a land use map of the study area was tessellated by a cartesian grid and the centroid of each activity was determined.

This data is displayed graphically in Figure 21, where cells representing activity centroids are labelled with the corresponding activity number, and in tabular form in Figure 22. The locations of Site 1 (Building 1300 area), Site 2 (Building 100 area) and Site 3 (Building 200 area) for the new ADH are represented by cells 950, 506 and 216, and are labelled S1, S2 and S3, respectively.

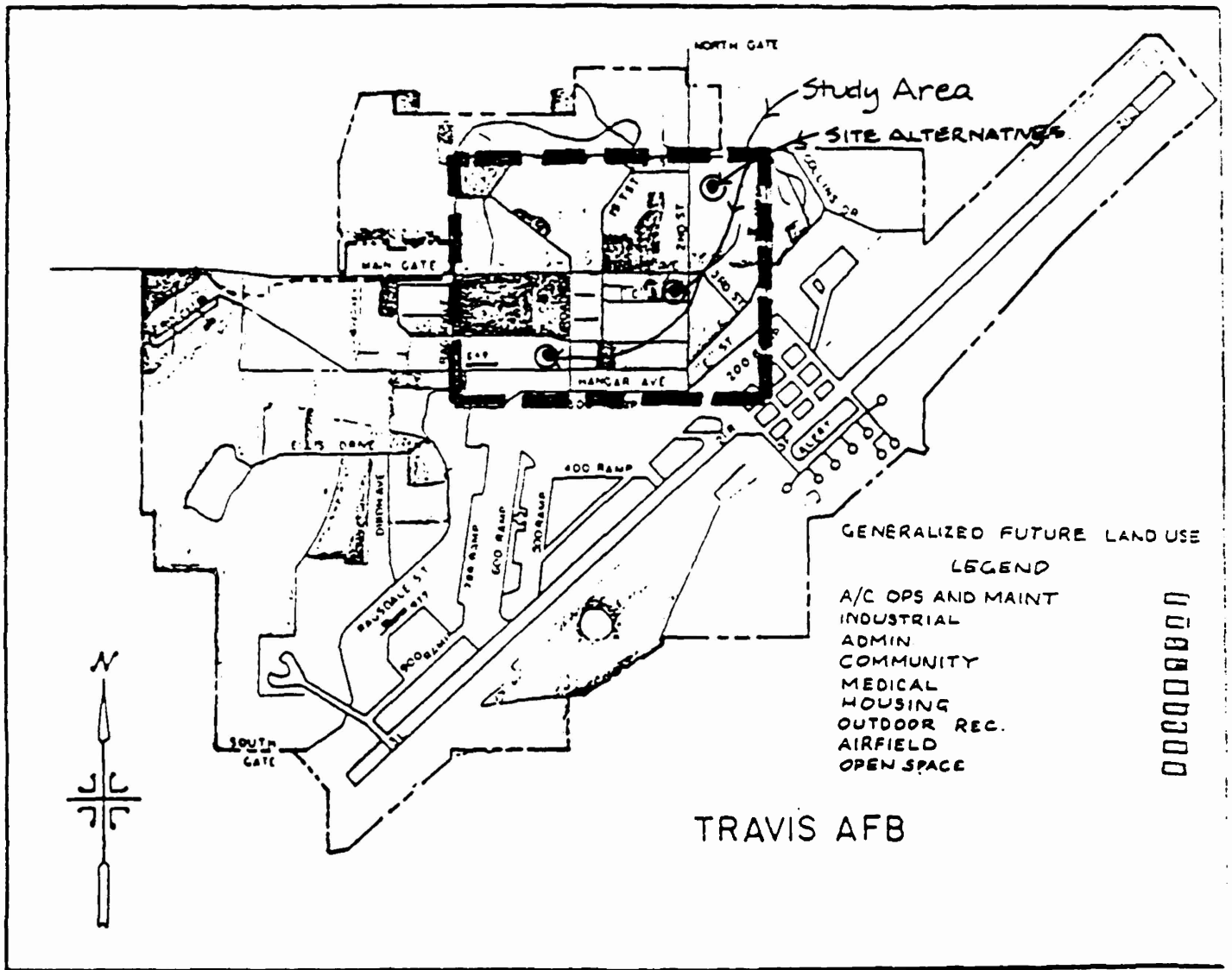


Figure 20: Travis Study Area

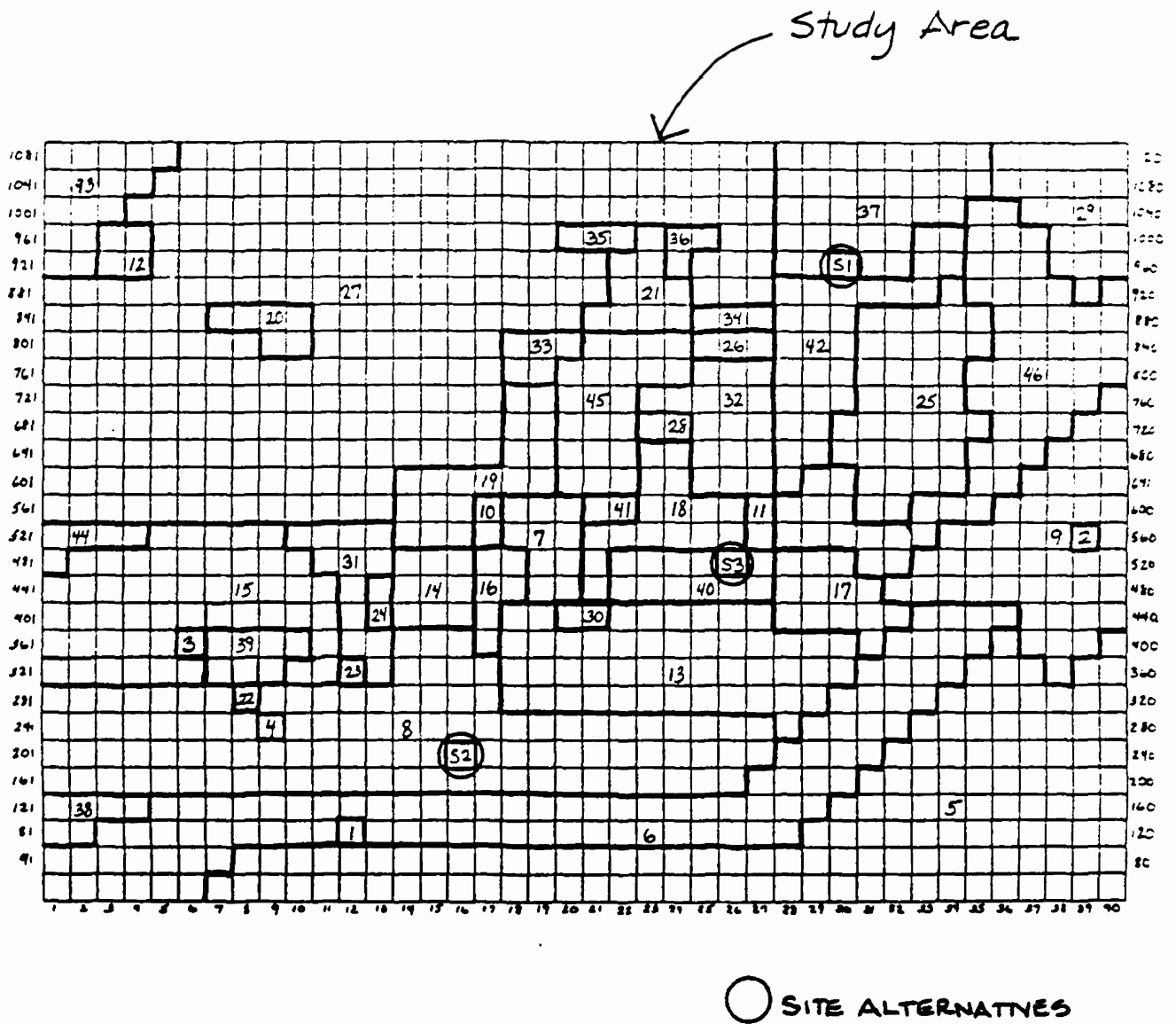


Figure 21: Location Data for Travis

ACTIVITY NAME	ACTIVITY NUMBER	CENTROID(S)
Fire Station	1	92
Flight Kitchen	2	559
Commercial Outlet	3	366
Troop Issue	4	249
Airfield	5	154
Aircraft Ops & Maint	6-7	103, 539
Industrial	8-12	254, 558, 577, 587, 924
Administration	13-14	344, 455
Community/Commer	15-21	448, 457, 470, 584 617, 849, 903
Medical	22-25	288, 332, 413, 753
Housing (Accomp.)	26-29	826, 892, 704, 1039
Housing (Unaccomp.)	30-37	421, 492, 746, 819 866, 981, 984, 1031
Outdoor Recreation	38-43	122, 368, 465, 582 829, 1042
Open Space	44-46	522, 741, 797
ADH	S1, S2, S3	950, 506, 216

Figure 22: Activity/Centroid Location Data
Travis AFB

The matrix of flow relationships for the Travis siting problem (Figure 23) is a subset of the matrix of flow relationships presented in Chapter III. This data represents the interaction between the ADH and all other existing land use activities within the study area.

Solving the Travis siting problem with the *FIS* we found that Site 3 was the optimal location for the new ADH with a performance measure of 20.80. Site 2 was the second-best location with a performance measure of 16.29. These solutions are displayed graphically in Figure 24; the grid in the upper right corner of Figure 24 represents the optimal solution and the grid in the upper left corner represents the second-best solution.

	ADH
Fire Station	5.21
Flight Kitchen	5.08
Commercial Outlet	1.75
Troop Issue	4.94
Airfield	3.44
Aircraft Ops & Maint	3.56
Industrial	3.25
Administration	3.94
Community/Commer.	2.97
Medical	3.56
Housing (Accompanied)	2.94
Housing (Unaccompanied)	5.81
Outdoor Recreation	3.44
Open Space	3.06

Figure 23: Matrix of Flow Relationships
Travis AFB

C. Beale AFB

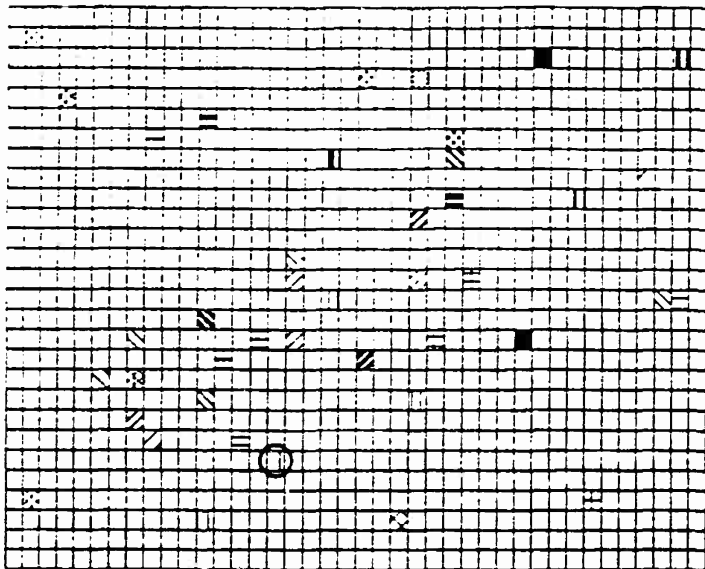
The Flight Kitchen (Building 1060) and Burch Inn ADH (Building 1086) at Beale AFB are operating under a critical space shortage and are in need of renovation. Both facilities are located in the flightline functional area of the base. Beale personnel were extremely interested in the siting model since several alternative locations for a new Flight Kitchen and/or ADH (or a consolidated facility) would be considered if MCP approval is obtained.

Beale personnel suggested several alternative sites that would be considered for a new facility. Two alternatives were to co-locate a new Flight Kitchen with either the existing ADH or the existing (but currently closed) Alert Kitchen; other alternative sites were located in open space areas within the flightline functional area. Further, they indicated that both site attributes and the flow relationships or interaction between the new facility and existing and planned land use activities in the flightline functional area would impact their siting decision, and suggested several site attributes that would be considered important at Beale AFB.

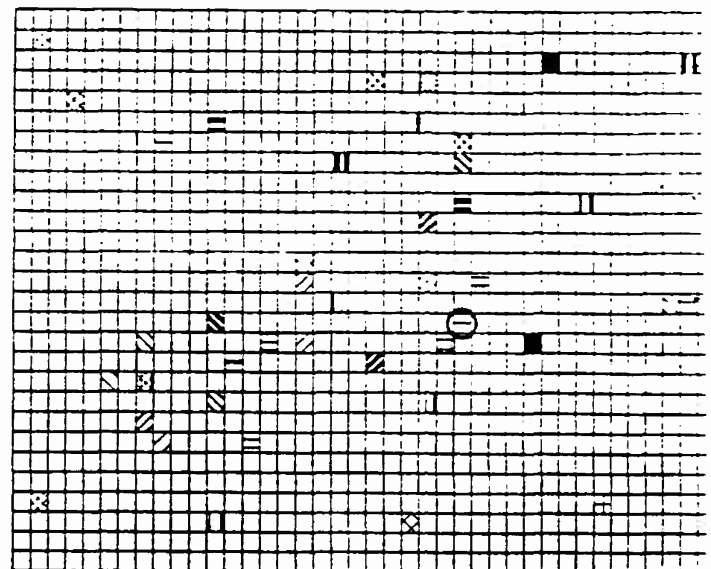
We used the siting model to select the best site for a Flight Kitchen among five alternatives in the flightline functional area of Beale AFB (Figure 25).

The flightline functional area is comprised of approximately 500 acres. Sites 1, 2 and 4 are located in areas of existing open space; Sites 3 and 5 represent co-locating the new facility with the ADH and Alert Kitchen, respectively.

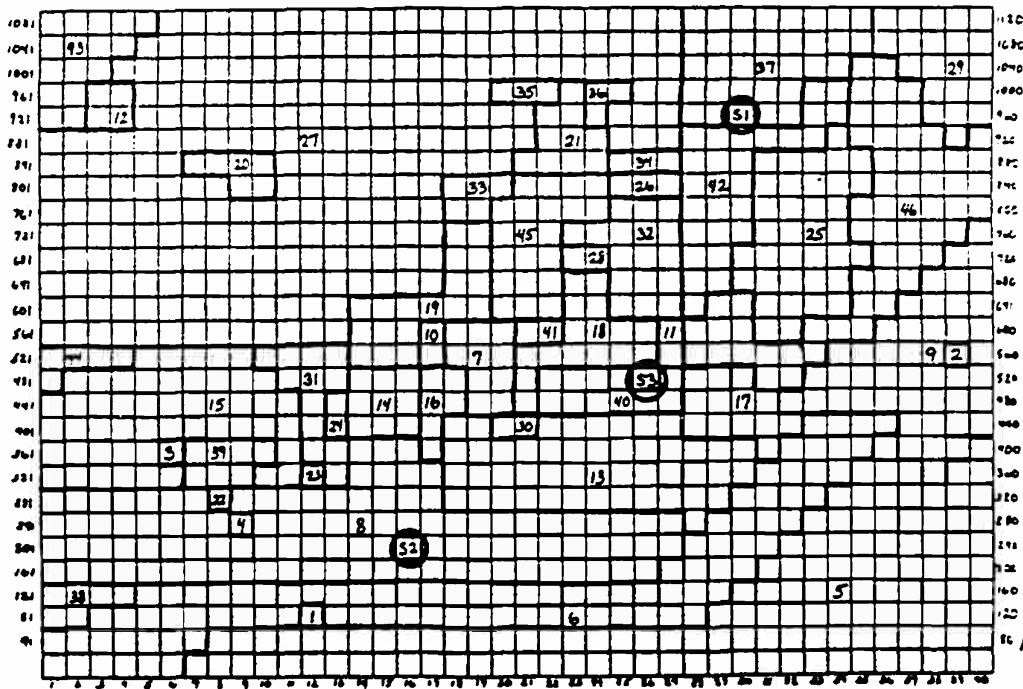
The following input data was required for solving the Beale siting problem with the FIS: the location of the five alternative sites for the new Flight Kitchen, the location of each existing land use activity in the flightline functional area (represented by the



18.20 2ND Best Solution



20.80 Optimal Solution



Input Data

○ SITE ALTERNATIVES



Figure 24: FIS Solution for Travis

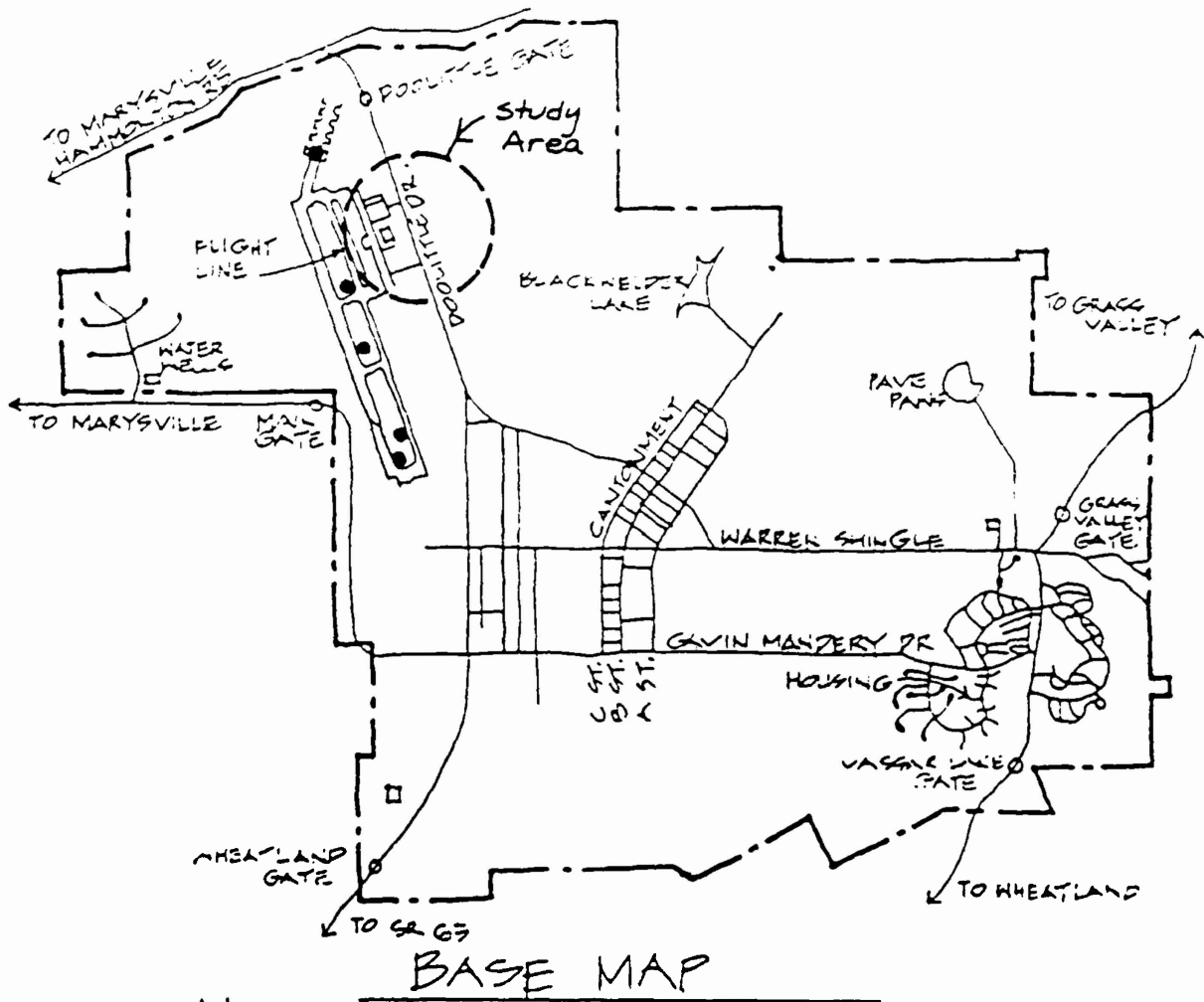


Figure 25: Beale Base Map

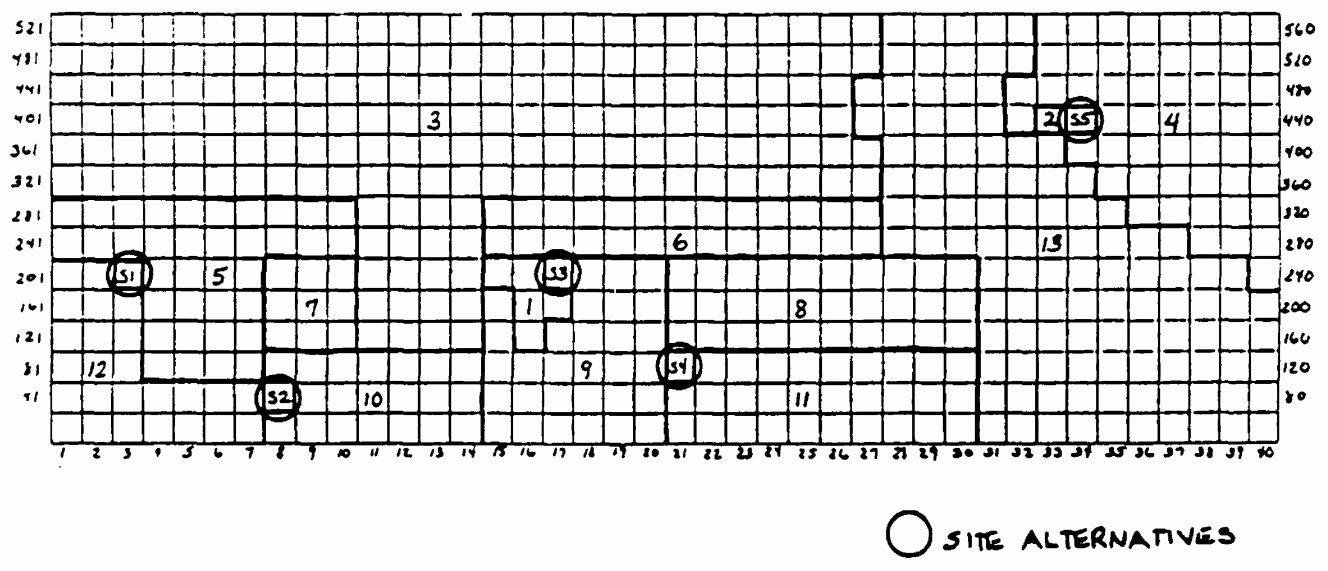
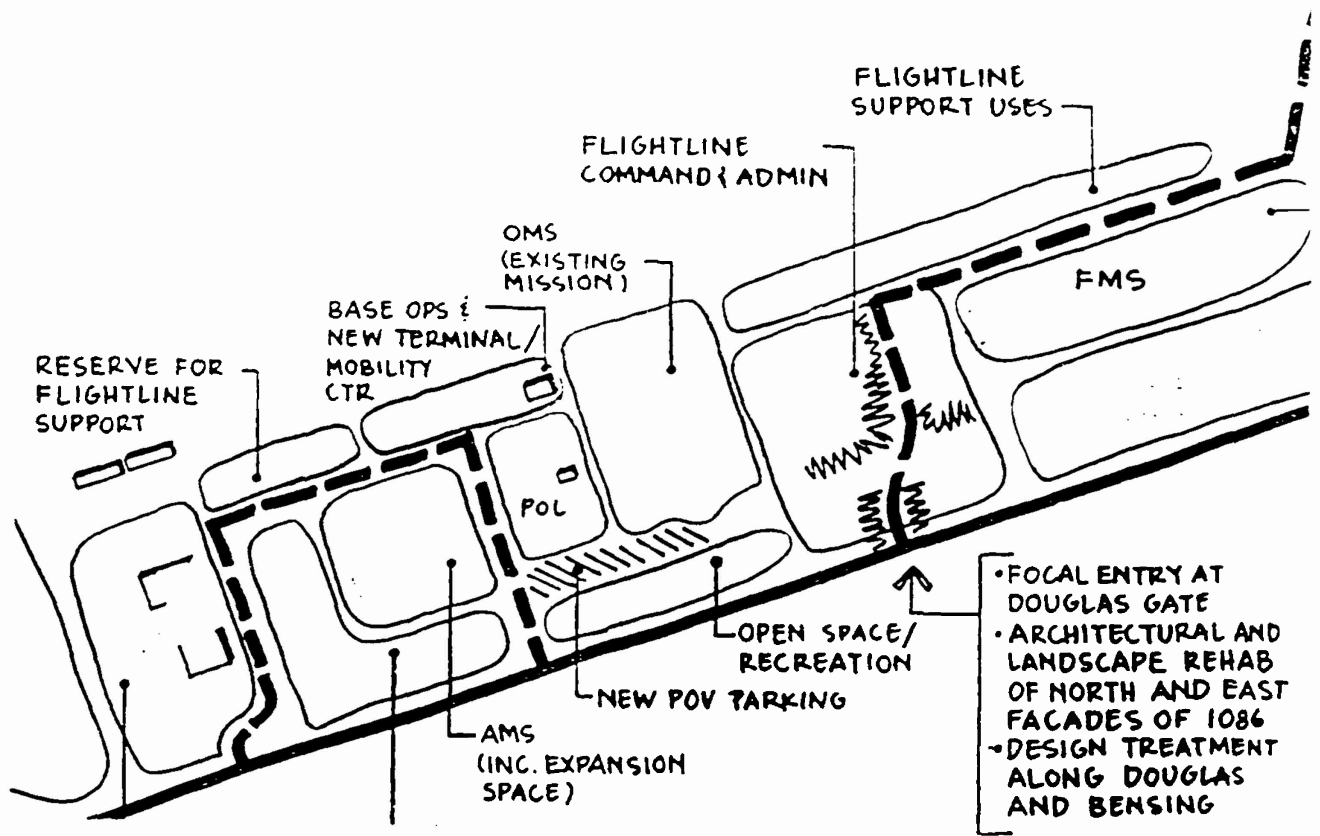


Figure 26: Location Data for Beale

location of the centroid of the activity), the matrix of flow relationships between land use activities, and a score reflecting the *utility* of each site based on site attributes.

In order to generate the required location data, a land use map of the flightline functional area was tessellated by a cartesian grid and the centroid of each activity was determined. This data is displayed graphically in Figure 26, where cells representing activity centroids are labelled with the corresponding activity number, and in tabular form in Figure 27.

The locations of Sites 1 through 5 are represented by cells 203, 48, 217, 101 and 434, and are labelled S1, S2, S3, S4 and S5, respectively.

ACTIVITY NAME	ACTIVITY NUMBER	CENTROID(S)
ADH	1	176
Alert Kitchen	2	433
Airfield	3-4	413, 437
Aircraft Ops & Maint	5-6	206, 261
Industrial	7-8	169, 185
Administrative	9	98
Outdoor Recreation	10-12	51, 65, 82
Open Space	13	273
FK	S1-S5	203, 48, 217, 101, 434

**Figure 27: Activity/Centroid Location Data
Beale AFB**

The matrix of flow relationships for the Beale AFB siting problem (Figure 28) is a subset of the matrix of flow relationships presented in Chapter II. This data summarizes the interaction between the Flight Kitchen and the existing land use activities in the flightline functional area.

The alternative sites were evaluated against the following five site attributes to determine the *utility of place* for each site:

1. Expandability: Square feet of vacant space adjacent to site that could be used for expansion of facility

2. Pedestrian Accessibility: Distance in miles from the site to the centroid of the flightline functional area

3. Environmental Hazard/Concern: Site located in or near potential subsurface contamination area (as outlined in the Planning Assistance Team (PAT) Report) (Yes/No)

	FK
ADH	5.08
Alert Kitchen	2.67
Airfield	4.42
Aircraft Ops & Maint	4.17
Industrial	3.58
Administrative	3.17
Outdoor Recreation	3.25
Open Space	2.75

Figure 28: Matrix of Flow Relationships
Beale AFB

4. **Vehicular Accessibility:** Distance in miles from the site to Doolittle Drive, the major arterial in the flightline functional area

5. **Parking:** Parking adjacent to or near the site (Yes/No)

Figure 29 presents a summary of site attribute data for the five alternative sites. *MUFCAP* (a software tool described in Chapter III) was used to collapse the array of attribute data for each site into a single score reflecting the overall utility of locating the new Flight Kitchen at that site. These scores are shown in Figure 30 (generated by the *FIS*) in which the five sites are ranked in order of expected utility. In addition, the *FIS* generates an alternative table (Figure 31) that can be used for sensitivity analysis.

Solving the Beale siting problem with the *FIS* we found that Site 3 (co-locating the new Flight Kitchen with the existing ADH) was the optimal location with a performance measure of 81.33. This solution is displayed graphically in Figure 32.

SUMMARY OF SITE ATTRIBUTE DATA
BEALE AFB

	Expandability (square feet)	Pedestrian Accessibility (miles)	Environmental Hazard/Concern	Vehicular Accessibility (miles)	Parking
Site 1	120,000	.7576	Yes	.1895	No
Site 2	200,000	.7197	Yes	.0379	Yes
Site 3	80,000	.2273	No	.1895	Yes
Site 4	120,000	.1894	Yes	.0758	No
Site 5	40,000	.6061	No	.3790	Yes

Figure 29: Site Attribute Data for Beale

RANKING IN ORDER OF EXPECTED UTILITY-- scale :

ALTERNATIVE	EXPECTED UTILITY
ACT 3	0.7224
ACT 2	0.6531
ACT 5	0.5246
ACT 4	0.4779
ACT 1	0.3153

Figure 30: Site Ranking

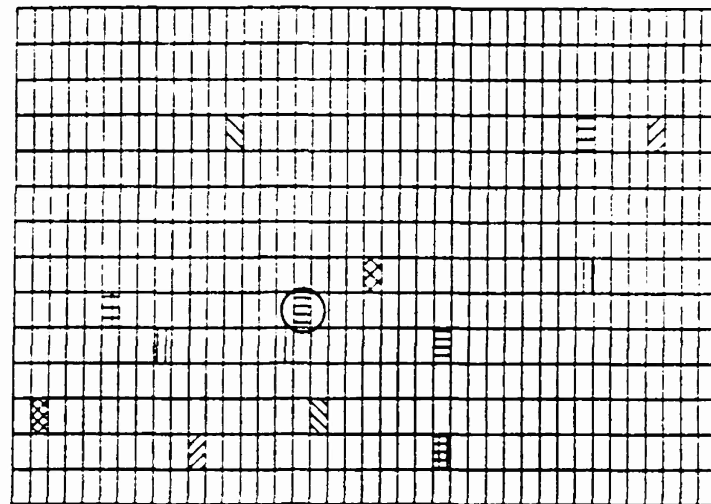
ALTERNATIVE TABLE:

ATTRIBUTES =	expandab	pedestri	environm	vehicula	parking
ALTERNATIVES:					
ACT 1	120.0	0.7580	0.0000E+00	0.1900	0.0000E+
U= (0.3153)	(0.6000)	(0.2420)	(0.0000)	(0.6200)	(0.0000)
ACT 2	200.0	0.7200	0.0000E+00	0.3800E-01	1.000
U= (0.9635)	(1.0000)	(0.2800)	(0.0000)	(0.9240)	(1.0000)
ACT 3	80.00	0.2270	1.000	0.1900	1.000
U= (1.6909)	(0.4000)	(0.7730)	(1.0000)	(0.6200)	(1.0000)
ACT 4	120.0	0.1890	0.0000E+00	0.7600E-01	0.0000E+
U= (2.1633)	(0.6000)	(0.8110)	(0.0000)	(0.3480)	(0.0000)
ACT 5	40.00	0.6060	1.000	0.3790	1.000
U= (2.6934)	(0.2000)	(0.3940)	(1.0000)	(0.2420)	(1.0000)

*** NOTE ***

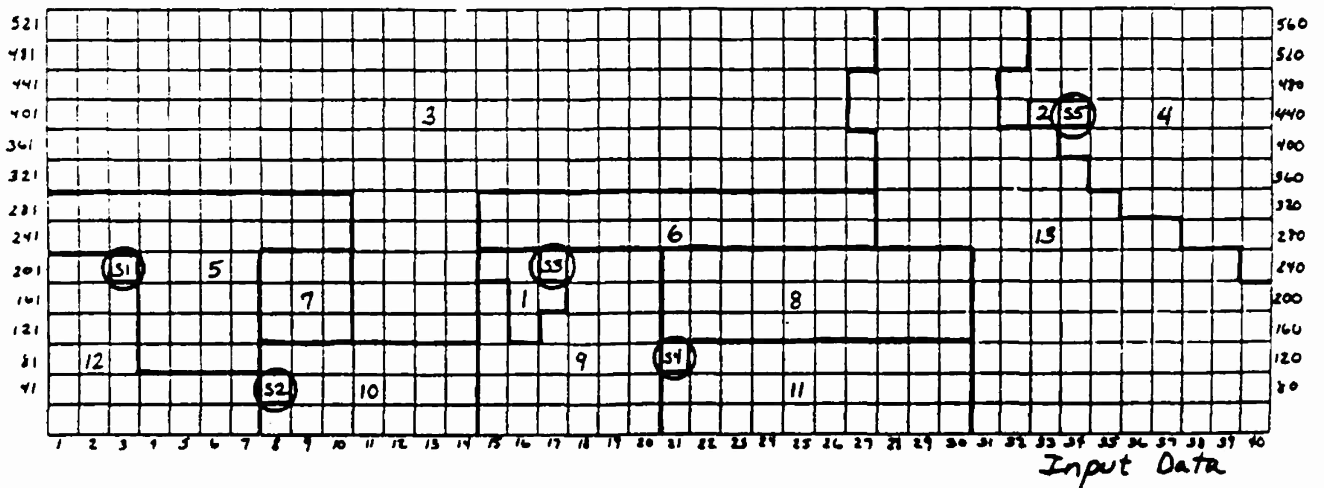
TWO ATTRIBUTE-SPECIFIC VALUES ARE LISTED FOR EACH ALTERNATIVE, ONE (THE EXPECTED UTILITY) BELOW THE OTHER (THE CERTAINTY EQUIVALENT). OVERALL UTILITY IS OUTPUT FOR EACH ALTERNATIVE (EXPRESSED AS U=).

Figure 31: Site Attribute Table



Optimal Solution

81.33



Input Data

Figure 32: FIS Solution for Beale

D. Summary and Conclusions

We have presented our DSS model for the siting of appropriated fund dining service facilities, the logic we have used to develop the model, the database used to assess its parameters and described the underlying software modelling tools which we have designed to carry out the DSS process. The DSS is a fairly sophisticated tool, but given the underlying complexity of locating facilities and designing land-use plans involving facilities costing millions of dollars, the best decision needs to be made given all necessary and relevant criteria.

The DSS is designed to follow the natural hierarchical planning process which occurs for locating these facilities over time. This planning process which may involve up to ten years of time is complicated by the fact that one needs to site a dining service facility on an exact location yet in the context of the larger service-life and location dynamics of other facilities and services on the AFB. This makes the best siting decision at an early stage in the planning process one of the most crucial to the entire fabric of the base.

Our three DSS decision shells/levels: *DIS*, *GIS*, & *FIS* corresponding to the three HPP planning stages: *BCP*, *ADP*, & *SPP* defined in Chapter I are nicely illustrated in Figure 33.

DIS: Planning Stage I: BCP



GIS: Planning Stage II: ADP



FIS: Planning Stage III: SPP

Figure 33: Integrated Model Environment

We feel that the software tools and the database for the siting decision process we have developed in this study represent a unique and valuable contribution to the siting of appropriated funded dining service facilities. While we have only truly integrated our software tools at the *FIS* level, the time is ripe and the tools are available for the eventual integration of all three levels.

APPENDIX I
Initial Site Visits Data

Travis AFB
California
MAC

A. Contacts

Lt Col Meinert, Chief of Services

Ernesto Cordova, Engineer/Planner

Ken Kaneda, Engineer/Planner

Jerry Heald, Engineer/Planner

60 ABG/DEEV

Travis AFB 04535-5496

438-2264 or 438-3043

B. Base Maps

Future Land Use Plan (1"=800')

Existing Land Use Plan (1"=800')

Comprehensive Development Plan (1"=400')

Transportation Plan (1"=400')

Installation Restoration Program (1"=400')

Cathodic Protection System (1"=400')

Liquid Fuel System (1"=400')

Central Heating and Gas System (1"=400')

Electrical Distribution System (1"=400')

Storm Drainage System (1"=400')

Sanitary Sewer System (1"=400')

Water Supply System (1"=400')

C. Reports and Documents

Planning Assistance Team Study (October, 1985)

Air Installation Compatible Use Zone Study (October, 1976)

D. Forms

D1. AF-1785 Facilities Inventory Report

Date: September, 1986

D2. AF-249 Food Service Operations Report

Reporting Period: January 1-31, 1987; March 1-31, 1987; April 1-30, 1987

Average Authorized SIK Daily: 923; 964; 912

E. Food Services

The tables on pages 3-6 summarize existing data on three categories of food service outlets on base:

E1. Appropriated Fund Food Services (ADH, CS, FK, FS, SF)

- A. Hours of Operation
- B. Daily Headcount by meal

E2. AAFES Food Services (BX, Burger King, etc)

E3. Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.)

F. Squadron Information

The tables on pages 7-9 summarize where personnel live and work on base, by squadron.

G. Distance from Dorm/Work to ADH

The tables on pages 10-14 summarize the distance from dormitory and work buildings to the ADH, by squadron

H. Weighted Distance from Dorm/Work to ADH

The tables on pages 15-19 show the weighted distance from dorm/work buildings to the ADH. The distance from each dorm/work site (pages 10-14) is weighted by the number of SIK personnel traveling that distance. We assume that the total number of SIK in each squadron is uniformly distributed among work/dorm buildings for that squadron. The weighted averages of dorm-ADH distance and work-ADH distance for SIK personnel in all squadrons on Travis AFB are presented on page 20.

I. Number of SIK Personnel vs. Distance to ADH

The histograms on pages 21-26 illustrate the distribution of SIK personnel by distance from work and dormitory buildings to each ADH on base.

Travis AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

HOURS OF OPERATION

- (1) Type of Facility: ADH, CS, FK, AK, FS, SF
- (2) Name of Facility
- (3) Building number (as shown on base map)
- (4) Hours of Operation for each meal
 - a. Monday through Friday
 - b. Weekends and Holidays

Type of Facility	Name of Facility	Building Number	Hours of Operation			
			Breakfast	Lunch	Dinner	Midnight
ADH	Galaxy	247	a. 0530-0730	a. 1030-1230	a. 1530-1730	a. 2300-0130
			b. 0630-1230	b. ———	b. 1530-1730	b. 2300-0130
ADH	Star-lifter	1315	a. 0600-0800	a. 1100-1300	a. 1600-1800	a. ———
			b. 0600-1300	b. ———	b. 1530-1730	b. ———
ADH	Ranch House	861	a. 0600-0800	a. 1100-1300	a. 1600-1800	a. ———
			b. 0600-1300	b. ———	b. 1530-1730	b. ———
CS	S100 Chicken Shack	560	a. 0800-1030	a. 1300-1500	a. 1800-2000	a. ———
			b. ———	b. 1300-1500	b. 1730-2000	b. ———
FS						

Travis AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

UTILIZATION

Type of Facility	Name of Facility	Building Number	Total Daily Headcount				Totals
			Breakfast	Lunch	Dinner	Midnight	
ADH	Galaxy	247	105	76	166	249	596
ADH	Star-lifter	1315	292	371	228	—	891
ADH	Ranch House	861	152	241	90	—	483
CS	S100 Chicken Shack	560	45	—	214	—	259
FS			—	13	11		24

(Based on average headcount for May, 1986)

Travis AFB

AAFES FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Monthly Food Sales
Terminal Cafeteria	P3	24 Hours Daily	\$ 165,103
Galaxy Lounge	1325	1200-2300 Mon-Thurs 1200-0100 Fri-Sat 1200-2300 Sun	\$ 33,655
Burger King Drive-thru	685	0630-2330 Mon-Thurs 0630-2400 Fri 0700-2400 Sat 0800-2300 Sun	\$ 151,019
Burger King Dining Room	685	0630-2130 Mon-Fri 0700-2130 Sat 0800-2130 Sun	
Flight Line Snack Bar	836	0700-1800 Mon-Fri Closed Sat-Sun	\$ 5,284
Hot Dog Stand	650	1000-1600 Mon-Fri 0900-1730 Sat 1100-1600 Sun	\$ 8,030
Deli	650	1000-1600 Mon-Fri 0900-1730 Sat 1100-1600 Sun	\$ 18,946
Baskin Robbins	650	1000-1800 Mon-Fri 0900-1730 Sat 1100-1600 Sun	\$ 7,395

Travis AFB

NON-APPROPRIATED FUND FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Annual Food Sales
NCO Club	660		\$ 198,553
Officer's Club	480	0630-0830 Mon-Fri 1100-1330 Mon-Fri	\$ 546,398
Golf Course Snack Bar	2012		\$ 45,963
Bowling Center Snack Bar	214		\$ 397,939

Travis AFB

SQUADRON INFORMATION

Squadron	Strength	% SIK	Dorm Building(s)	Work Site Buildings
22AF	171	1	107, 113, 1303 1304, 1306	241, 243
60MAW	513	13	1304, 1345	4, 50, 51, 150 238, 249, 1204 1212, 1312
504 AF BAND	48	0	858	867
7MAS	131	0	120, 860 1327	558
22MAS	150	.6	119, 1327	556
75MAS	156	0	119, 120 1303, 1330	912
86MAS	140	0	119, 860 1327	557
60AMS	428	11	1303, 1304 1306	21, 150, 804 942

Travis AFB

SQUADRON INFORMATION
(continued)

Squadron	Strength	% SIK	Dorm Building(s)	Work Site Building(s)
60FMS	1074	14	1328, 1329 1330, 1331 1332	11, 12, 16, 114, 525 550, 551, 808-810 819, 839, 840, 904 1201, 1330
60OMS	587	12	1307, 1308 1333	809, 810, 837 838, 1333
602OMS	324	6	855, 1334	52, 250, 549, 759 835, 840, 842, 843 844
60SUPS	347	16	107, 108 110, 111	111, 549, 1202
60 TRNSPS	98	26	109	109, 138, 139 144, 250, 977 1204
60APS	489	9	857, 859 1304, 1344 1346	911, 960 977, 981
60ABG	216	16	113, 114 118, 1330	51, 112, 246 1204
60CES	274	27	851, 853 858	571

Travis AFB

SQUADRON INFORMATION
(continued)

Squadron	Strength	% SIK	Dorm Building(s)	Work Site Building(s)
60SPS	261	.8	852, 854	246, 344, 700, 805 828, 850, 854
60SVS	92	29	107, 113 118	81, 404, 405 1312, 1315
1901CG	328	3	1330, 1343 1344	54, 241, 243 1348
3754 FLDTS	44	0	No Information	No Information
DET 2 1600 MES MACMET	10	0	1303	244
David Grant Medical Center	738	38	1303, 1304 1305, 1309 1310, 1333	117, 121, 237, 372 377, 380-383 543
17WS	5	0	1303, 1304 1306	241, 243

Travis AFB

DISTANCE FROM DORM TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Dorm Building(s)	Dorm-ADH Distance (miles)		
				Galaxy Building 247	Starlifter Building 1315	Ranch House Building 561
22AF	171	2 (1%)	107, 113	.6	1.1	1.4
			1303, 1304, 1306	.8	.02	2.5
60MAW	513	67 (13%)	1304	.8	.02	2.5
			1345	1.1	.2	2.8
504AFBAND	48	0	858	1.7	2.6	.04
7MAS	131	0	120	.4	1.2	1.4
			860	1.7	2.5	.02
			1327	1.1	.25	2.8
22MAS	150	1 (.6%)	119	.4	1.2	1.4
			1327	1.1	.25	2.8
75MAS	156	0	119, 120	.4	1.2	1.4
			1303	.8	.02	2.5
			1330	1.0	.17	2.7
86MAS	140	0	119	.4	1.2	1.4
			860	1.7	2.5	.02
			1327	1.1	.25	2.8
60AMS	428	49 (11%)	1303, 1304, 1306	.8	.02	2.5
60FMS	1074	152 (14%)	1328-32	1.0	.17	2.7
60OMS	587	70 (12%)	1307, 1308	.87	.08	2.6
			1333	.9	.09	2.6
602OMS	324	20 (6%)	855	1.8	2.6	.06
			1334	.9	.09	2.6

Travis AFB

DISTANCE FROM DORM TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Dorm Building(s)	Dorm-ADH Distance (miles)		
				Galaxy Building 247	Starlifter Building 1315	Ranch House Building 861
60SUPS	347	54 (16%)	107, 108	.6	1.02	1.46
			110, 111			
60TRNSPS	98	25 (26%)	109	.6	1.02	1.46
60APS	489	42 (9%)	857, 859	1.76	2.6	.04
			1304	.8	.02	2.5
			1344, 1346	.2	1.06	2.75
60ABG	216	34 (16%)	113, 114	.53	1.27	1.3
			118	.42	1.14	1.32
			1330	1.0	.17	2.7
60CES	274	73 (27%)	851, 853	1.8	2.65	.15
			858	1.7	2.6	.04
60SPS	261	2 (.8%)	852, 854	1.8	2.7	.15
60SVS	92	27 (29%)	107, 113, 118	.6	1.14	1.4
1901CG	328	11 (3%)	1330	1.0	.17	2.7
			1343, 1344	.23	1.06	2.75
3754FLDTS	44	0	No Information			
MACMET	10	0	1303	.8	.02	2.5
DGMC	738	283 (38%)	1303, 1304, 1305	.8	.02	2.5
			1309, 1310			
			1333			
17WS	5	0	1303, 1304, 1306	.8	.02	2.5

Travis AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles)		
				Galaxy Building 247	Starlifter Building 1315	Ranch House Building 861
22AF	171	2 (1%)	241, 243	.1	.7	1.8
60MAW	513	67 (13%)	4	.3	.85	1.7
			50-51	.17	.72	1.86
			150	.3	1.14	1.4
			238-239	.25	.76	1.67
			1204	.87	1.1	2.56
			1212	1.08	.9	2.76
			1312	.93	.09	2.6
504AFBAND	48	0	867	1.6	2.39	.09
7MAS	131	0	558	.6	1.44	1.21
22MAS	150	1 (.6%)	556	.64	1.48	1.17
75MAS	156	0	912	1.85	2.69	.17
86MAS	140	0	557	.63	1.46	1.19
60AMS	428	49 (11%)	21	.53	1.23	1.21
			150	.3	1.14	1.4
			804	1.17	1.9	.49
			942	2.33	3.24	.64
60FMS	1074	152 (14%)	11, 12	.23	.9	1.59
			16	.6	1.2	1.29
			114	.53	1.2	1.27
			525	.98	1.76	.7
			550, 551	.83	1.6	.87
			808	.87	1.74	.74
			809	1.04	1.9	.57
			810	1.14	2.08	.53
			819	1.4	2.16	.51
			839, 840	1.65	2.46	.42
			904	1.9	2.69	.23
			1201	.68	.9	2.5
1330	1.0	.17	2.7			

Travis AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles:		
				Galaxy Building 247	Starlifter Building 1315	Ranch House Building 551
60OMS	587	70 (12%)	809	1.04	1.9	.57
			810	1.14	2.08	.53
			837, 838	1.76	2.58	.49
			1333	.9	.09	2.6
602OMS	324	20 (6%)	52	.3	.8	1.93
			250	.2	.97	1.5
			549	.76	1.5	.85
			759	1.93	2.7	.5
			835, 840	1.65	2.46	.42
			842-844	1.78	2.58	.49
60SUPS	347	54 (16%)	111	.6	1.02	1.46
			549	.76	1.5	.85
			1202	.76	.95	2.4
60TRNSPS	98	25 (26%)	109	.6	1.02	1.46
			138, 139	.45	1.25	1.23
			144	.3	1.1	1.36
			250	.2	.96	1.5
			977	2.23	2.99	.57
			1204	.87	1.1	2.56
60APS	489	42 (9%)	911	1.86	2.63	.19
			960	2.54	3.31	.87
			977	2.23	2.99	.57
			981	2.0	2.8	.57
60ABG	216	34 (16%)	51	.17	.72	1.86
			112	.59	1.17	1.28
			246	.1	.74	1.8
			1204	.87	1.1	2.56
60CES	274	73 (27%)	571	.47	1.25	1.23

Travis AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles)		
				Galaxy Building 247	Starlifter Building 1315	Ranch House Building 861
60SPS	261	2 (.8%)	246	.11	.74	1.8
			344	.45	.66	2.14
			700	1.25	2.0	.9
			805	1.33	2.06	.36
			828	1.55	2.35	.42
			850	1.76	2.56	.27
			854	1.8	2.7	.15
60SVS	92	27 (29%)	81	.34	.57	2.0
			404, 405	.57	.34	2.06
			1312	.93	.09	2.56
			1315	.8	0	2.46
1901CG	328	11 (3%)	54	.32	.78	1.95
			241, 243	.1	.7	1.8
			1348	1.06	.23	2.68
3754FLDTS	44	0	No Information			
MACMET	10	0	244	.32	.57	1.86
DGMIC	738	283 (38%)	117	.49	1.0	1.44
			121	.45	1.25	1.23
			237	.45	.87	1.6
			372	.64	.19	2.27
			377	.78	.8	2.42
			380	.63	.32	2.23
			382, 383	.74	.17	2.37
			543	.57	1.36	1.12
17WS	5	0	241, 243	.1	.7	1.8

Travis AFB

WEIGHTED DORM-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total = of Bldgs	SIK per Bldg	= of Bldgs (line)	Weight	Dorm-ADH Distance			Weighted Distance		
						Bldg 247	Bldg 1315	Bldg 861	Bldg 247	Bldg 1315	Bldg 861
22AF	2	5	.4	2	.8	.6	1.1	1.4	.48	.88	1.12
				3	1.2	.8	.02	2.5	.96	.02	3.0
60MAW	67	2	33.5	1	33.5	.8	.02	2.5	26.8	.67	83.75
				1	33.5	1.1	.2	2.8	36.85	6.7	93.8
504AFBAND	0	1	0	1	0	1.7	2.6	.04	0	0	0
7MAS	0	3	0	1	0	.4	1.2	1.4	0	0	0
				1	0	1.7	2.5	.02	0	0	0
				1	0	1.1	.25	2.8	0	0	0
22MAS	1	2	.5	1	.5	.4	1.2	1.4	.2	.6	.7
				1	.5	1.1	.25	2.8	.55	.13	1.4
75MAS	0	4	0	2	0	.4	1.2	1.4	0	0	0
				1	0	.8	.02	2.5	0	0	0
				1	0	1.0	.17	2.7	0	0	0
86MAS	0	3	0	1	0	.4	1.2	1.4	0	0	0
				1	0	1.7	2.5	.02	0	0	0
				1	0	1.1	.25	2.8	0	0	0
60AMS	49	3	16.33	3	49	.8	.02	2.5	39.2	.98	122.5
60FMS	152	5	30.4	5	152	1.0	.17	2.7	152	25.84	410.4
60OMS	70	3	23.3	2	46.6	.87	.08	2.6	40.54	3.73	121.16
				1	23.3	.9	.09	2.6	20.97	2.09	60.58
602OMS	20	2	10	1	10	1.8	2.6	.06	18	26	.6
				1	10	.9	.09	2.6	9	.9	26
SUBTOTAL									345.35	68.54	925.01

Travis AFB

WEIGHTED DORM-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total = of Bldgs	SIK per Bldg	= of Bldgs (line)	Weight	Dorm-ADH Distance			Weighted Distance		
						Bldg 247	Bldg 1315	Bldg 861	Bldg 247	Bldg 1315	Bldg 861
60SUPS	54	4	13.5	4	54	.6	1.02	1.46	32.4	55.08	78.84
60TRNSPS	25	1	25	1	25	.6	1.02	1.46	15.0	25.5	36.5
60APS	42	5	8.4	2	16.8	1.76	2.6	.04	29.57	43.68	.67
				1	8.4	.8	.02	2.5	6.72	.17	21.0
				2	16.8	.2	1.06	2.75	3.36	17.8	46.2
60ABG	34	4	8.5	2	17	.53	1.27	1.3	9.01	21.59	22.1
				1	8.5	.42	1.14	1.32	3.57	9.69	11.22
				1	8.5	1.0	.17	2.7	8.5	1.45	22.95
60CES	73	3	24.3	2	48.6	1.8	2.65	.15	87.48	129.79	7.29
				1	24.3	1.7	2.6	.04	41.31	63.18	.97
60SPS	2	2	1	2	1	1.8	2.7	.15	3.6	5.4	.3
60SVS	27	3	9	3	27	.6	1.14	1.4	16.2	30.78	37.8
1901CG	11	3	3.7	1	3.7	1.0	.17	2.7	3.7	.63	9.99
				2	7.4	.23	1.06	2.75	1.7	7.84	20.35
3754FLDTS	0								0	0	0
MACMET	0	1	0	1	0	.8	.02	2.5	0	0	0
DGMC	283	6	47.2	5	236	.8	.02	2.5	188.8	4.72	590.0
				1	47.2	.9	.09	2.6	42.48	4.25	122.72
17WS	0	3	0	3	0	.8	.02	2.5	0	0	0
SUBTOTAL									493.4	420.55	1028.9

Travis AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance			Weighted Distance		
						Bldg 247	Bldg 1315	Bldg 861	Bldg 247	Bldg 1315	Bldg 861
22AF	2	2	1	2	2	.1	.7	1.8	.2	1.4	3.6
60MAW	67	9	7.45	1	7.45	.3	.85	1.7	2.24	6.33	12.67
				2	14.9	.17	.72	1.86	2.53	10.73	27.71
				1	7.45	.3	1.14	1.4	2.24	8.49	10.43
				2	14.9	.25	.76	1.67	3.73	11.32	24.88
				1	7.45	.87	1.1	2.56	6.48	8.2	19.07
				1	7.45	1.08	.9	2.76	8.05	6.7	20.56
504AFBAND	0				0	1.6	2.39	.09	0	0	0
						0	.6	1.44	1.21	0	0
7MAS	0				0	.64	1.48	1.17	.64	1.48	1.17
22MAS	1	1	1	1	1	1.85	2.69	.17	0	0	0
75MAS	0				0	.63	1.46	1.19	0	0	0
86MAS	0				0						
60AMS	49	4	12.25	1	12.25	.53	1.23	1.21	6.49	15.07	14.82
				1	12.25	.3	1.14	1.4	3.68	13.97	17.15
				1	12.25	1.17	1.9	.49	14.33	23.28	6.0
				1	12.25	2.33	3.24	.64	28.54	39.7	7.84
60FMS	152	16	9.5	2	19.0	.23	.9	1.59	4.37	17.1	30.2
				1	9.5	.6	1.2	1.29	5.7	11.4	12.26
				1	9.5	.53	1.2	1.27	5.04	11.4	12.07
				1	9.5	.98	1.76	.7	9.31	16.72	6.65
				2	19	.83	1.6	.87	15.77	30.4	16.53
				1	9.5	.87	1.74	.74	8.23	16.53	7.03
				1	9.5	1.04	1.9	.57	9.88	18.05	5.42
				1	9.5	1.14	2.08	.53	10.83	19.76	5.04
				1	9.5	1.4	2.16	.51	13.3	20.52	4.85
				2	19	1.65	2.46	.42	31.35	46.74	7.98
				1	9.5	1.9	2.69	.23	18.05	25.56	2.19
				1	9.5	.68	.9	2.5	6.46	8.55	23.75
1	9.5	1.0	.17	2.7	9.5	1.62	25.65				
SUBTOTAL									233.87	391.69	344.89

Travis AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total = of Bldgs	SIK per Bldg	= of Bldgs (line)	Weight	Work-ADH Distance			Weighted Distance		
						Bldg 247	Bldg 1315	Bldg 861	Bldg 247	Bldg 1315	Bldg 861
60OMS	70	5	14	1	14	1.04	1.9	.57	14.56	26.6	7.98
				1	14	1.14	2.08	.53	15.96	29.12	7.42
				2	28	1.78	2.58	.49	49.84	72.24	13.72
				1	14	.9	.09	2.6	12.6	1.26	36.4
602OMS	20	9	2.2	1	2.2	.3	.8	1.93	.66	1.76	4.25
				1	2.2	.2	.97	1.5	.44	2.13	3.3
				1	2.2	.76	1.5	.85	1.67	3.3	1.87
				1	2.2	1.93	2.7	.5	4.25	5.94	1.1
				2	4.4	1.65	2.46	.42	7.26	10.92	1.85
				3	6.6	1.78	2.58	.49	11.79	17.03	3.23
60SUPS	54	3	18	1	18	.6	1.02	1.46	10.8	18.36	26.28
				1	18	.76	1.5	.85	13.68	27.0	15.3
				1	18	.76	.95	2.4	13.68	17.1	43.2
60TRNSPS	25	7	3.6	1	3.6	.6	1.02	1.46	2.16	3.67	5.26
				2	7.2	.45	1.25	1.23	3.24	9.0	8.56
				1	3.6	.3	1.1	1.36	1.08	3.96	4.9
				1	3.6	.2	.96	1.5	.72	3.46	5.4
				1	3.6	2.23	2.99	.57	8.03	10.76	2.05
				1	3.6	.87	1.1	2.56	3.13	3.96	9.22
60APS	42	4	10.5	1	10.5	1.86	2.63	.19	19.53	27.62	1.99
				1	10.5	2.54	3.31	.87	26.67	34.76	9.14
				1	10.5	2.23	2.99	.57	23.42	31.4	5.99
				1	10.5	2.0	2.8	.57	21.0	29.4	5.99
60ABG	34	4	8.5	1	8.5	.17	.72	1.86	1.45	6.12	15.81
				1	8.5	.59	1.17	1.28	5.02	9.95	10.88
				1	8.5	.1	.74	1.8	.85	6.29	15.3
				1	8.5	.87	1.1	2.56	7.4	9.35	21.76
60CES	73	1	73	1	73	.47	1.25	1.23	34.3	91.25	89.79
SUBTOTAL									315.19	513.61	378.24

Travis AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance			Weighted Distance		
						Bldg 247	Bldg 1315	Bldg 861	Bldg 247	Bldg 1315	Bldg 861
60SPS	2	7	.29	1	.29	.11	.74	1.8	.03	.22	.52
				1	.29	.45	.66	2.14	.13	.19	.62
				1	.29	1.25	2.0	.9	.36	.58	.26
				1	.29	1.33	2.06	.36	.39	.6	.1
				1	.29	1.55	2.35	.42	.45	.68	.12
				1	.29	1.76	2.56	.27	.51	.74	.07
				1	.29	1.8	2.7	.15	.52	.78	.04
60SVS	27	5	5.4	1	5.4	.34	.57	2.0	1.84	3.08	10.8
				2	10.8	.57	.34	2.06	6.16	3.67	22.25
				1	5.4	.93	.09	2.56	5.02	.49	13.62
				1	5.4	.8	0	2.46	4.32	0	13.28
1901CG	11	4	2.75	1	2.75	.32	.78	1.95	.88	2.15	5.36
				2	5.5	.1	.7	1.8	.55	3.85	9.9
				1	2.75	1.06	.23	2.68	2.92	.63	7.37
3754FLDIS	3								0	0	0
MACMET	0	1	0	1	0	.32	.57	1.86	0	0	0
DGMC	283	9	31.4	1	31.4	.49	1.0	1.44	15.39	31.4	45.22
				1	31.4	.45	1.25	1.23	14.13	39.25	38.62
				1	31.4	.45	.87	1.6	14.13	27.32	50.24
				1	31.4	.64	.19	2.27	20.1	5.97	71.28
				1	31.4	.78	.8	2.42	24.49	25.12	75.99
				1	31.4	.63	.32	2.23	19.78	10.05	70.02
				2	62.8	.74	.17	2.37	46.47	10.67	148.84
1	31.4	.57	1.36	1.12	17.9	42.7	35.17				
17WS	0	2	0	0	0	.1	.7	1.8	0	0	0
SUBTOTAL									196.47	210.13	619.89

Travis AFB

WEIGHTED AVERAGE: DORM-ADH DISTANCE

Galaxy (Building 247)

Subtotal (page 15)	345.35
Subtotal (page 16)	<u>493.40</u>
TOTAL	$838.75 \div 912 = .9197$

Starlifter (Building 1315)

Subtotal (page 15)	68.54
Subtotal (page 16)	<u>420.55</u>
TOTAL	$489.09 \div 912 = .5363$

Ranch House (Building 861)

Subtotal (page 15)	925.01
Subtotal (page 16)	<u>1028.90</u>
TOTAL	$1953.91 \div 912 = 2.1424$

WEIGHTED AVERAGE: WORK-ADH DISTANCE

Galaxy (Building 247)

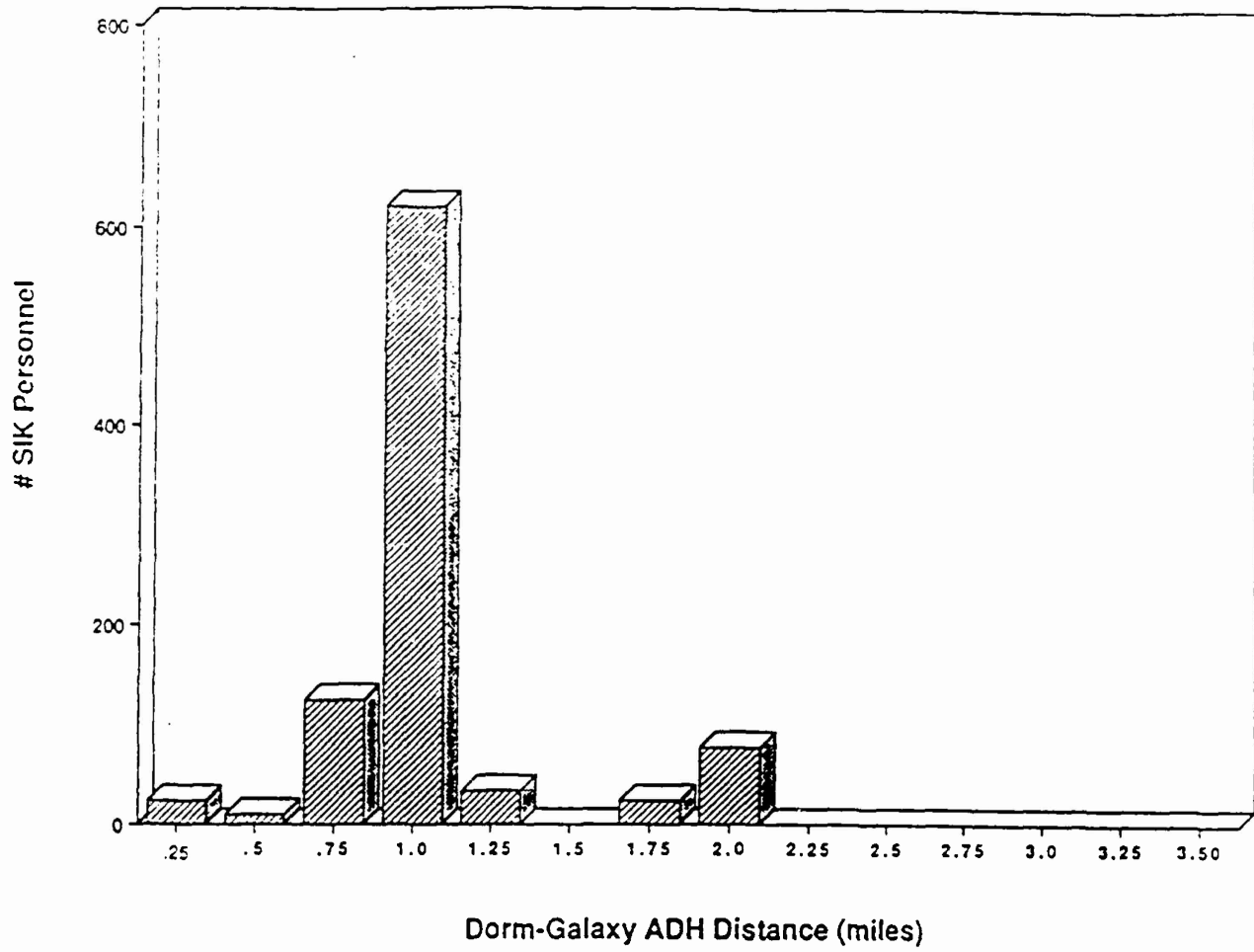
Subtotal (page 17)	233.87
Subtotal (page 18)	315.19
Subtotal (page 19)	<u>196.47</u>
TOTAL	$745.53 \div 912 = .8175$

Starlifter (Building 1315)

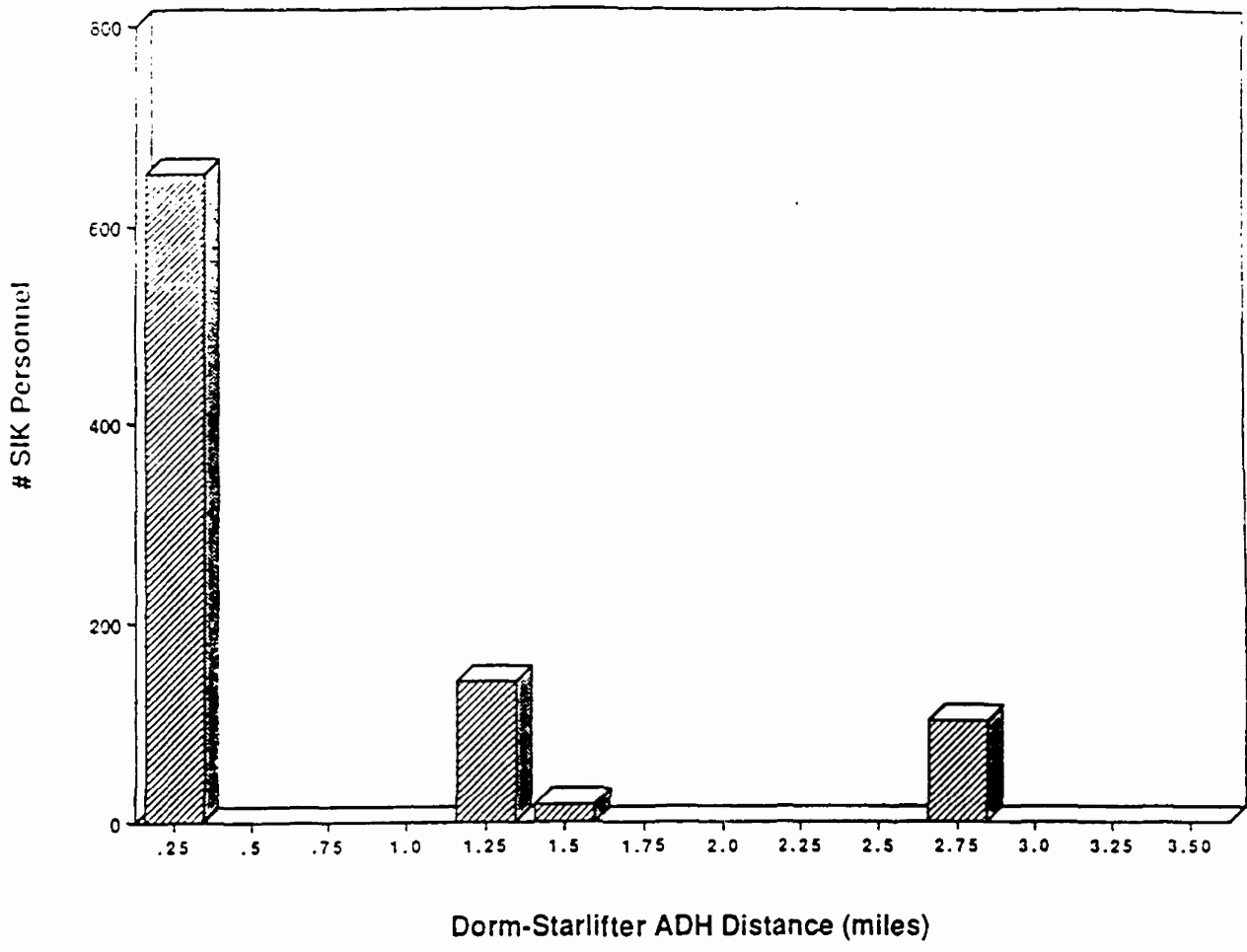
Subtotal (page 17)	391.69
Subtotal (page 18)	513.61
Subtotal (page 19)	<u>210.13</u>
TOTAL	$1115.43 \div 912 = 1.2231$

Ranch House (Building 861)

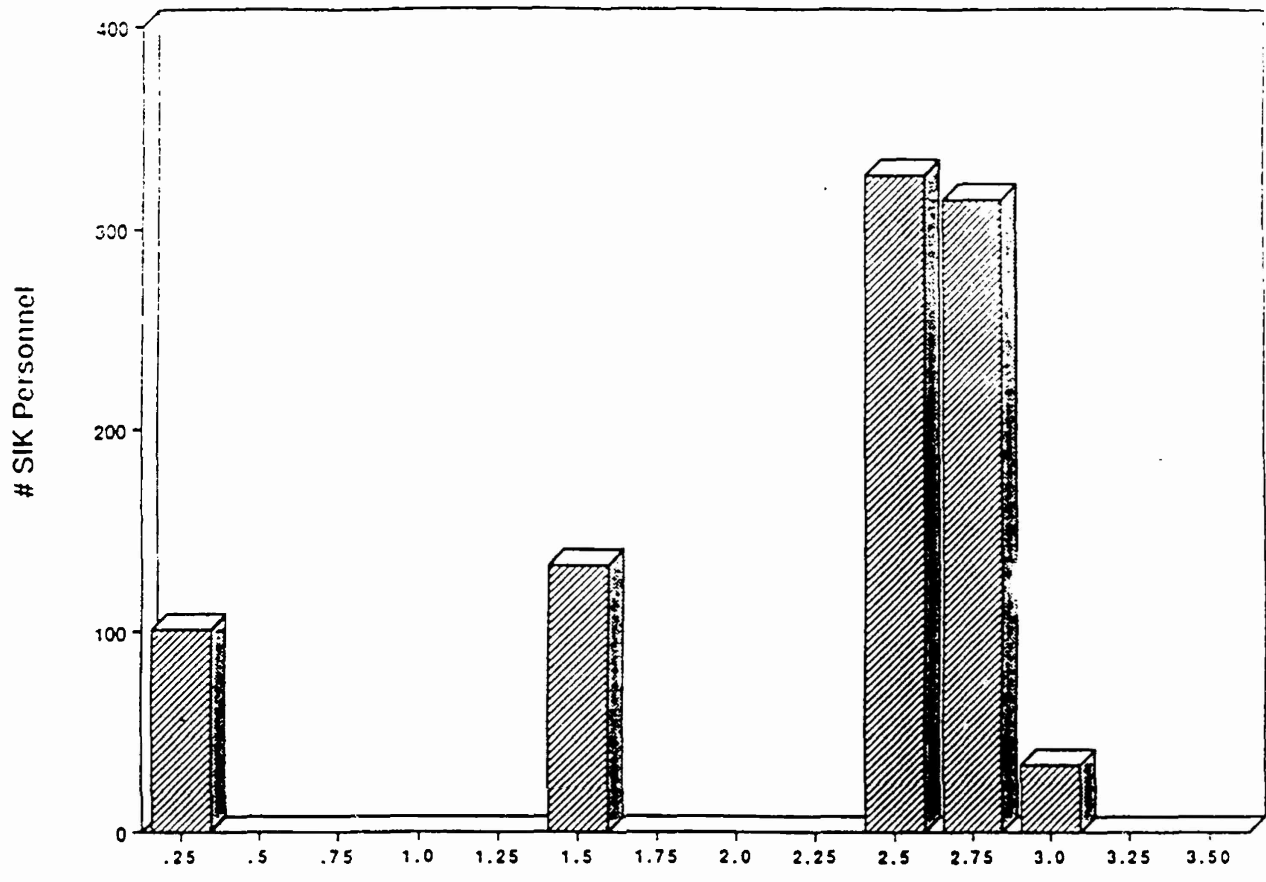
Subtotal (page 17)	344.89
Subtotal (page 18)	378.24
Subtotal (page 19)	<u>619.89</u>
TOTAL	$1343.02 \div 912 = 1.4726$



TRAVIS AFB

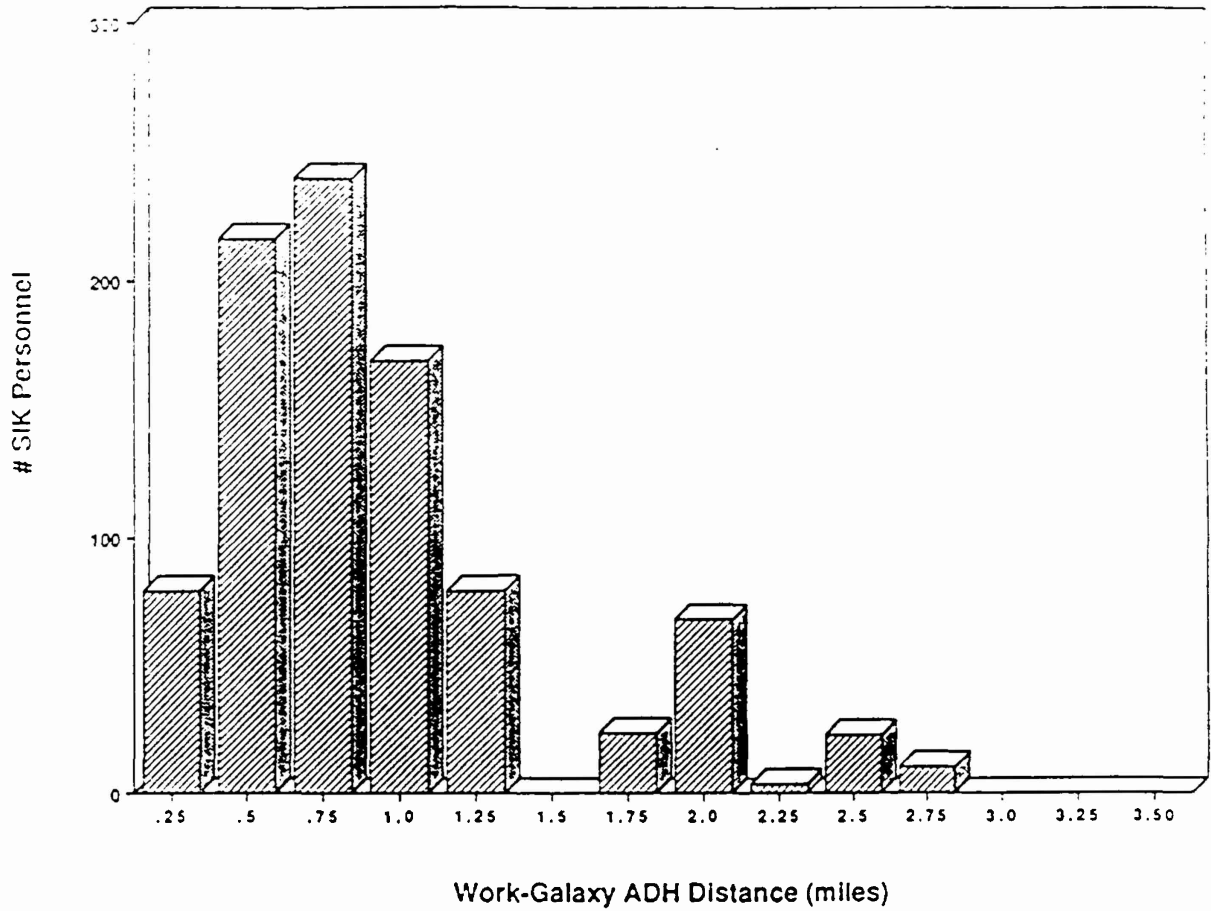


TRAVIS AFB

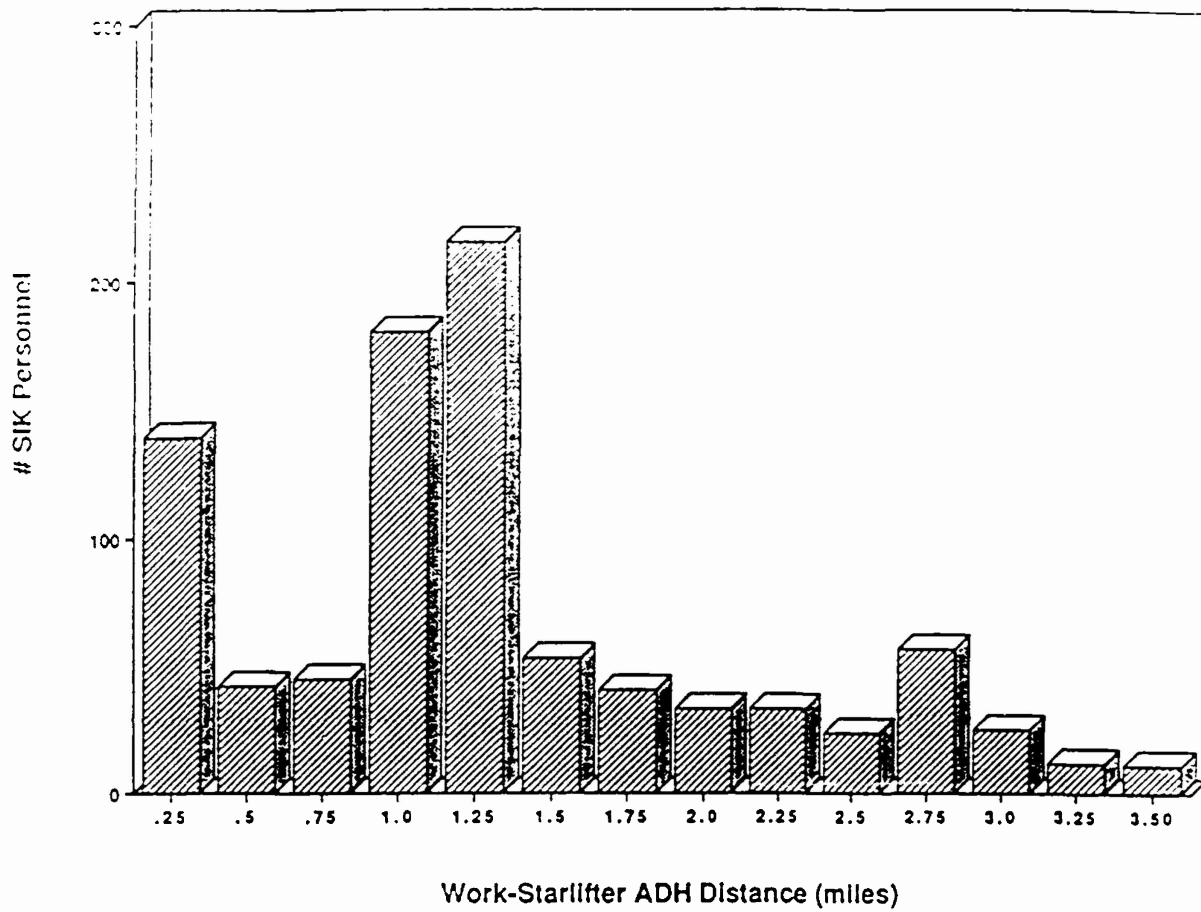


Dorm-Ranch House ADH Distance (miles)

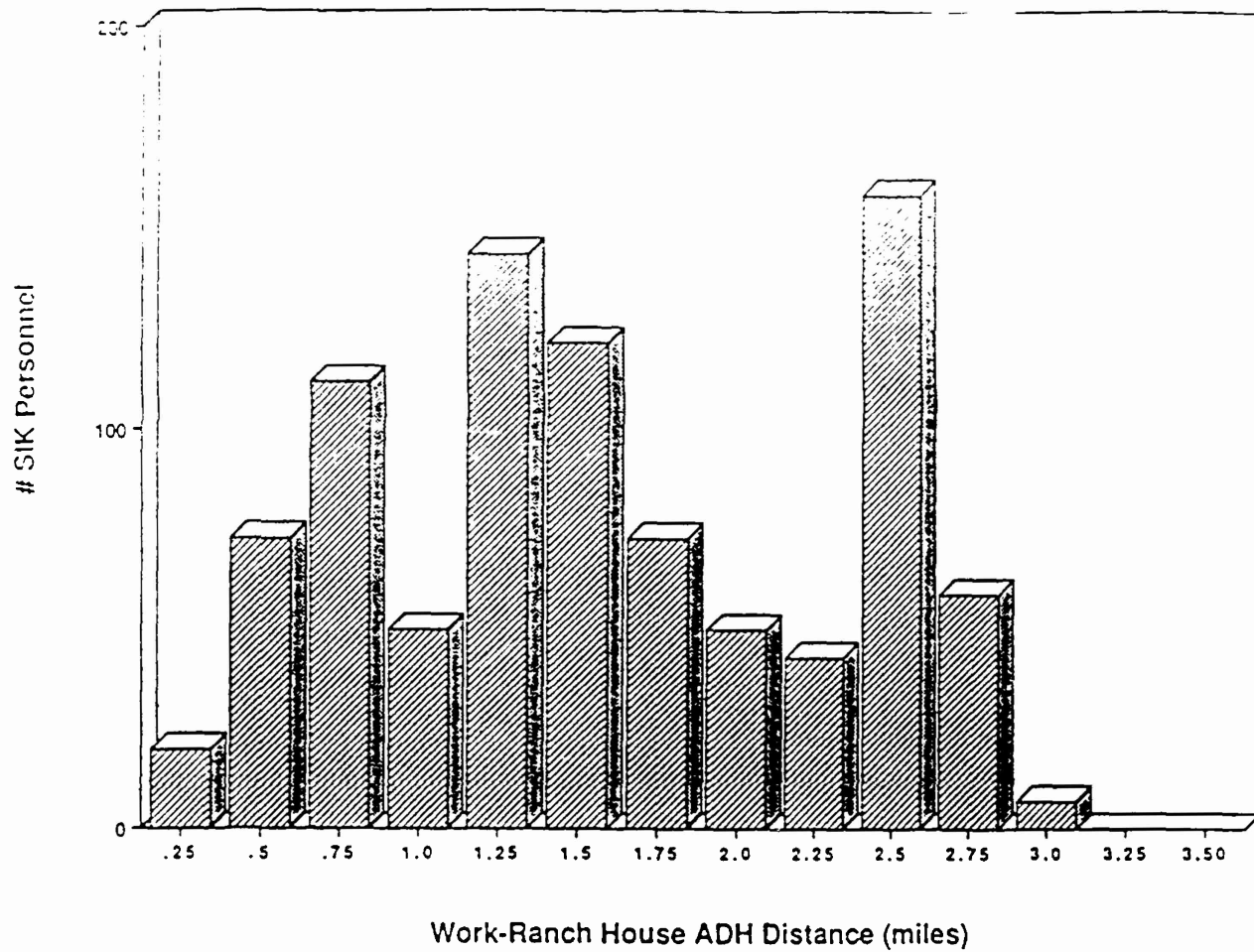
TRAVIS AFB



TRAVIS AFB



TRAVIS AFB



TRAVIS AFB

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B. Base Maps

Master Plan (1"=400')
Water Supply Systems (1"=400')
Sanitary Sewage Systems (1"=400')
Storm Drains (1"=400')
Central Heat and Gas (1"=400')

C. Reports and Documents

Planning Assistance Team Study (February, 1987)
Air Installation Compatible Use Zone Study (May, 1985)
Future Luke (Facilities Improvement Plan-2000)

D. Forms

D1. AF-1785 Facilities Inventory Report

Date: September 1, 1986

D2. AF-249 Food Service Operations Report

Reporting Period: March 1-31, 1987; April 1-30, 1987
Average Authorized SIK Daily: 1082; 1060

E. Food Services

The tables on pages 3-6 summarize existing data on three categories of food service outlets on base:

E1. Appropriated Fund Food Services (ADH, CS, FK, FS, SF)

- A. Hours of Operation
- B. Daily Headcount by meal

E2. AAFES Food Services (BX, Burger King, etc)

E3. Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.)

F. Squadron Information

The table on page 7 summarizes where personnel live and work on base, by squadron.

G. Distance from Dorm/Work to ADH

The tables on pages 8-10 summarize the distance from dormitory and work buildings to the ADH, by squadron.

H. Weighted Distance from Dorm/Work to ADH

The tables on pages 11-13 show the weighted distance from dorm/work buildings to the ADH. The distance from each dorm/work site (pages 8-10) is weighted by the number of SIK personnel traveling that distance. We assume that the total number of SIK in each squadron is uniformly distributed among dorm/work buildings for that squadron. The weighted averages of dorm-ADH distance and work-ADH distance for SIK personnel in all squadrons on Luke AFB are presented on page 14.

I. Number of SIK Personnel vs. Distance to ADH

The histograms on pages 15-16 illustrate the distribution of SIK personnel by distance from work and dormitory buildings to each ADH on base.

Luke AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

HOURS OF OPERATION

- (1) Type of Facility: ADH, CS, FK, AK, FS, SF
- (2) Name of Facility
- (3) Building number (as shown on base map)
- (4) Hours of Operation for each meal
 - a. Monday through Friday
 - b. Weekends and Holidays

Type of Facility	Name of Facility	Building Number	Hours of Operation			
			Breakfast	Lunch	Dinner	Midnight
ADH	Thunderbird	543	a. 0430-0800	a. 1030-1300 a. 1500-1530	a. 1600-1800	a. 2245-0100
	Inn		b. 0600-1330	b. ———	b. 1530-1800	b. 2245-0100
	Thunderbird (carry-out)	543	a. ——— b. ———	a. ——— b. ———	a. 1900-2100 b. ———	a. ——— b. ———
FK	Thunderbolt (carry-out)	907	a. ——— b. ———	a. 1100-1330 b. ———	a. 1600-1800 b. ———	a. ——— b. ———
FS		443	a. ——— b. ———	a. 1100-1145 b. 1100-1145	a. 1700-1745 b. 1700-1745	a. ——— b. ———

Luke AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

UTILIZATION

Type of Facility	Name of Facility	Building Number	Total Daily Headcount				Totals
			Breakfast	Lunch	Dinner	Midnight	
ADH	Thunderbird Inn	543	470	513	504	175	1662
	Carry-out	543	—	—	153	—	153
FK	Thunderbolt	907	—	383	297	—	680
FS		443	—	15	15	—	30

Luke AFB

AAFES FOOD SERVICE FACILITIES

Name of Facility	Building Number	Total Daily Headcount			Totals
		Breakfast	Lunch	Dinner	
Burger King	1520	270	617	217	1104
Pizza Pub	18	N/A	108	75	183
Snack Bar (BX)	1540	55	100	40	195
Snack Bar (Base Ops)	439	70	45	N/A	115

Luke AFB

NON-APPROPRIATED FUND FOOD SERVICE FACILITIES

Name of Facility	Building Number	Total Daily Headcount			Totals
		Breakfast	Lunch	Dinner	
NCOOM	259	N/A	295	65	360
OOM	750	38	163	72	273
Bowling Center Snack Bar	1525	85	245	180	510

Luke AFB

SQUADRON INFORMATION

Squadron	Strength	% SIK	Dorm Building(s)	Work Site Buildings
55	1375	23	528, 530, 542, 565	900, 902-07, 909-18, 920-24 930-33, 935, 940-43, 947-56 959-63, 965, 968, 970-74, 976-77 979-94, 996, 998-99, 1002-3 1005-10, 1016, 1022
405	1427	23	569, 581, 587	400, 401, 404, 407, 414-17 419, 422, 426, 431-32, 435, 439 442-44, 450-51, 453-54, 458-59 460, 465, 467, 470, 475, 482, 484 485, 491-92, 495, 497, 499
CSG	1166	12	636	242, 244-49, 256, 259, 260, 268 275, 280, 284-85, 287-91, 296 718-23, 727-29
832 SU'PS	327	30	637	908, 944, 945, 964
607th	110	32	528, 569	1353, 1354, 1362, 1365, 1369 1371, 1373, 1377, 1382-87
CES	227	33	634	300, 304, 310, 312, 315, 316 321-26, 329, 338-39, 341-45, 348 352, 354-55, 357-58, 362, 373, 375 392

Luke AFB

DISTANCE FROM DORM TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Dorm Building(s)	Dorm-ADH Distance (miles) Thunderbird Inn Building 543
58	1575	361 (23%)	528	.11
			530	.06
			542	.25
			565	.04
405	1427	308 (23%)	569	.08
			581	.11
			587	.19
CSG	1166	137 (12%)	636	.21
832SUPS	327	99 (30%)	637	.23
607	110	35 (32%)	528	.11
			569	.08
CES	227	74 (33%)	634	.11

Luke AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles) Thunderbird Inn Building 543
58	1575	361 (23%)	947-51, 960	1.25
			900, 906, 909, 918 922, 924, 928, 943 965, 968, 992	1.42
			911, 912, 940 942, 959	1.5
			903-05, 907, 913 916, 920, 921, 923 925-27, 941, 954 956, 963, 971-72	1.6
			930-32, 962 974	1.6
			914-15, 935, 953 961, 970, 973	1.76
			902, 910, 917, 933 976, 980, 981, 984 986, 987, 989, 990 994, 996, 998	1.70
			955, 982, 983, 985, 991	1.88
			952, 977, 979, 988 993, 999, 1022	1.93
			1008-1010 1016	1.93
			1005-1007	2.14
			1002, 1003	2.27

Luke AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles, Thunderbird Inn Building 543)
405	1427	308 (23%)	482, 484, 491, 492	.45
			495, 497, 499	
			431, 470, 475, 485	.34
			450, 451, 453, 454	.34
			460, 467	
			458, 459, 465	.19
			432, 435, 439	.38
			442-44	
			407, 416, 422, 426	.47
			414, 415, 417, 419	.42
CSG	1166	137 (12%)	400, 401, 404	.64
			242, 244-49	.3
			256, 259, 260, 268	.3
			275, 280, 284-85	.36
			287-91, 296	
			718-23	.38
832SUPS	327	99 (30%)	727-29	.42
			908, 944-45	1.14
607	110	35 (32%)	964	
			1365, 1369, 1373	1.9
			1353, 1354, 1377	2.0
			1371, 1382-83	2.0
			1384, 1362	2.08
CES	227	74 (33%)	1385-87	2.27
			310, 312, 315-16, 392	.64
			304, 324-26, 329	.42
			341, 342, 345, 348	
			323, 338-39, 343-44	.57
			352, 354-55, 357-58	
362, 373, 375				
300, 321-22	.49			

Luke AFB

WEIGHTED DORM-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Dorm-ADH Distance	
						Thunderbird Inn Building 543	Weighted Distance Thunderbird Inn Building 543
58	361	4	90.25	1	90.25	.11	9.93
				1	90.25	.06	5.42
				1	90.25	.25	22.56
				1	90.25	.04	3.61
405	308	3	102.7	1	102.7	.08	8.22
				1	102.7	.11	11.3
				1	102.7	.19	19.5
CSG	137	1	137	1	137	.21	28.77
832SUPS	99	1	99	1	99	.23	22.77
607	35	2	17.5	1	17.5	.11	1.93
				1	17.5	.08	1.4
CES	74	1	74	1	74	.11	8.14
TOTAL							143.55

Luke AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance	
						Thunderbird Inn Building 543	Weighted Distance Thunderbird Inn Building 543
58	361	88	4.1	6	24.6	1.25	30.75
				11	45.1	1.42	64
				5	20.5	1.5	30.75
				18	73.8	1.6	118
				5	20.5	1.6	32.8
				7	28.7	1.76	50.5
				15	61.5	1.70	104.55
				5	20.5	1.88	38.5
				7	28.7	1.93	55.4
				4	16.4	1.93	31.7
				3	12.3	2.14	26.3
				2	8.2	2.27	18.6
				405	308	37	8.3
4	33.2	.34	11.3				
6	49.8	.34	16.9				
3	24.9	.19	4.7				
6	49.8	.38	18.9				
4	33.2	.47	15.6				
4	33.2	.42	13.9				
3	24.9	.64	15.9				
CSG	137	30	4.6	7	32.2	.3	9.6
				4	18.4	.3	5.5
				10	46.0	.36	16.5
				6	27.6	.38	10.5
				3	13.8	.42	5.8
832SUPS	99	4	4	24.75	99	1.14	112.8
SUBTOTAL							885.95

Luke AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance	
						Thunderbird Inn Building 543	Weighted Distance Thunderbird Inn Building 543
607	35	14	2.5	3	7.5	1.9	14.25
				3	7.5	2.0	15.0
				3	7.5	2.0	15.0
				2	5.0	2.08	10.4
				3	7.5	2.27	17.0
CES	74	30	2.5	5	12.5	.64	8.0
				9	22.5	.42	9.5
				13	32.5	.57	18.5
				3	7.5	.49	3.7
SUBTOTAL							111.35

Luke AFB

WEIGHTED AVERAGE: DORM-ADH DISTANCE

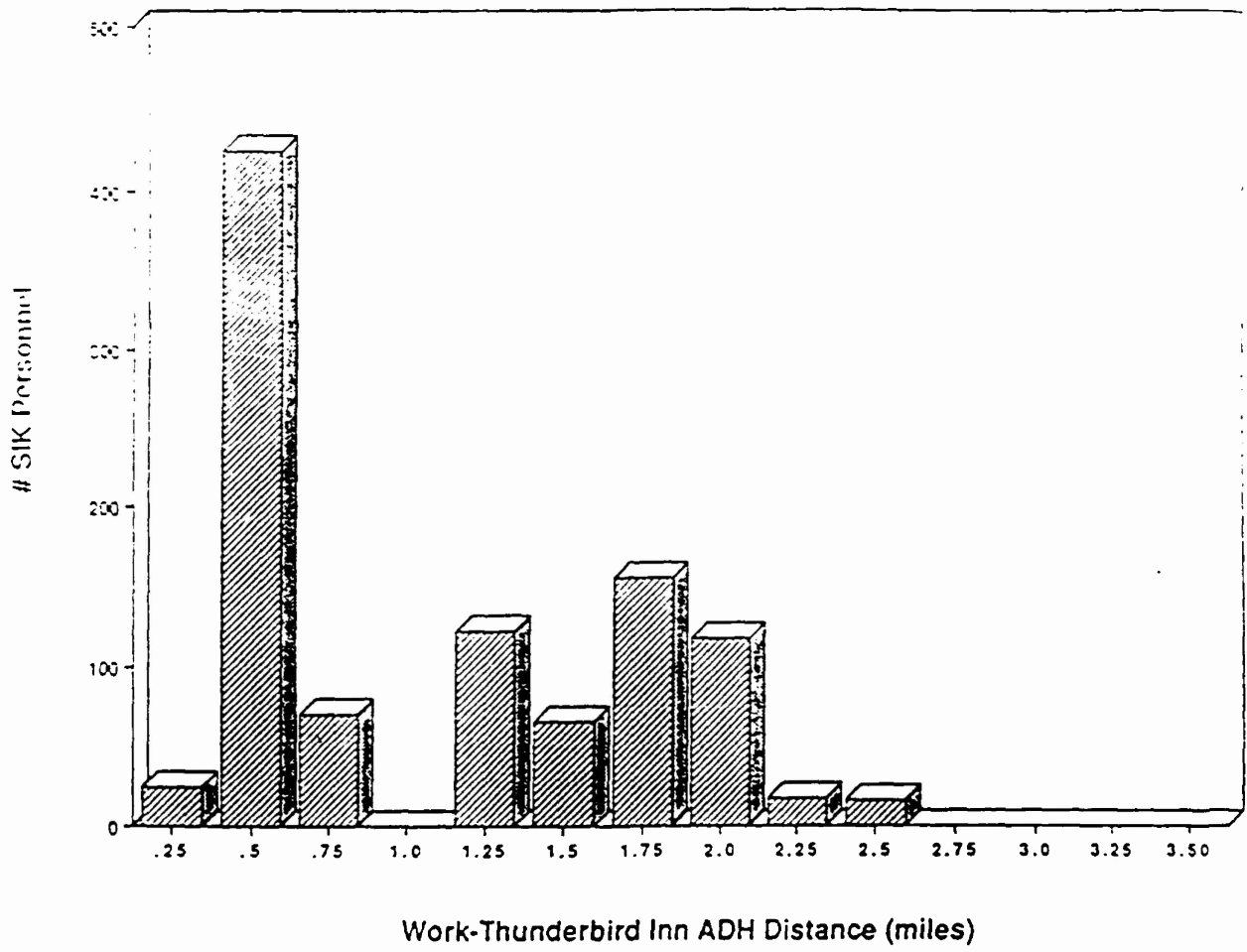
Thunderbird Inn (Building 543)

TOTAL (page 11) $143.55 \div 1014 = .1416$

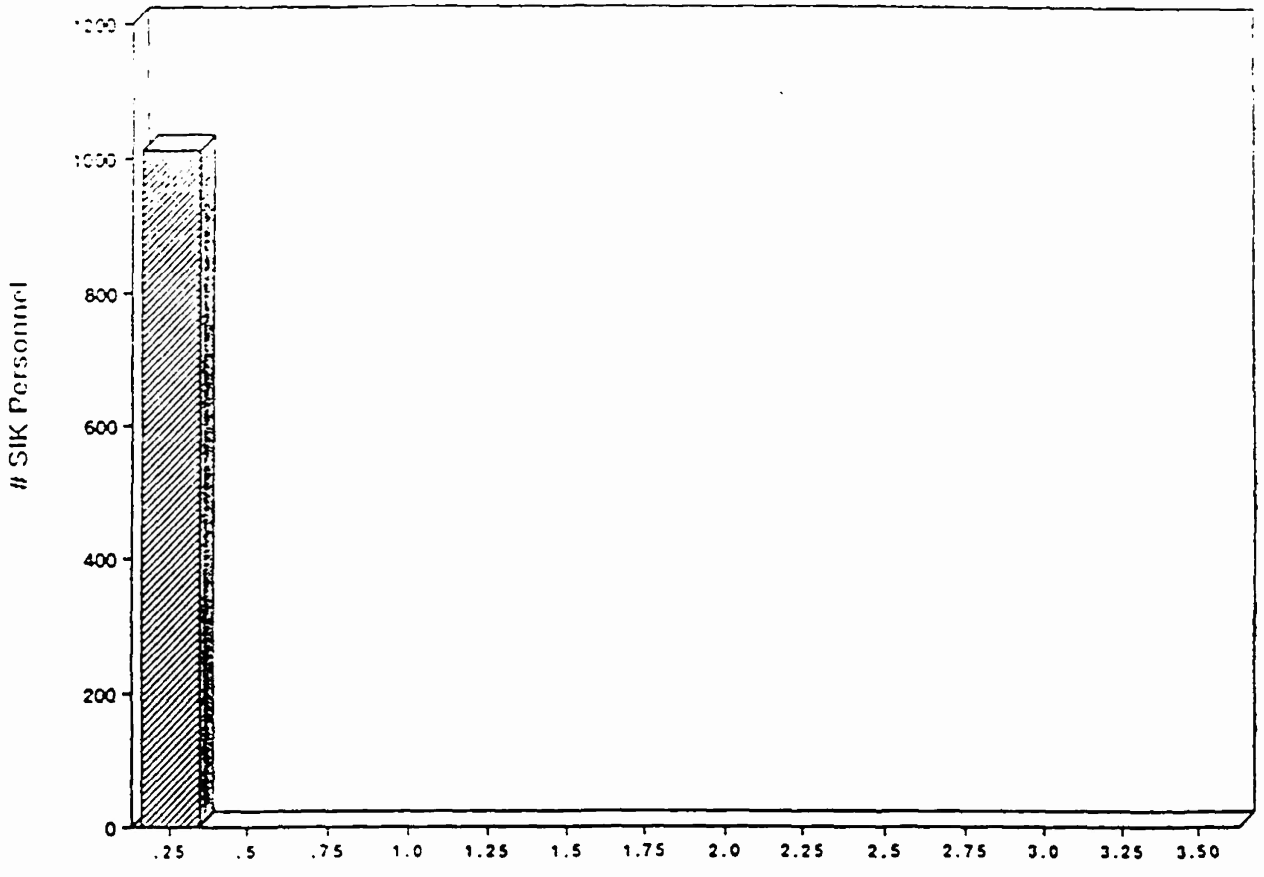
WEIGHTED AVERAGE: WORK-ADH DISTANCE

Thunderbird Inn (Building 543)

Subtotal (page 12)	885.95
Subtotal (page 13)	<u>111.35</u>
TOTAL	$997.30 \div 1014 = .9835$



LUKE AFB



Dorm-Thunderbird Inn ADH Distance (Miles)

LUKE AFB

Grand Forks AFB
North Dakota
SAC

A. Contacts

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32 SVS/CC
Grand Forks AFB
North Dakota 58205

CMSgt Cheri. Food Services

Mrs. Debra Barbour, AAFES
594-5941

B. Base Maps

Master Plan (1"=400')

C. Reports and Documents

Economic Analysis, Food Services Facilities
February, 1987

FY 1991 Military Construction Program Proposal
Project Title: Dining Facility/Troop Issue Warehouse

D. Forms

D1. AF-1785 Facilities Inventory Report

Date: October, 1986

D2. AF-249 Food Service Operations Report

Reporting Period: January 1-31, 1987; March 1-31, 1987; April 1-30, 1987
Average Authorized SIK Daily: 603; 615; 608

E. Food Services

The tables on pages 3-6 summarize existing data on three categories of food service outlets on base:

E1. Appropriated Fund Food Services (ADH, CS, FK, FS, SF)

A. Hours of Operation

B. Daily Headcount by meal

E2. AAFES Food Services (BX, Burger King, etc)

E3. Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.)

F. Squadron Information

The tables on pages 7-9 summarize where personnel live and work on base, by squadron.

G. Distance from Dorm/Work to ADH

The tables on page 10-14 summarize the distance from dormitory and work buildings to the ADH, by squadron.

H. Weighted Distances from Dorm/Work to ADH

The tables on pages 15-18 show the weighted distance from dorm/work buildings to the ADH. The distance from each dorm/work site (pages 10-14) is weighted by the number of SIK personnel traveling that distance. We assume that the total number of SIK in each squadron is uniformly distributed among work/dorm buildings for that squadron. The weighted averages of dorm-ADH distance and work-ADH distance for SIK personnel in all squadrons on Grand Forks AFB are presented on page 19.

I. Number of SIK Personnel vs. Distance to ADH

The histograms on pages 20-21 illustrate the distribution of SIK personnel by distance from work and dormitory buildings to each ADH on base.

J. Other Information

A major concern is colocating proposed dining facility with troop issue warehouse. Severe weather conditions may affect utilization of dining facilities and other food service outlets during winter months.

Grand Forks AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

HOURS OF OPERATION

- (1) Type of Facility: ADH, CS, FK, AK, FS, SF
- (2) Name of Facility
- (3) Building number (as shown on base map)
- (4) Hours of Operation for each meal
 - a. Monday through Friday
 - b. Weekends and Holidays

Type of Facility	Name of Facility	Building Number	Hours of Operation			
			Breakfast	Lunch	Dinner	Midnight
ADH	Red River Inn	220	a. 0230-0300 0530-0830	a. 1030-1300	a. 1500-1830	a. 2300-0100
			b. 0230-0300 0630-1000	b. 1000-1300	b. 1300-1500 1500-1830	b. 2300-0100
FK		530	a. ———	a. 1130-1230	a. 1700-1800	a. ———
AK		807	a. 0700-0830	a. 1130-1300	a. 1700-1830	a. ———
			b. 0830-1130	b. ———	b. 1430-1730	b. ———
SF	Launch Control Facility Kitchen					

Carryout service from Red River Inn (Bldg. 220):
 Weekdays 1000-1830
 Weekends 1030-1830

Grand Forks AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

UTILIZATION

Type of Facility	Building Number	Total Daily Headcount				Totals
		Breakfast	Lunch	Dinner	Midnight	
ADH	220	164	483	340	22	1009
FK	530	—			—	12
AK	807					
SF Launch Control Facility						486

Total daily headcounts for FK and SF based on average of total meals per month FY 1987
(Sept 86-April 87)

Total daily headcount for SF represents total meals served at all launch control facility kitchens

Grand Forks AFB

AAFES FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Daily Food Sales	Average Daily Headcount
Burger King	501	0600-2300 Sun-Thu 0600-2400 Fri-Sat	\$ 3,139.56	1060
Baskin Robbins	501	1100-2100 Mon-Fri 1000-1700 Sat-Sun	\$ 194	100
Vie De France	501	0900-1730 Mon-Fri 1000-1700 Sat-Sun	\$ 114	68
Bomb Missile Wing	607	0700-1400 Mon-Fri	\$ 250	167
Missile Wing	306	0700-1300 Mon-Fri	\$ 220	160
Captain Nemos	240	0645-2100 Mon-Fri 0900-1900 Sat-Sun	\$ 368	174
Base Operation Snack Bar	528	0700-1300 Mon-Fri	\$ 99	75

Grand Forks AFB

NON-APPROPRIATED FUND FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Monthly Food Sales
OOM	118	1130-1300 Mon-Fri 1730-2000 Tues-Sat 1000-1300 Sunday	\$ 16.728
NCOOM	309	(dining room) 1100-1300 Tues-Thur 1730-2000 Tues-Thur 1730-2100 Fri-Sat (take out) 1700-2200 Sun-Thur 1700-0001 Fri-Sat	\$ 21.209
Bowling Center Snack Bar	202	24 hours daily	\$ 22.420
Golf Course Snack Bar	811	(summer) 0800-1530 Mon-Fri 0730-1430 Sat-Sun 0830-1530 Holidays (winter) 0830-1330 Mon-Fri	\$ 2,890

Grand Forks AFB

SQUADRON INFORMATION

	Squadron	Strength	% SIK	Dorm Buildings	Work Site Buildings
319 Bomb Wing	319 BMW	175	14	321	600-610
	319 AMS	98	28	218	600-610
	319 OMS	525	26	321, 322	600-610
	319 FMS	204	12	218	600-610
	319 MMS	244	16	222	600-610
321 SMW Maint	321 OMMS	168	12	232	306 312-319
	321 FMMS	127	7	231	306 312-319
321 CSG	321 CES	276	20	219	410, 411 412

Grand Forks AFB

SQUADRON INFORMATION
(continued)

	Squadron	Strength	% SIK	Dorm Building(s)	Work Site Building(s)
321 CSG (con't)	321 SVS	117	40	227	207, 220 230
	321 CHSS	378	9	214	101, 102 306, 307
321 SMW Resource Mgt	321 SUPS	218	21	323	408, 409, 434 413-416, 418
	321 TRANS	162	7	229	408, 409, 434 413-416, 418
	321 CPTS	65	9	214	101
321 Security Police Group	321 SPS	432	0	212, 217	513-515
	321 MSS	339	0	221	515
	322 MSS	224	0	213	306

Grand Forks AFB

SQUADRON INFORMATION
(continued)

	Squadron	Strength	% SIK	Dorm Building(s)	Work Site Building(s)
N/A	2152 CS	255	15	225	548
N/A	321 STRAT HOSP	156	26	217	108-110

Grand Forks AFB

DISTANCE FROM DORM TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Dorm Building(s)	Dorm-ADH Distance (miles) Red River Inn Building 220
319BMW	176	25 (14%)	321	.04
319AMS	98	27 (28%)	218	.13
319OMS	525	137 (26%)	321	.04
			322	.08
319FMS	204	25 (12%)	218	.13
319MMS	244	39 (16%)	222	.09
321OMMS	168	20 (12%)	232	.44
321FMMS	127	9 (7%)	231	.42
321CES	276	55 (20%)	219	.04
321SVS	117	47 (40%)	227	.28
321CHSS	378	34 (9%)	214	.21
321SUPS	218	41 (21%)	323	.02
321TRANS	162	11 (7%)	229	.32
321CPTS	65	6 (9%)	214	.21

Grand Forks AFB

DISTANCE FROM DORM TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Dorm Building(s)	Dorm-ADH Distance (miles) Red River Inn Building 220
321SPS	432	0	212	.08
			217	.02
321MSS	339	0	221	.02
322MSS	224	0	213	.04
2152CS	255	38 (15%)	225	.15
321STRAT HOSP	156	41 (26%)	217	.02

Grand Forks AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles) Red River Inn Building 220
319BMW	176	25 (14%)	600-603	.6
			605	.49
			607	.5
			608	.57
			609-610	.59
319AMS	98	27 (28%)	600-603	.6
			605	.49
			607	.5
			608	.57
			609-610	.59
319OMS	525	137 (26%)	600-603	.6
			605	.49
			607	.5
			608	.57
			609-610	.59
319FMS	204	25 (12%)	600-603	.6
			605	.49
			607	.5
			608	.57
			609-610	.59
319MMS	244	39 (16%)	600-603	.6
			605	.49
			607	.5
			608	.57
			609-610	.59

Grand Forks AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles) Red River Inn Building 220
321OMMS	168	20 (12%)	306	.59
			312	.63
			313	.55
			314	.59
			316	.19
			317	.5
321FMMS	127	9 (7%)	306	.59
			312	.63
			313	.55
			314	.59
			316	.19
			317	.5
321CES	276	55 (20%)	410-12	.45
321SVS	117	47 (40%)	207	.42
			220	0
			230	.38
321CHSS	378	34 (9%)	101-02	.76
			306-07	.53
321SUPS	218	46 (21%)	408, 409	.9
			413-16	.5
			418	.49
			434	.64
321TRANS	162	11 (7%)	408, 409	.9
			413-416	.5
			418	.49
			434	.64

Grand Forks AFB

DISTANCE FROM WORK TO ADH
BY SQUADRON
(continued)

Squadron	Strength	SIK (% SIK)	Work Building(s)	Work-ADH Distance (miles) Red River Inn Building 220
321CPTS	65	6 (9%)	101	.76
321SPS	432	0	513-515	1.14
321MSS	339	0	515	1.16
322MSS	224	0	306	.59
2152CS	255	38 (15%)	548	.98
321STRAT HOSP	156	41 (26%)	108-10	.49

Grand Forks AFB

WEIGHTED DORM-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Dorm-ADH Distance	
						Red River Inn Building 220	Red River Inn Building 220
319BMW	25	1	25	1	25	.04	1.0
319AMS	27	1	27	1	27	.13	3.51
319OMS	137	2	68.5	1	68.5	.04	2.74
				1	68.5	.08	5.48
319FMS	25	1	25	1	25	.13	3.25
319MMS	39	1	39	1	39	.09	3.51
321OMMS	20	1	20	1	20	.44	8.8
321FMMS	9	1	9	1	9	.42	3.78
321CES	55	1	55	1	55	.04	2.2
321SVS	47	1	47	1	47	.28	13.16
321CHSS	34	1	34	1	34	.21	7.14
321SUPS	46	1	46	1	46	.02	.92
321TRANS	11	1	11	1	11	.32	3.52
321CPTS	6	1	6	1	6	.21	1.26
321SPS	0	2	0	1	0	.08	0
				1	0	.02	0
321MSS	0	1	0	1	0	.02	0
322MSS	0	1	0	1	0	.04	0
2152CS	38	1	38	1	38	.15	5.7
321STRAT HOSP	41	1	41	1	41	.02	.82
TOTAL							66.79

Grand Forks AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON

Squadron	SIK	Total # of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance	
						Red River Inn Building 220	Weighted Distance Red River Inn Building 220
319BMW	25	9	2.78	4	11.12	.6	6.67
				1	2.78	.49	1.36
				1	2.78	.5	1.39
				1	2.78	.57	1.58
				2	5.56	.59	3.28
319AMS	27	9	3	4	12	.6	7.2
				1	3	.49	1.47
				1	3	.5	1.5
				1	3	.57	1.71
				2	6	.59	3.54
319OMS	137	9	15.2	4	60.9	.6	36.54
				1	15.2	.49	7.45
				1	15.2	.5	7.6
				1	15.2	.57	8.7
				2	30.4	.59	17.9
319FMS	25	9	2.78	4	11.12	.6	6.67
				1	2.78	.49	1.36
				1	2.78	.5	1.39
				1	2.78	.57	1.58
				2	5.56	.59	3.28
319MMS	39	9	4.3	4	17.2	.6	10.32
				1	4.3	.49	2.1
				1	4.3	.5	2.15
				1	4.3	.57	2.45
				2	8.6	.59	5.07
SUBTOTAL							144.26

Grand Forks AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total = of Bldgs	SIK per Bldg	# of Bldgs (line)	Weight	Work-ADH Distance	
						Red River Inn Building 220	Weighted Distance Red River Inn Building 220
321OMMS	20	6	3.33	1	3.33	.59	1.96
				1	3.33	.63	2.1
				1	3.33	.55	1.8
				1	3.33	.59	1.96
				1	3.33	.19	.63
				1	3.33	.5	1.67
321FMMS	9	6	1.5	1	1.5	.59	.89
				1	1.5	.63	.95
				1	1.5	.55	.83
				1	1.5	.59	.89
				1	1.5	.19	.29
				1	1.5	.5	.75
321CES	55	3	18.33	3	55	.45	24.75
321SVS	47	3	15.67	1	15.67	.42	6.6
				1	15.67	0	0
				1	15.67	.38	5.95
321CHSS	34	4	8.5	2	17	.76	12.9
				2	17	.53	9.01
321SUPS	46	8	5.75	2	11.5	.9	10.35
				4	23	.5	11.5
				1	5.75	.49	2.82
				1	5.75	.64	3.7
321TRANS	11	8	1.375	2	2.75	.9	2.48
				4	5.5	.5	2.75
				1	1.375	.49	.67
				1	1.375	.64	.88
SUBTOTAL							109.08

Grand Forks AFB

WEIGHTED WORK-ADH DISTANCE
BY SQUADRON
(continued)

Squadron	SIK	Total = of Bldgs	SIK per Bldg	= of Bldgs (line)	Weight	Work-ADH Distance	
						Red River Inn Building 220	Weighted Distance Red River Inn Building 220
321CPTS	6	1	6	1	6	.76	4.56
321SPS	0	3	0	3	0	1.14	0
321MSS	0	1	0	1	0	1.16	0
322MSS	0	1	0	1	0	.59	0
2152CS	38	1	38	1	38	.98	37.24
321STRAT HOSP	41	3	13.67	3	41	.49	20.09
SUBTOTAL							61.89

Grand Forks AFB

WEIGHTED AVERAGE: DORM-ADH DISTANCE

Red River Inn (Building 220)

TOTAL (page 15) $66.79 \div 560 = .1193$

WEIGHTED AVERAGE: WORK-ADH DISTANCE

Red River Inn (Building 220)

Subtotal (page 16)	144.26
Subtotal (page 17)	109.08
Subtotal (page 18)	<u>61.89</u>
TOTAL	$315.23 \div 560 = .5629$

Lowry AFB
Colorado
ATC

A. Contacts

Major Dennis Bossen, Chief of Services

Captain Chin
Alan Burkey
3415 CES/DEEV
Lowry Air Base
Denver, CO 80230-5000

B. Base Maps

Existing Land Use Plan (1"=400')
Future Land Use Plan (1"=400')
5 Year Capital Improvement Plan (1"=400')
Base Plan (1"=800')

C. Reports and Documents

Base Comprehensive Plan with the following color plates:
Existing Land Use Plan (with and without transportation network)
Future Land Use Plan (with and without transportation network)

D. Forms

D1. AF-1785 Facilities Inventory Report
Date: October, 1986
D2. AF-249 Food Service Operations Report
Reporting Period: January 1-31, 1987; March 1-31, 1987
Average Authorized SIK Daily: 3502; 3548

E. Food Services

The tables on pages 3-6 summarize existing data on three categories of food service outlets on base:

- E1. Appropriated Fund Food Services (ADH, CS, FK, FS, SF)
 - A. Hours of Operation
 - B. Daily Headcount by meal
- E2. AAFES Food Services (BX, Burger King, etc)
- E3. Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.)

F. Squadron Information

Information on where personnel live and work on base by squadron was unavailable for Lowry AFB. This was primarily due to the nature of the ATC bases where squadrons come and go throughout the year for training

G. Other Information

Problem with overcrowding of ADH 1400 and underutilization of ADH 1477

Lowry AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

HOURS OF OPERATION

- (1) Type of Facility: ADH, CS, FK, AK, FS, SF
- (2) Name of Facility
- (3) Building number (as shown on base map)
- (4) Hours of Operation for each meal
 - a. Monday through Friday
 - b. Weekends and Holidays

Type of Facility	Name of Facility	Building Number	Hours of Operation			
			Breakfast	Lunch	Dinner	Midnight
ADH		411	CLOSED	CLOSED	CLOSED	CLOSED
ADH		700	a. 0430-0715 b. 0700-0900	a. 1015-1300 b. 1100-1300	a. 1600-1900 b. 1600-1900	a. _____ b. _____
ADH		900	a. 0430-0715 b. 0700-0900	a. 1015-1300 b. 1100-1300	a. 1600-1900 b. 1600-1900	a. 2215-0100 b. 1900-2100 (Snack line)
ADH		1400	a. 0430-0730 b. 0700-0900	a. 1015-1300 b. 1100-1300	a. 1600-1900 b. 1600-1900	a. _____ b. _____
ADH		1477	a. 0430-0715 b. 0700-0900	a. 1015-1300 b. 1100-1300	a. 1600-1900 b. 1600-1900	a. _____ b. _____

Lowry AFB

APPROPRIATED FUND FOOD SERVICE FACILITIES

UTILIZATION

Type of Facility	Building Number	Total Daily Headcount				Totals
		Breakfast	Lunch	Dinner	Midnight	
ADH	411	0	0	0	0	0
ADH	700	359	607	609		1575
ADH	900	580	713	855		2148
ADH	1400	349	643	506		1498
ADH	1477	362	635	659		1656

(Based on figures for the month of March, 1987)

Lowry AFB

AAFES FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Monthly Food Sales
BX	667		\$ 40,993
	349		\$ 21,966
	444		\$ 55,713
Burger King			\$ 104,802

Lowry AFB

NON-APPROPRIATED FUND FOOD SERVICE FACILITIES

Name of Facility	Building Number	Hours of Operation	Average Monthly Food Sales
OOM			\$ 40,286
NCO			\$ 22,776
AOM			\$ 6,096
Lowry Lanes Snack Bar			\$ 25,406
Golf Course Snack Bar			\$ 1,980

APPENDIX II

Questionnaire Analysis

Beale AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
9 Strat Hosp	395	8.7%	91.3%	96%	CAR
90MS	874	18%	82%	88%	CAR
1883 CS	163	94%	6%	90%	CAR
9CES	268	87%	13%	90%	CAR
9RTS	101	11%	89%	99%	CAR
9SPS DA	236	3%	97%	95%	CAR
9AMS	271	11%	89%	90%	CAR
9SVS	71	10%	90%	90%	CAR
9CSG	711	93%	7%	90%	CAR
9TRANSPS	127	5%	95%	98%	CAR
9FMS	415	13%	87%	95%	CAR
9SUFS	271	19%	81%	95%	CAR

Dorm Building Number(s)	Work Site Building Number(s)						
	1025	2156	1086	2179	2490	2459	1060
2450	15	1	2	2	6	2	3
Dorm Building Number(s)	Work Site Building Number(s)						
	2491	2496	1023	2432	1062	1086	1225
2450	30	9	4	2	2		
2176						38	20
Dorm Building Number(s)	Work Site Building Number(s)						
	1077	1243	1071	2471	1023	1025	1086
2176	3	5	1				
2405				5	16	14	6
Dorm Building Number(s)	Work Site Building Number(s)						
	1069	1319	1322	1064			
2405	4	1	1	4			

Beale AFB Questionnaire Trip/Flow Data

Dorm Building Number(s)	Work Site Building Number(s)						
	5700	1029	2160	2469	1075	1076	1086
2177	66	22	2	1			
2401					145	101	
2450					1		
2452					7	6	12
2175							1
2448							4

Dorm Building Number(s)	Work Site Building Number(s)						
	1060	502	2145/2172	2445/2171	2159	2535	2539
2175	5	5	10	40	4		
2452						2	12

Dorm Building Number(s)	Work Site Building Number(s)						
	2565	2145	2440	2444	1200	355	1025
2452	10	13					
2448			2	1	2	2	
2175							45

Beale AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
2403	1086	1086	1086	1086
2403	2179	2490	2490	2490
2403	2145	2490	2490	2490
2403	2561	2490	2490	2490
2403	2419	2490	2490	2490
2403	2432	2490	2490	2490
2403	2415	2490	2490	2490
2403	2400	2490	2490	2490
2403	2483	2490	2490	2490
2452	2535	2490	2490	2490
2452	2539	2490	2490	2490
2452	2565	2490	2490	2490
2452	1086	1086	1086	1086
2401	1075	2490	1086	2490
2401	1076	2490	1086	1086
2450	1075	2490	1086	2490
2452	1075	2490	1086	2490
2452	1076	2490	1086	2490
2175	1086	1086	1086	1086
2175	1060	1086	1086	1086
2175	502	2490	2490	2490
2175	2145	2490	2490	2490
2175	2445	2490	2490	2490
2175	2172	2490	2490	2490
2175	2171	2490	2490	2490
2452	2145	2490	2490	2490
2177	5700	2490	2490	2490
2177	1029	1086	1086	2490

Beale AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
2177	2160	2490	2490	2490
2177	2469	2490	2490	2490
2175	1025	2490	1086	2490
2450	1025	2490	1086	2490
2450	2491	2490	2490	2490
2450	2496	2490	2490	2490
2450	1023	2490	1086	2490
2450	2432	2490	2490	2490
2450	1062	2490	1086	2490
2450	2400	2490	2490	2490
2450	2156	2490	2490	2490
2450	2179	2490	2490	2490
2450	2490	2490	2490	2490
2450	2459	2490	2490	2490
2450	1086	1086	1086	1086
2450	1060	1086	1086	1086
2450	1086	2490	1086	2490
2450	1225	2490	1086	2490
2450	1077	2490	1086	2490
2450	1243	2490	1086	2490
2450	1071	2490	1086	2490
2405	1023	2490	1086	2490
2405	1025	2490	1086	2490
2405	1086	2490	1086	2490
2405	1069	2490	1086	2490
2405	1322	2490	1086	2490
2405	2471	2490	2490	2490
2405	1319	2490	2490	2490
2405	1064	2490	2490	2490

Blytheville AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
97 SPS	323	56%	44%	100%	car
2101 Comm	180	17%	83%	98%	car
97 MYS	250	9%	91%	90%	car

Dorm Building Number(s)	Work Site Building Number(s)						
	464	233	229	641	201	1205	1212
620	56					1	
609		10	15	3	3	2	
608							1
619							16

Dorm Building Number(s)	Work Site Building Number(s)						
	1285	1288	107				
620			2				
609	3		1				
608	1		1				
619	21	3	25				

Blytheville AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
620	464	613	613	613
609	233	613	613	613
609	229	613	613	613
609	641	613	613	613
609	201	613	613	613
608	1212	613	613	613
608	1285	613	613	613
608	107	613	613	613
609	1205	613	613	613
609	1285	613	613	613
609	107	613	613	613
619	1212	613	613	613
619	1285	613	613	613
619	1288	613	613	613
619	107	613	613	613
620	1205	613	613	613
620	107	613	613	613

Bolling AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
DIA	580	0%	100%	85%	car
1776TRNSPS/LGTA	30	0%	100%	100%	car
1100SVS/CCQ	28	46%	54%	95%	walk
OLAA 1776SUPS/LGSE	19	21%	79%	95%	car
AFOSR/XOA	10	30%	70%	100%	car
OLA/MGMC SGHFB	98	39%	61%	90%	walk
OLA 89 FMS/MAAP	35	3%	97%	95%	walk
HQ AFOSI/CCQ	226	16%	84%	95%	walk
1802 ISS/CCQ	43	30%	70%	85%	car
USAF BAND	224	0%	100%	100%	car
HONOR GUARD	150	5%	95%	75%	car
1100 CES	144	33%	67%	85%	walk
1100 SPS/DA	84	2%	98%	95%	car
AFDW/CCQ	260	36%	64%	90%	car

Dorm Building Number(s)	Work Site Building Number(s)						
	P-20	5681	Pentagon	P-53	Hangar 2	P-55	422
1302	100	50	80	25	110		
3621	3			20			10
3623	6			15	20		
P55						120	
Dorm Building Number(s)	Work Site Building Number(s)						
	626	P17	1300	416	P13	1302	3621
1302	75	10	30		6	6	
3621			20	3			1
3623							1
P-55							
Dorm Building Number(s)	Work Site Building Number(s)						
	3623	607	361	5000			
1302	1		6	250			
3621		2		20			
3623							
P-55							

Bolling AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
1302	P20	1301	1301	1301
3621	5661	1301	1301	1301
3623	Hangar 2	1301	1301	1301
P-55	P-55	1301	1301	1301

Hill AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
2849 SPS	67	.5%	99.5%	85%	car/truck/motorcycle
1954 RADES	109	1%	99%	100%	car
6501st Ranger Squadron	6	17%	83%	100%	car
2701	68	0%	100%	100%	auto
388 TFW	304	3%	97%	95%	car
729 TCS	316	28%	72%	92%	PJV
2849 CCQ/MA	102	34%	66%	90%	car/motorcycle
DET 6, 17WS	22	0%	100%	100%	car
4400 MTF	18	0%	100%	100%	car
388 EMS	415	16%	84%	97%	car
40 ARRS	14	28%	72%	100%	car
DET 8, 1365 ANS	25	0%	100%	100%	car
DET 1404	12	0%	100%	100%	car
388 AGS	747	13%	87%	98%	car

Dorm Building Number(s)	Work Site Building Number(s)						
	1219	1512	1283	1285	2106	2103	36
517	63	3					
523	1						6
345			6		16	15	
518				1			
Dorm Building Number(s)	Work Site Building Number(s)						
	41	120	1133	1910	1900 Cpnd	45	42
523	1	3					
349			3	14	73	66	31
Dorm Building Number(s)	Work Site Building Number(s)						
	1622	2405	1642	UTTR 40080	1	800	1269
361	1	6	12		4	2	3
UTTR 40020				13			
Dorm Building Number(s)	Work Site Building Number(s)						
	41	56	25	58	52	40	
518	3	13	9	26	5	10	

Hill AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
517	1219	519	519	519
523	1512	519	519	519
345	1283	519	?	519
518	1285	519	519	519
345	2103	519	519	519
345	2106	519	519	519
523	38	519	519	519
523	120	519	519	519
523	41	519	519	519
349	1133	519	519	519
349	1900 compd	519	519	519
349	1910	519	519	519
361	1642	519	519	519
361	2405	519	519	519
361	1622	519	519	519
40020	40080	519	519	519
361	1	519	519	519
518	41	519	519	519
518	25	519	519	519
518	52	519	519	519
518	58	519	519	519
518	58	519	519	519
518	40	519	519	519
361	800	519	519	519
361	1269	519	other	519
523	45	519	519	519
523	42	519	519	519

Pease AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
541 AF Band	48	%	100%	99%	car
509th	140	45%	55%	90%	car
AFCOMS	7	7%	93%	100%	car
509 SUPS	240	20.4%	79.6%	85%	car
509 CSG/DA	21	20%	80%	83%	car
509 BMW/TK	9	%	100%	100%	car
509 BINW/PA	7	14%	86%	100%	car
509 Strat Hosp	227	32%	68%	80%	car
230	224	43%	64%	75%	car
3519 USAFRSQ	98	%	100%	100%	walk
509 CPTS	73	21%	79%	100%	car
509 AREFS	20	%	100%	98%	car
DOT 8,26WS	18	28%	72%	100%	car
AFOSI Dist 1	26	%	100%	100%	car
1916 CS	202	12%	88%	85%	car
509 CSG/OT	24	5%	95%	96%	car
3904 MES	13	%	100%	100%	car
509 SP	410	%	100%	70%	car
509 OMS	439	7%	93%	99%	car/walk
509 AMS	195	26%	74%	100%	car

Pease AFB Questionnaire Trip/Flow Data

Dorm Building Number(s)	Work Site Building Number(s)						
	95	31	130	122	88	116	113
9	46						
47		15	107	43	5		6
56						2	
49		2					
Dorm Building Number(s)	Work Site Building Number(s)						
	245	6	88	23	217	205	468
47	13						
56					3		
49		5	1	13			
58							20
88					10	10	
Dorm Building Number(s)	Work Site Building Number(s)						
	93	98	36	112	251	59	23
49							13
84	201	11	15			1	
58				7	7		
Dorm Building Number(s)	Work Site Building Number(s)						
	238	35	32	22	239	232	34
56	5	8	6	10	12	18	
49	7						3
Dorm Building Number(s)	Work Site Building Number(s)						
	155	211	457/WSA	307/AAPA	227	113	86
9	6	3	7	8			
84	4	6	19	19			
8	14	5	62	63			
50					168		
49					1		
80					20		
58						172	23

Pease AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
49	6	49	49	49
58	113	60	60	60
58	86	60	60	60
47	31	60	60	60
47	120	60	60	60
47	130	60	60	60
47	88	60	60	60
49	238	60	60	60
49	34	60	60	60
49	227	60	60	60
50	227/212/Alert	205/60	205/60	205/60
8	155	60	60	60
8	211	60	60	60
8	457	60	60	60
8	307	205	205	205
9	155	60	60	60
9	211	60	60	60
9	457	60	60	60
9	307	205	205	205
84	155	60	60	60
84	211	60	60	60
84	457	60	60	60
84	307	205	205	205

Pease AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
56	35	60	60	60
56	32	60	60	60
56	22	60	60	60
56	217	60	60	60
56	239	60	60	60
56	232	60	60	60
56	90	60	60	60
56	10	60	60	60
56	238	46	46	46
88	217	BAS	BAS	BAS
88	205	205	205	205
49	23	60	60	60
49	31	60	60	60
84	59	46	46	46
58	112	2	7	5
58	251	20	60	58
58	468	17	20	18
84	93	84	84	84
84	98	84	84	84
84	36	84	84	84
49	88	0	60	off base
47	112	60	60	60
47	113	60	60	60
47	245	60	60	60
56	116		60	60
9	95	60	60	60

Peterson AFB Questionnaire Trip/Flow Data

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
47 Comm Gp	338	25%	75%	80%	walk
HQ SP CMND	125	30%	70%	75%	car
3rd Space SP&Wg	130	0%	100%	95%	walk
1st Space Wg	77	0%	100%	95%	walk
1003 Space SP&Gp	275	3%	97%	98%	walk

Dorm Building Number(s)	Work Site Building Number(s)						
	Fed Bldg	CMC	PAFB	660	982	365	415
1102	8	74					
1164	1	12		2	3	3	5
1158		106	19				
1154				3	2	2	6

Dorm Building Number(s)	Work Site Building Number(s)						
	391	390	860	861	862	540	
1102							
1164	1		10	7	3	5	
1158							
1154	1	2	17	10	8	16	

Peterson AFB Questionnaire Trip/Flow Data

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
1102	Fed Bldg	1160	Fed Bldg	1160
1102	CMC	1160	"1"	1160
1164	Fed Bldg	1160	Fed Bldg	1160
1164	CMC	1160	"1"	1160
1156	PAFB	1160	1160	1160
1156	CMC	CMC	CMC	CMC
1164	660	1160	1160	1160
1164	982	1160	1160	1160
1164	365	1160	1160	1160
1154	660	1160	1160	1160
1154	982	1160	1160	1160
1154	365	1160	1160	1160
1164	391	1160	1160	1160
1154	391	1160	1160	1160
1154	390	1160	1160	1160
1164	860	1160	1160	1160
1164	861	1160	1160	1160
1164	862	1160	1160	1160
1164	540	1160	1160	1160
1164	415	1160	1160	1160
1154	860	1160	1160	1160
1154	861	1160	1160	1160
1154	862	1160	1160	1160
1154	540	1160	1160	1160
1154	415	1160	1160	1160

Questionnaire Data — Aggregated

PLACE 1 is AIRMENS DINING HALL
 PLACE 2 is CARRY OUT SERVICE
 PLACE 3 is FIRE STATION

PLACE 4 is FLIGHT KITCHEN
 PLACE 5 is ALERT KITCHEN
 PLACE 6 is SATELLITE FACILITY

Summaries of AIRMENS DINING HALL

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	2	5.3125	2.3013	16
	PLACE	3	5.2143	1.8051	14
	PLACE	4	5.0833	1.8320	12
	PLACE	5	4.9000	2.0248	10
	PLACE	6	4.4286	2.2991	7

Summaries of CARRY OUT SERVICE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	1	5.5000	2.0976	16
	PLACE	3	5.1429	2.0327	14
	PLACE	4	5.0833	1.8320	12
	PLACE	5	4.4000	2.5906	10
	PLACE	6	4.1429	2.3401	7

Summaries of FLIGHT KITCHEN

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	1	3.7500	2.1756	16
	PLACE	2	4.1250	2.6552	16
	PLACE	3	3.5000	2.5344	14
	PLACE	5	3.8000	2.7809	10
	PLACE	6	3.0000	2.3094	7

Summaries of FIRE STATION

BY LEVELS OF PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	1	4.3750	1.9621	16
	PLACE	2	4.6875	2.1203	16
	PLACE	4	4.0833	2.6443	12
	PLACE	5	4.6000	2.6331	10
	PLACE	6	4.1429	2.1931	7

Summaries of ALERT KITCHEN

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	1	2.5000	2.3381	16
	PLACE	2	2.8125	2.7621	16
	PLACE	3	2.9286	2.7023	14
	PLACE	4	2.6667	2.9336	12
	PLACE	6	2.0000	2.5820	7

Summaries of SATELLITE FACILITY

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
	PLACE	1	2.6875	2.1515	16
	PLACE	2	3.3125	2.4958	16
	PLACE	3	2.4286	2.0273	14
	PLACE	4	2.5000	1.9306	12
	PLACE	5	2.3000	2.0575	10

Summaries of COMMERCIAL OUTLETS (E.G. BURGER KINGS')

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			1.8000	1.9452	75
PLACE	1		1.7500	1.6931	16
PLACE	2		1.6875	1.9225	16
PLACE	3		2.2143	2.2931	14
PLACE	4		1.3333	1.8749	12
PLACE	5		1.6000	1.9551	10
PLACE	6		2.4286	2.2991	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of FLEET SERVICES

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			2.3200	2.3719	75
PLACE	1		2.3125	2.2721	16
PLACE	2		2.1875	2.5356	16
PLACE	3		2.6429	2.6197	14
PLACE	4		2.4167	2.6785	12
PLACE	5		2.0000	2.1602	10
PLACE	6		2.2857	2.2147	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of TROOP ISSUE PERISHABLE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			4.1600	2.5629	75
PLACE	1		4.9375	2.5421	16
PLACE	2		4.0625	2.5682	16
PLACE	3		3.8571	2.4763	14
PLACE	4		4.2500	2.7010	12
PLACE	5		4.0000	2.8674	10
PLACE	6		3.2857	2.5635	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of TROOP ISSUE SEMI-PERISHABLE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			4.2533	2.5367	75
PLACE	1		4.9375	2.5421	16
PLACE	2		4.0625	2.5682	16
PLACE	3		3.8571	2.4763	14
PLACE	4		4.2500	2.7010	12
PLACE	5		4.7000	2.6268	10
PLACE	6		3.2857	2.5635	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of CENTRAL PREPARATION FACILITY

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			2.9467	2.5569	75
PLACE	1		2.9375	2.8395	16
PLACE	2		2.7500	2.5949	16
PLACE	3		2.0714	2.2690	14
PLACE	4		3.2500	2.4909	12
PLACE	5		3.8000	2.7809	10
PLACE	6		3.4286	2.4398	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of OTHER SPECIFY

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population			1.0000	1.8959	75
PLACE	1		.6250	1.7464	16
PLACE	2		1.0625	1.9138	16
PLACE	3		.8571	1.7033	14
PLACE	4		1.3333	2.4618	12
PLACE	5		.8000	1.6865	10
PLACE	6		1.7143	2.1381	7
Total Cases = 101					
Missing Cases = 26 OR 25.7 PCT.					

Summaries of AIRFIELD

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.8933	2.5017	75
	PLACE	2	3.4375	2.3372	16
	PLACE	3	3.5000	2.1602	16
	PLACE	4	4.4286	2.7094	14
	PLACE	5	4.4167	2.7122	12
	PLACE	6	4.4000	3.0984	10
Total Cases =			3.1429	2.1931	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of AIRCRAFT OPERATIONS AND MAINTENANCE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.8667	2.4347	75
	PLACE	2	3.5625	2.3372	16
	PLACE	3	4.0625	2.1125	16
	PLACE	4	3.7857	2.6941	14
	PLACE	5	4.1667	2.6227	12
	PLACE	6	4.3000	3.0203	10
Total Cases =			3.1429	2.1931	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of INDUSTRIAL

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.6133	2.1803	75
	PLACE	2	3.2500	2.0817	16
	PLACE	3	3.7500	1.9494	16
	PLACE	4	4.0000	2.3205	14
	PLACE	5	3.5833	2.3143	12
	PLACE	6	3.8000	2.6998	10
Total Cases =			3.1429	2.1931	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of ADMINISTRATIVE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.6133	2.1175	75
	PLACE	2	3.9375	1.8428	16
	PLACE	3	3.7500	1.9833	16
	PLACE	4	3.7857	2.1901	14
	PLACE	5	3.1667	2.4802	12
	PLACE	6	3.6000	2.5473	10
Total Cases =			3.0000	2.0817	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of COMMUNITY (COMMERCIAL)

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.2267	2.1721	75
	PLACE	2	2.8125	2.0073	16
	PLACE	3	3.5000	2.0656	16
	PLACE	4	3.5000	2.2787	14
	PLACE	5	3.2500	2.3789	12
	PLACE	6	3.2000	2.6583	10
Total Cases =			3.0000	2.0817	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of COMMUNITY SERVICE

By levels of PLACE	Variable	Value Label	Mean	Std Dev	Cases
For Entire Population					
	PLACE	1	3.2400	2.0850	75
	PLACE	2	3.1250	1.8930	16
	PLACE	3	3.4375	1.9990	16
	PLACE	4	3.4286	2.2089	14
	PLACE	5	3.1667	2.2896	12
	PLACE	6	3.1000	2.5582	10
Total Cases =			3.0000	2.0817	7
Missing Cases =					

26 OR 25.7 PCT.

Summaries of MEDICAL

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		3.5333	2.0686	75
	PLACE	2		3.5625	1.9653	16
	PLACE	3		3.5625	1.8608	16
	PLACE	4		3.7857	2.1901	14
	PLACE	5		3.5000	2.2764	12
	PLACE	6		3.5000	2.5495	10
	PLACE	7		3.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of ACCOMPANIED HOUSING

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		3.2533	2.2306	75
	PLACE	2		2.9375	2.3229	16
	PLACE	3		3.1250	1.9958	16
	PLACE	4		4.0000	2.3205	14
	PLACE	5		3.2500	2.3789	12
	PLACE	6		3.1000	2.5582	10
	PLACE	7		3.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of UNACCOMPANIED HOUSING

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		4.9333	2.0817	75
	PLACE	2		5.8125	1.7970	16
	PLACE	3		5.0625	2.2648	16
	PLACE	4		5.0000	1.7974	14
	PLACE	5		4.4167	2.1933	12
	PLACE	6		4.5000	2.3688	10
	PLACE	7		4.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of OUTDOOR RECREATION

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		3.3067	2.0728	75
	PLACE	2		3.4375	1.8963	16
	PLACE	3		3.5625	1.8608	16
	PLACE	4		3.2143	2.1901	14
	PLACE	5		3.2500	2.3789	12
	PLACE	6		3.1000	2.5582	10
	PLACE	7		3.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of OPEN SPACE

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		2.9867	1.9693	75
	PLACE	2		3.0625	1.8062	16
	PLACE	3		3.0625	1.8062	16
	PLACE	4		3.1429	1.9556	14
	PLACE	5		2.7500	2.2613	12
	PLACE	6		2.8000	2.4855	10
	PLACE	7		3.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of WATER

By levels of PLACE	Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population	PLACE	1		2.5067	1.8843	75
	PLACE	2		2.4375	1.7877	16
	PLACE	3		2.5000	1.8619	16
	PLACE	4		2.5714	2.1018	14
	PLACE	5		2.3333	1.7753	12
	PLACE	6		2.4000	2.1705	10
	PLACE	7		3.0000	2.0817	7
Total Cases = 101						
Missing Cases = 26 OR 25.7 PCT.						

Summaries of OUTDOOR RECREATION

By levels of PLACE	Variable Value Label	Mean	Std Dev	Cases
For Entire Population		3.3067	2.0728	75
PLACE	1	3.4375	1.8963	16
PLACE	2	3.5625	1.8608	16
PLACE	3	3.2143	2.1901	14
PLACE	4	3.2500	2.3789	12
PLACE	5	3.1000	2.5582	10
PLACE	6	3.0000	2.0817	7
Total Cases =	101			
Missing Cases =	26 OR 25.7 PCT.			

Summaries of OPEN SPACE

By levels of PLACE	Variable Value Label	Mean	Std Dev	Cases
For Entire Population		2.9867	1.9693	75
PLACE	1	3.0625	1.8062	16
PLACE	2	3.0625	1.8062	16
PLACE	3	3.1429	1.9556	14
PLACE	4	2.7500	2.2613	12
PLACE	5	2.8000	2.4855	10
PLACE	6	3.0000	2.0817	7
Total Cases =	101			
Missing Cases =	26 OR 25.7 PCT.			

Summaries of WATER

By levels of PLACE	Variable Value Label	Mean	Std Dev	Cases
For Entire Population		2.5067	1.8843	75
PLACE	1	2.4375	1.7877	16
PLACE	2	2.5000	1.8619	16
PLACE	3	2.5714	2.1018	14
PLACE	4	2.3333	1.7753	12
PLACE	5	2.4000	2.1705	10
PLACE	6	3.0000	2.0817	7
Total Cases =	101			
Missing Cases =	26 OR 25.7 PCT.			

Questionnaire Data — Disaggregated

- Base**
 1 BLYTHEVILLE
 2 PETERSON
 3 BOLLING
 4 WRIGHT-PATTERSON
 5 PEASE
 6 BEALE

- Person**
 1= Food Services
 2= Engineering
 3= Wing Commander

- Place (Dining Facility)**
 1= Airman's Dining Hall
 2= Carry Out Service
 3= Fire Station
 4= Flight Kitchen
 5= Alert Kitchen
 6= Satellite Facility

Summaries of CARRY OUT SERVICE

By levels of PERSON		Mean		Std Dev		Cases	
Variable	Value Label	For Entire Population	PERSON	For Entire Population	PERSON	For Entire Population	PERSON
PERSON	1	5.1800	5.7857	2.0137	1.5482	75	28
PLACE	1	6.1667	1.6021			6	6
PLACE	2	5.0000	2.6077			6	6
PLACE	3	5.8000	1.0954			5	5
PLACE	4	6.2500	.9574			4	4
PLACE	5	5.7500	.9574			4	4
PLACE	6	6.0000	1.0000			3	3
PERSON	2	4.5862	2.5845			29	29
PLACE	1	5.1667	2.7869			6	6
PLACE	2	5.1667	2.7869			6	6
PLACE	3	5.0000	2.5298			6	6
PLACE	4	4.0000	2.3452			5	5
PLACE	5	4.0000	2.9439			4	4
PLACE	6	2.5000	3.5355			2	2
PERSON	3	5.1111	1.2783			18	18
PLACE	1	5.0000	1.8257			4	4
PLACE	2	6.0000	1.1547			4	4
PLACE	3	4.6667	1.1547			3	3
PLACE	4	5.3333	.5774			3	3
PLACE	5	5.0000	1.4142			2	2
PLACE	6	4.0000	1.4142			2	2
Total Cases =		101					
Missing Cases =		26 OR 25.7 PCT.					

Summaries of FS

By levels of PERSON		Mean		Std Dev		Cases	
Variable	Value Label	For Entire Population	PERSON	For Entire Population	PERSON	For Entire Population	PERSON
PERSON	1	4.6800	5.2500	2.0740	1.8384	75	28
PLACE	1	4.3333	2.1602			6	6
PLACE	2	4.5000	2.4290			6	6
PLACE	3	5.8000	1.3038			5	5
PLACE	4	6.2500	.9574			4	4
PLACE	5	6.0000	1.1547			4	4
PLACE	6	5.3333	2.0817			3	3
PERSON	2	4.1379	2.5032			29	29
PLACE	1	4.8333	2.4833			6	6
PLACE	2	4.6667	2.5033			6	6
PLACE	3	4.8333	2.4833			6	6
PLACE	4	4.0000	2.3452			5	5
PLACE	5	2.2500	2.6300			4	4
PLACE	6	2.5000	3.5355			2	2
PERSON	3	4.6667	1.4142			18	18
PLACE	1	3.7500	.5000			4	4
PLACE	2	5.0000	1.4142			4	4
PLACE	3	4.6667	2.5166			3	3
PLACE	4	5.3333	.5774			3	3
PLACE	5	5.5000	2.1213			2	2
PLACE	6	4.0000	1.4142			2	2
Total Cases =		101					
Missing Cases =		26 OR 25.7 PCT.					

Summaries of FK

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
PERSON	1	3.9867	2.4301	75
PERSON	2	5.0000	2.1430	28
PERSON	3	5.0000	1.6733	6
PERSON	4	5.1667	2.7142	6
PERSON	5	4.2000	2.4900	5
PERSON	6	4.2500	3.0957	4
PERSON	7	6.0000	1.1547	4
PERSON	8	5.6667	1.5275	3
PERSON	9	2.5862	2.5845	29
PERSON	10	2.3333	2.5820	6
PERSON	11	2.3333	2.5820	6
PERSON	12	2.6667	2.9439	6
PERSON	13	3.2000	2.9496	5
PERSON	14	2.7500	3.2016	4
PERSON	15	2.0000	2.8284	2
PERSON	16	4.6667	1.3720	18
PERSON	17	4.0000	.8165	4
PERSON	18	5.2500	1.2583	4
PERSON	19	4.0000	2.0000	3
PERSON	20	5.3333	1.5275	3
PERSON	21	5.5000	2.1213	2
PERSON	22	4.0000	0.0	2

Total Cases = 101
Missing Cases = 26 OR 25.7 PCT.

Summaries of AK

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
PERSON	1	2.8933	2.5972	75
PERSON	2	3.3571	2.7109	28
PERSON	3	2.5000	2.7386	6
PERSON	4	3.5000	3.0166	6
PERSON	5	4.0000	2.3452	5
PERSON	6	3.0000	3.5590	4
PERSON	7	4.2500	2.9661	4
PERSON	8	3.0000	3.0000	3
PERSON	9	1.9655	2.4125	29
PERSON	10	2.3333	2.5820	6
PERSON	11	1.5000	2.3452	6
PERSON	12	1.8333	2.8577	6
PERSON	13	1.8000	2.4900	5
PERSON	14	2.5000	2.8868	4
PERSON	15	2.0000	2.8284	2
PERSON	16	3.6667	2.3764	18
PERSON	17	2.7500	1.8930	4
PERSON	18	3.7500	2.8723	4
PERSON	19	3.3333	3.0551	3
PERSON	20	3.6667	3.5119	3
PERSON	21	5.5000	2.1213	2
PERSON	22	4.0000	1.4142	2

Total Cases = 101
Missing Cases = 26 OR 25.7 PCT.

Summaries of SF

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		2.6267	2.1672	75
PERSON	1	2.8571	2.3048	28
PLACE	1	2.8333	2.4833	6
PLACE	2	3.5000	2.8810	6
PLACE	3	2.8000	2.1679	5
PLACE	4	2.0000	1.8257	4
PLACE	5	2.5000	2.3805	4
PLACE	6	3.3333	3.0551	3
PERSON	2	2.0345	2.1627	29
PLACE	1	2.1667	2.4014	6
PLACE	2	2.1667	2.4014	6
PLACE	3	2.1667	2.4014	6
PLACE	4	2.4000	2.1909	5
PLACE	5	2.0000	2.3094	4
PLACE	6	0.0	0.0	2
PERSON	3	3.2222	1.8005	18
PLACE	1	3.2500	1.5000	4
PLACE	2	4.7500	1.5000	4
PLACE	3	2.3333	1.5275	3
PLACE	4	3.3333	2.0817	3
PLACE	5	2.5000	2.1213	2
PLACE	6	2.0000	2.8284	2
Total Cases =		101		
Missing Cases =		26	OR	25.7 PCT.

Summaries of COMM.

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		1.8000	1.9452	75
PERSON	1	1.7500	1.8384	28
PLACE	1	1.6667	1.6330	6
PLACE	2	1.8333	2.1370	6
PLACE	3	2.2000	2.1679	5
PLACE	4	.5000	.5774	4
PLACE	5	1.7500	2.2174	4
PLACE	6	2.6667	2.3094	3
PERSON	2	1.7241	2.1364	29
PLACE	1	1.5000	1.7607	6
PLACE	2	1.3333	1.7512	6
PLACE	3	2.5000	2.8107	6
PLACE	4	1.8000	2.4900	5
PLACE	5	1.0000	2.0000	4
PLACE	6	2.5000	3.5355	2
PERSON	3	2.0000	1.8787	18
PLACE	1	2.2500	2.0616	4
PLACE	2	2.0000	2.3094	4
PLACE	3	1.6667	2.0817	3
PLACE	4	1.6667	2.0817	3
PLACE	5	2.5000	2.1213	2
PLACE	6	2.0000	2.8284	2
Total Cases =		101		
Missing Cases =		26	OR	25.7 PCT.

Summaries of FLEET
By levels of PERSON

Variable For Entire Population	Value Label	Mean	Std Dev	Cases
PERSON	1	2.3200	2.3719	75
PLACE	1	2.5714	2.7679	28
PLACE	2	2.1667	2.7869	6
PLACE	3	2.1667	3.0605	6
PLACE	4	3.2000	3.1145	5
PLACE	5	3.2500	3.7749	4
PLACE	6	2.0000	2.4405	4
PERSON	2	3.0000	2.6458	3
PLACE	1	1.9655	2.2596	29
PLACE	2	2.0000	2.1909	6
PLACE	3	2.3333	2.5820	6
PLACE	4	2.5000	2.8107	6
PLACE	5	1.6000	2.1909	5
PLACE	6	2.0000	2.3094	4
PERSON	3	0.0	0.0	2
PLACE	1	2.5000	1.8865	18
PLACE	2	3.0000	2.0000	4
PLACE	3	2.0000	2.3094	4
PLACE	4	2.0000	2.0000	3
PLACE	5	2.6667	2.3094	3
PLACE	6	2.0000	2.8284	2
PLACE	6	3.5000	.7071	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of TRP ISSUE PERISHABLE
By levels of PERSON

Variable For Entire Population	Value Label	Mean	Std Dev	Cases
PERSON	1	4.1600	2.5029	75
PLACE	1	5.4643	1.4778	28
PLACE	2	6.1667	.7528	6
PLACE	3	4.3333	2.2509	6
PLACE	4	5.2000	1.3038	5
PLACE	5	6.0000	.8165	4
PLACE	6	6.2500	.5000	4
PERSON	2	5.0000	1.7321	3
PLACE	1	2.3103	2.9045	29
PLACE	2	3.0000	3.3466	6
PLACE	3	2.6667	3.0768	6
PLACE	4	2.8333	3.2506	6
PLACE	5	2.4000	3.3615	5
PLACE	6	1.0000	2.0000	4
PERSON	3	0.0	0.0	2
PLACE	1	5.1111	1.2783	18
PLACE	2	6.0000	.8165	4
PLACE	3	5.7500	.9574	4
PLACE	4	3.6667	1.5275	3
PLACE	5	5.0000	1.0000	3
PLACE	6	5.5000	.7071	2
PLACE	6	4.0000	1.4142	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of NON-PERISHABLE

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		4.2533	2.5367	75
PERSON	1	5.4643	1.4778	28
PLACE	1	6.1667	.7528	6
PLACE	2	4.3333	2.2509	6
PLACE	3	5.2000	1.3038	5
PLACE	4	6.0000	.8165	4
PLACE	5	6.2500	.5000	4
PLACE	6	5.0000	1.7321	3
PERSON	2	2.5517	2.9951	29
PLACE	1	3.0000	3.3466	6
PLACE	2	2.6667	3.0768	6
PLACE	3	2.8333	3.2506	6
PLACE	4	2.4000	3.3615	5
PLACE	5	2.7500	3.4034	4
PLACE	6	0.0	0.0	2
PERSON	3	5.1111	1.2783	18
PLACE	1	6.0000	.8165	4
PLACE	2	5.7500	.9574	4
PLACE	3	3.6667	1.5275	3
PLACE	4	5.0000	1.0000	3
PLACE	5	5.5000	.7071	2
PLACE	6	4.0000	1.4142	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of CENTRAL PREP

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		2.9467	2.5569	75
PERSON	1	3.0357	2.6032	28
PLACE	1	2.8333	3.2506	6
PLACE	2	2.3333	2.5820	6
PLACE	3	2.6000	2.4083	5
PLACE	4	3.7500	2.6300	4
PLACE	5	4.0000	2.8284	4
PLACE	6	3.3333	3.0651	3
PERSON	2	2.2414	2.6546	29
PLACE	1	2.6667	3.0768	6
PLACE	2	2.6667	3.0768	6
PLACE	3	1.5000	2.3452	6
PLACE	4	1.8000	2.4900	5
PLACE	5	2.7500	3.4034	4
PLACE	6	2.0000	2.8284	2
PERSON	3	3.9444	2.0428	18
PLACE	1	3.5000	2.5166	4
PLACE	2	3.5000	2.3805	4
PLACE	3	2.3333	2.5166	3
PLACE	4	5.0000	1.0000	3
PLACE	5	5.5000	.7071	2
PLACE	6	5.0000	0.0	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of OTHER

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		1.0000	1.8959	75
PERSON	1	1.4643	2.2191	28
PLACE	1	1.0000	2.4495	6
PLACE	2	1.5000	2.3452	6
PLACE	3	1.6000	2.1909	5
PLACE	4	1.5000	3.0000	4
PLACE	5	1.0000	2.0000	4
PLACE	6	2.6667	2.3094	3
PERSON	2	0.0	0.0	29
PLACE	1	0.0	0.0	6
PLACE	2	0.0	0.0	6
PLACE	3	0.0	0.0	6
PLACE	4	0.0	0.0	5
PLACE	5	0.0	0.0	4
PLACE	6	0.0	0.0	2
PERSON	3	1.8889	2.2199	18
PLACE	1	1.0000	2.0000	4
PLACE	2	2.0000	2.3094	4
PLACE	3	1.3333	2.3094	3
PLACE	4	3.3333	3.0551	3
PLACE	5	2.0000	2.8284	2
PLACE	6	2.0000	2.8284	2
Total Cases =		101		
Missing Cases =		26 OR 25.7 PCT.		

Summaries of AIRFIELD

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.8933	2.5017	75
PERSON	1	4.2143	2.3938	28
PLACE	1	4.5000	2.2583	6
PLACE	2	4.1667	2.1370	6
PLACE	3	4.0000	2.5495	6
PLACE	4	4.2500	2.8723	4
PLACE	5	5.0000	3.3665	4
PLACE	6	3.0000	2.6458	3
PERSON	2	3.0000	3.0000	29
PLACE	1	1.5000	1.8708	6
PLACE	2	2.1667	2.3166	6
PLACE	3	4.6667	3.6148	6
PLACE	4	3.8000	3.4928	5
PLACE	5	3.2500	3.7749	4
PLACE	6	2.5000	3.5355	2
PERSON	3	4.8333	.9235	18
PLACE	1	4.7500	.9574	4
PLACE	2	4.5000	1.0000	4
PLACE	3	4.6667	1.1547	3
PLACE	4	5.6667	.5774	3
PLACE	5	5.5000	.7071	2
PLACE	6	4.0000	0.0	2
Total Cases =		101		
Missing Cases =		26 OR 25.7 PCT.		

Summaries of OPER & MAIN
By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
PERSON	1	3.8667	2.4347	75
PERSON	2	3.8929	2.4089	28
PERSON	3	4.3333	2.2509	6
PERSON	4	4.1667	2.1370	6
PERSON	5	2.6000	2.4083	5
PERSON	6	4.2500	2.8723	4
PERSON	7	4.7500	3.2016	4
PERSON	8	3.0000	2.6458	3
PERSON	9	3.1034	2.8328	29
PERSON	10	1.6667	1.8619	6
PERSON	11	3.3333	2.5820	6
PERSON	12	4.3333	3.3862	6
PERSON	13	3.2000	3.1145	5
PERSON	14	3.2500	3.7749	4
PERSON	15	2.5000	3.5355	2
PERSON	16	5.0556	.9376	18
PERSON	17	5.2500	.9574	4
PERSON	18	5.0000	1.1547	4
PERSON	19	4.6667	1.1547	3
PERSON	20	5.6667	.5774	3
PERSON	21	5.5000	.7071	2
PERSON	22	4.0000	0.0	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of INDUSTRIAL
By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
PERSON	1	3.6133	2.1803	75
PERSON	2	3.9286	2.2432	28
PERSON	3	4.1667	2.2286	6
PERSON	4	3.8333	2.0412	6
PERSON	5	3.8000	2.2804	5
PERSON	6	4.0000	2.8284	4
PERSON	7	4.5000	3.0000	4
PERSON	8	3.0000	2.6458	3
PERSON	9	2.8621	2.5174	29
PERSON	10	1.8333	1.9408	6
PERSON	11	3.3333	2.5820	6
PERSON	12	4.0000	3.0984	6
PERSON	13	2.6000	2.4083	5
PERSON	14	2.5000	2.8868	4
PERSON	15	2.5000	3.5355	2
PERSON	16	4.3333	.7670	18
PERSON	17	4.0000	.8185	4
PERSON	18	4.2500	.5000	4
PERSON	19	4.3333	.5774	3
PERSON	20	4.6667	1.1547	3
PERSON	21	5.0000	1.4142	2
PERSON	22	4.0000	0.0	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of ADMIN
By levels of PERSON
PLACE

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.6133	2.1175	75
PERSON	1	3.7857	2.1492	28
PLACE	1	3.8333	2.0412	6
PLACE	2	3.8333	2.0412	6
PLACE	3	3.8000	2.2804	5
PLACE	4	4.0000	2.8284	4
PLACE	5	4.0000	2.7080	4
PLACE	6	3.0000	2.6458	3
PERSON	2	3.0345	2.5282	29
PLACE	1	4.0000	2.3664	6
PLACE	2	3.3333	2.8583	6
PLACE	3	3.6667	2.8752	6
PLACE	4	1.6000	2.1909	5
PLACE	5	2.5000	2.8668	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.2778	.7519	18
PLACE	1	4.0000	.8165	4
PLACE	2	4.2500	.5000	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of COMMERCIAL COMMUNITY
By levels of PERSON
PLACE

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.2267	2.1721	75
PERSON	1	3.6429	2.2806	28
PLACE	1	3.0000	2.4495	6
PLACE	2	3.8333	2.0412	6
PLACE	3	3.8000	2.2804	5
PLACE	4	4.0000	2.8284	4
PLACE	5	4.2500	2.8723	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.2414	2.3246	29
PLACE	1	2.0000	2.0976	6
PLACE	2	2.8333	2.7869	6
PLACE	3	3.0000	2.9665	6
PLACE	4	1.8000	2.0494	5
PLACE	5	1.2500	1.8930	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.1667	.7071	18
PLACE	1	3.7500	.5000	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2
Total Cases =				101
Missing Cases =				26 OR 25.7 PCT.

Summaries of COMMUNITY SERVICE

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.2400	2.0850	75
PERSON	1	3.6429	2.0224	28
PLACE	1	3.6667	1.8619	6
PLACE	2	3.6667	1.8619	6
PLACE	3	3.6000	2.0736	5
PLACE	4	3.7500	2.6300	4
PLACE	5	4.0000	2.7080	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.2414	2.3246	29
PLACE	1	2.0000	2.0976	6
PLACE	2	2.8333	2.7869	6
PLACE	3	3.0000	2.9665	6
PLACE	4	1.8000	2.0494	5
PLACE	5	1.2500	1.8930	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.2222	.7321	18
PLACE	1	4.0000	.8165	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of MEDICAL

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.5333	2.0686	75
PERSON	1	3.8929	2.2168	28
PLACE	1	4.1667	2.2286	6
PLACE	2	3.8333	2.0412	6
PLACE	3	3.8000	2.2804	5
PLACE	4	4.0000	2.8284	4
PLACE	5	4.2500	2.8723	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.7586	2.2781	29
PLACE	1	2.6667	2.1602	6
PLACE	2	3.0000	2.3684	6
PLACE	3	3.6667	2.8752	6
PLACE	4	2.4000	2.1909	5
PLACE	5	2.0000	2.3094	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.2222	.7321	18
PLACE	1	4.0000	.8165	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of HOUSING (ACCOMPANIED)

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.2533	2.2306	75
PERSON	1	3.7500	2.2048	28
PLACE	1	3.8333	2.4014	6
PLACE	2	3.6667	1.9664	6
PLACE	3	3.8000	2.2804	5
PLACE	4	4.0000	2.8284	4
PLACE	5	4.0000	2.7080	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.2069	2.3357	29
PLACE	1	1.8333	2.1370	6
PLACE	2	2.0000	2.3664	6
PLACE	3	3.8333	2.9944	6
PLACE	4	1.8000	2.0494	5
PLACE	5	1.2500	1.8930	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.1667	1.3394	18
PLACE	1	3.2500	2.3629	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.6667	1.1547	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of HOUSING UNACCOMPANIED

By levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		4.9333	2.0817	75
PERSON	1	5.3571	1.5206	28
PLACE	1	6.0000	.8944	6
PLACE	2	4.3333	2.4221	6
PLACE	3	5.2000	1.3038	5
PLACE	4	5.7500	1.2583	4
PLACE	5	5.7500	.9574	4
PLACE	6	5.3333	1.5276	3
PERSON	2	4.4483	2.8232	29
PLACE	1	5.6667	2.8048	6
PLACE	2	5.5000	2.7386	6
PLACE	3	5.0000	2.5298	6
PLACE	4	3.2000	2.7749	5
PLACE	5	3.0000	3.1623	4
PLACE	6	2.0000	2.8284	2
PERSON	3	5.0556	1.1618	18
PLACE	1	5.7500	1.2583	4
PLACE	2	5.5000	1.2910	4
PLACE	3	4.6667	1.1547	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of OUTDOOR REC

By Levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		3.3067	2.0728	75
PERSON	1	3.8214	2.1612	28
PLACE	1	4.0000	2.0976	6
PLACE	2	3.8333	2.0412	6
PLACE	3	3.8000	2.2804	5
PLACE	4	4.0000	2.8284	4
PLACE	5	4.0000	2.7080	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.2069	2.1108	29
PLACE	1	2.3333	1.9664	6
PLACE	2	3.0000	2.3664	6
PLACE	3	2.3333	2.5820	6
PLACE	4	1.8000	2.0494	5
PLACE	5	1.2500	1.8930	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.2778	.6691	18
PLACE	1	4.2500	.5000	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of OPEN SPACE

By Levels of PERSON

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		2.9867	1.9693	75
PERSON	1	2.9643	2.0991	28
PLACE	1	3.0000	2.0000	6
PLACE	2	3.0000	2.0000	6
PLACE	3	2.8000	2.1679	5
PLACE	4	2.7500	2.7538	4
PLACE	5	3.2500	2.7638	4
PLACE	6	3.0000	2.6458	3
PERSON	2	2.2069	2.0068	29
PLACE	1	2.3333	1.9664	6
PLACE	2	2.5000	2.1679	6
PLACE	3	3.0000	2.3664	6
PLACE	4	1.6000	1.8166	5
PLACE	5	1.2500	1.8930	4
PLACE	6	2.0000	2.8284	2
PERSON	3	4.2778	.6691	18
PLACE	1	4.2500	.5000	4
PLACE	2	4.0000	0.0	4
PLACE	3	4.0000	0.0	3
PLACE	4	4.6667	1.1547	3
PLACE	5	5.0000	1.4142	2
PLACE	6	4.0000	0.0	2

Total Cases = 101

Missing Cases = 26 OR 25.7 PCT.

Summaries of WATER
By levels of PERSON
PLACE

Variable	Value Label	Mean	Std Dev	Cases
For Entire Population		2.5067	1.8843	75
PERSON	1	2.6429	1.9093	28
PLACE	1	2.6667	1.7512	6
PLACE	2	2.8333	1.9408	6
PLACE	3	2.6000	2.0736	5
PLACE	4	2.0000	1.8257	4
PLACE	5	2.7500	2.6300	4
PLACE	6	3.0000	2.6458	3
PERSON	2	1.9310	1.9808	29
PLACE	1	1.6667	1.9664	6
PLACE	2	1.6667	1.9664	6
PLACE	3	2.1667	2.4014	6
PLACE	4	2.2000	2.0494	5
PLACE	5	2.0000	2.3094	4
PLACE	6	2.0000	2.8284	2
PERSON	3	3.2222	1.4371	18
PLACE	1	3.2500	1.5000	4
PLACE	2	3.2500	1.5000	4
PLACE	3	3.3333	2.0817	3
PLACE	4	3.0000	1.7321	3
PLACE	5	2.5000	2.1213	2
PLACE	6	4.0000	0.0	2
Total Cases =	101			
Missing Cases =				26 OR 25.7 PCT.

APPENDIX III
Survey Instruments

NRDEC AF⁸⁸⁻⁴ Siting of Appropriated
Fund Enlisted Dining Facilities

SURVEY QUESTIONNAIRE

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August 1, 1987

I. Introduction and Overview

A. Purpose

Dining facilities have historically been constructed in dormitory areas because of the convenience of Subsistence-In-Kind (SIK) personnel under the assumption that utilization rates would be higher if facilities were located in their immediate living area. However, time constraints due to base mission changes, facility deterioration, on-base work and classroom schedule changes, the proliferation of commercial food outlets on or near installations, and the inevitable vehicular traffic, parking and transport problems on bases have decreased utilization of dining facilities. The effects of these and other factors must be considered for future construction projects, in order to provide the required level of service. The primary purpose of this questionnaire is to identify and quantify these factors underlying the siting of appropriated fund dining facilities.

B. Dining Services Description

This survey is designed to capture information related to the siting and location of the following Dining Service facilities on Air Force Bases (AFB's):

- Airmen's Dining Hall (ADH)
- Carry-out Service (CS)
- Flight Kitchen (FK)
- Alert Kitchen (AK)
- Fire Station (FS)
- Satellite Facilities (SF) or consolidated services with food provisioning.

The above facilities represent the key dining service operations found on most AFB's. Additional facilities exist on some AFB's such as a Central Preparation Facility or a Pastry Kitchen but these are support operations for the Dining facilities which is our main concern. Each base will have a different number and composition of these facilities with perhaps certain combinations of the above and occasional commercial outlet's such as *Burger Kings* located on or nearby the base. The questionnaire seeks to identify and quantify the key factors related to the siting of the above dining service operations.

C. Organization of the Questionnaire

The questionnaire is organized into five parts. The first part includes a discussion of the purpose and the organization of the questionnaire. The second part is designed to capture existing data on dining service operations which can be assembled from existing map and forms data presently compiled by base personnel. Part II is probably best filled out by someone from *Food Services*. The third part requests information on trip flows from housing and the workplace or classrooms to dining services, how personnel travel on the base and the distances implied by this travel. Part III is probably best filled out by someone who knows information about each squadron on base and where they live, work and eat their meals. The fourth part requests data on the "ideal" relationship that should exist between dining services and other land use activities on the base. Part IV. of the questionnaire is probably best filled out by someone from *Food Services and Civil Engineering or the Community Planning Office*. Finally, the fifth part requests data on future siting and location of dining service facility decisions. Part V. is probably best filled out by someone from the *Services Staff*.

II. Base Map and Existing Data

NAME OF BASE _____ MAJOR COMMAND _____
MAIN CONTACT _____ TITLE _____
AUTOVON _____ TELEPHONE _____
DATE _____

A. Introduction

This section of the questionnaire is designed to gather existing data on the location and utilization of all types of food service outlets on base. Please provide the base maps and forms specified below, and complete the tables on the following pages.

B. Base Maps

Please include a base map with the completed questionnaire. The base map must indicate building numbers, and may have a scale of 1"=800', 1"=400', or 1"=200' (whichever is appropriate for your base).

C. Forms

Please include copies of the following forms with the completed questionnaire:

C1. AF-1785 Facilities Inventory Report

This should be the most recent Facilities Inventory Report(s), and include all dining services on base. Please include a brief description of the condition codes used in items 15 and 16 on the form(s).

C2. AF-249 Food Service Operations Report

This should be the Food Service Operations Reports for the reporting periods of March 1-31 and April 1-30, 1987.

D. Tables

The tables on the following pages are designed to capture existing data on three categories of food service outlets on base:

D1. Dining Services (ADH, CS, FK, FS, SF)

D2. AAFES Food Services (BX, Burger King, etc)

D3. Non-Appropriated Fund Food Services (OOM, NCO, Snack Bars, etc.)

The tables should be completed by the Food Services Officer or staff. Instructions for completing each table are listed at the top of the page. Wherever exact figures are not available, please estimate.

D1. Dining Services

Instructions: For each dining facility, please enter the following:

- (1) Type of facility: ADH, CS, FK, AK, FS, SF (see pg. 2)
- (2) Building number (as shown on base map)
- (3) Hours of operation
- (4) Estimate of number of parking spaces (if any)
- (5) Total daily headcount and % SIK
 - a. Total daily headcount for each meal (breakfast, lunch, dinner, midnight)
 - b. Percentage of headcount that represents SIK personnel

Type of Facility	Building Number	Hours of Operation	Parking Spaces	Total Daily Headcount and % SIK				Totals	
				Breakfast	Lunch	Dinner	Midnight		
				a.	a.	a.	a.	a.	
				b. %	b. %	b. %	b. %	b. %	%
				a.	a.	a.	a.	a.	
				b. %	b. %	b. %	b. %	b. %	%
				a.	a.	a.	a.	a.	
				b. %	b. %	b. %	b. %	b. %	%
				a.	a.	a.	a.	a.	
				b. %	b. %	b. %	b. %	b. %	%
				a.	a.	a.	a.	a.	
				b. %	b. %	b. %	b. %	b. %	%

D2. AAFES Food Services

Instructions: For each AAFES food service outlet, please enter the following:

- (1) Name of facility (BX, Burger King, etc.)
- (2) Building number (as shown on the base map)
- (3) Hours of operation
- (4) Estimate the number of parking spaces (if any)
- (5) Total daily headcount for each meal (breakfast, lunch, dinner, midnight)

Type of Facility	Building Number	Hours of Operation	Parking Spaces	Total Daily Headcount				Totals
				Breakfast	Lunch	Dinner	Midnight	

D3. Non-Appropriated Fund Food Services

Instructions: For each Non-Appropriated Fund food service outlet, please enter the following:

- (1) Name of facility (OOM, NCO, Snack Bar, etc.)
- (2) Building number (as shown on the base map)
- (3) Hours of operation
- (4) Estimate of number of parking spaces (if any)
- (5) Total daily headcount for each meal (breakfast, lunch, dinner, midnight)

Type of Facility	Building Number	Hours of Operation	Parking Spaces	Total Daily Headcount				Totals
				Breakfast	Lunch	Dinner	Midnight	

III. Trip/Flow Matrix

A. Introduction/Purpose

In this part of the questionnaire we seek information which will be used to estimate (at the squadron level) the daily trips made between dorm areas, dining facilities, and work sites. We realize that some of the questions may require an estimate since exact figures will not be available, but please try to be as accurate as possible. Also, since work sites will be keyed to building numbers for the purposes of the study, it may be necessary for personnel at a work site complex to be aggregated and identified with a single building number near the center of the cluster of buildings. Similarly, please omit extraneous buildings and only list enlisted dining facilities on base.

Each questionnaire is probably best filled out by a person knowledgeable about the squadron.

B. Instructions

Please fill out one of the attached forms (Trip/Flow Questionnaire) for each squadron.

Duplicate as many additional forms as necessary.

C. Example

As an example to aid in filling out the attached form consider a hypothetical squadron (832 CSG) which contains a total of 183 people. Sixty-six of the 183 members of the squadron are housed in two dorms (Buildings 133 and 156) and work at three work sites (Buildings 245, 316, and 557). They eat in buildings 543, 443, and 907. The remainder of the squadron personnel live off base. The completed tables are listed below. (Note that the entries in Tables 1 and 2 only reflect dorm residents.)

Squadron Number (a)	Strength (b)	% SIK (c)	% BAS (d)	% with cars (e)	Mode of Transport (f)
832 CSG	183	35%	65%	100%	car

Dorm Building Number(s)	Work Site Building Number(s)			
	245	316	557	
133	31	0	0	
156	0	20	15	

Table 1: Dorm/Work Site Trip Matrix.

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner
133	245	543	443	443
156	316	543	907	543
156	557	543	543	543

Table 2: Dining Flow Matrix.

Trip/Flow Questionnaire

Duplicate and fill out one of these forms for each squadron.

Instructions: For the squadron, please list

- (a) the squadron number,
- (b) the strength (total number of personnel),
- (c) the percentage of total listed who are SIK,
- (d) the percentage of total listed who are on BAS,
- (e) the percentage of total listed who have cars,
- (f) the primary mode of transportation on base (walk, car, bus, taxi, etc.).

Squadron Number	Strength	% SIK	% BAS	% with cars	Mode of Transport
(a)	(b)	(c)	(d)	(e)	(f)

For the squadron given above, list in the left hand column of the following table the building number(s) in which personnel are housed. Then list across the top row of the table the work site building number(s) for these personnel. Finally, complete the table by entering the number of squadron members who live in the building for that row and work at the work site for that column.

Dorm Building Number(s)	Work Site Building Number(s)				

Table 1: Dorm/Work Site Trip Matrix.

Each non-zero entry in the previous table (Table 1.) corresponds to the portion of the squadron associated with a particular dorm/work site combination. In the following table, list each of these dorm/work site combinations and estimate the location (building number) at which the majority of each of these subgroups eats breakfast, lunch and dinner. Please exclude extraneous buildings and only list enlisted dining facilities on base.

Dorm Building	Work Site Building	Building Where Majority Eat		
		Breakfast	Lunch	Dinner

Table 2: Dining Flow Matrix.

IV. Ideal Relationship Matrix

A. Introduction/Purpose

In this part of the questionnaire, we are seeking to define the "ideal" relationship that should exist between Dining Services and the other land use activities on the base. This "flow" type of information is crucial to future siting of Dining facilities.

B. General Land Use Categories

In general there are 12 basic types of land use activities normally found on AFB's. Dining Services as we have defined them exists as a separate category of interest for which we need to define its relationship to all of the other major land use categories. Below is a brief description of each of the twelve major categories including the type of facility included within the category. Please refer to the following definitions when answering the remaining questions in this survey.

- **Airfield:** Airfield, runway, taxiway, apron and related open space.
- **Aircraft Operations & Maintenance:** Hangars, shops, and adjoining terminals.
- **Industrial:** Warehouses, Base maintenance and utility functions, and industrial services such as those belonging to transportation, communications, and civil engineering.
- **Administrative:** Military command and tenant activity, management, wing/group headquarters, classrooms and lecture halls, civilian administrative activities, security operations, gate/visitor management, and military operations security.
- **Community (Commercial):** Shopping, gas stations, recreation, base exchange, commissary, clubs, and other personal services such as barber shops, bowling alleys and other indoor recreational facilities.
- **Community (Service):** Non-commercial activities important in day-to-day living such as schools, adult education facilities, post office, library, day care centers, chapel and other religious education facilities.
- **Medical:** Hospital, clinics, optometry, dental care, and related medical facilities.
- **Housing (Accompanied):** Attached and detached residential units occupied by enlisted and officer families.
- **Housing (Unaccompanied):** Bachelor officer housing, airmen's dormitories, and visiting officer and airman's quarters.
- **Outdoor Recreation:** Parks, playgrounds, picnic areas, running tracks, golf courses, swimming pools, and tennis courts.
- **Open Space:** Greenbelts or undeveloped buffer space, airfield's AICUZ, railroad rights-of-way, utility easements, hazardous waste safety limits, and security buffers.
- **Water:** Ponds, streams, lakes, and shorefronts.

These categories may overlap in certain aspects, but at the base-wide planning levels, these categories are useful ways of guiding the facility planner in his/her siting decision process.

What we intend to do in the following sections of the survey is find out the critical relationship between the Dining Services and the twelve major land use categories described above.

C.1 Airmen's Dining Hall (ADH)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Airmen's Dining Hall (ADH)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Airmen's Dining Hall (ADH)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of AIRMEN'S DINING HALL (ADH) to:

+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other(please specify)_____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

To Be Completed By:
COMMAND

C.2 Carry Out Service (CS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Carry Out Service (CS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Carry Out Service (CS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of CARRY OUT SERVICE (CS) to:

+3	+2	+1	0	-1	-2	-3	
							<i>Airmen's Dining Hall (ADH)</i>
							<i>Fire Station (FS)</i>
							<i>Flight Kitchen (FK)</i>
							<i>Alert Kitchen (AK)</i>
							<i>Satellite Facility or consolidated operation (SF)</i>
							<i>Commercial Outlet's [e.g. Burger King's]</i>
							<i>Fleet Services</i>
							<i>Troop Issue (perishable)</i>
							<i>Troop Issue (semi-perishable)</i>
							<i>Central Preparation Facility</i>
							<i>Other(please specify) _____</i>
							<i>Airfield</i>
							<i>Aircraft Operations & Maintenance</i>
							<i>Industrial</i>
							<i>Administrative</i>
							<i>Community (Commercial)</i>
							<i>Community (Service)</i>
							<i>Medical</i>
							<i>Housing (Accompanied)</i>
							<i>Housing (Unaccompanied)</i>
							<i>Outdoor Recreation</i>
							<i>Open Space</i>
							<i>Water</i>

To Be Completed By
COMMAND

C.3 Fire Station (FS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Fire Station (FS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Fire Station (FS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
+1 :	<i>Separate whenever possible.</i>
+2 :	<i>Incompatible and should definitely be separated.</i>
+3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FIRE STATION (FS) to:

+3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

To Be Completed By:
COMMAND

C.4 Flight Kitchen (FK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Flight Kitchen (FK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Flight Kitchen (FK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FLIGHT KITCHEN (FK) to:

+3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.5 Alert Kitchen (AK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Alert Kitchen (AK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Alert Kitchen (AK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of ALERT KITCHEN (AK) to:

+3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other(please specify)_____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

To Be Completed By:
COMMAND

C.6 Satellite Facility or consolidated operation (SF)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Satellite Facility or consolidated operation (SF)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Satellite Facility or consolidated operation (SF)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of SATELLITE FACILITY (SF) to:

+3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

IV. Ideal Relationship Matrix

A. Introduction/Purpose

In this part of the questionnaire, we are seeking to define the "ideal" relationship that should exist between Dining Services and the other land use activities on the base. This "flow" type of information is crucial to future siting of Dining facilities.

B. General Land Use Categories

In general there are 12 basic types of land use activities normally found on AFB's. Dining Services as we have defined them exists as a separate category of interest for which we need to define its relationship to all of the other major land use categories. Below is a brief description of each of the twelve major categories including the type of facility included within the category. Please refer to the following definitions when answering the remaining questions in this survey.

- **Airfield:** Airfield, runway, taxiway, apron and related open space.
- **Aircraft Operations & Maintenance:** Hangars, shops, and adjoining terminals.
- **Industrial:** Warehouses, Base maintenance and utility functions, and industrial services such as those belonging to transportation, communications, and civil engineering.
- **Administrative:** Military command and tenant activity, management, wing/group headquarters, classrooms and lecture halls, civilian administrative activities, security operations, gate/visitor management, and military operations security.
- **Community (Commercial):** Shopping, gas stations, recreation, base exchange, commissary, clubs, and other personal services such as barber shops, bowling alleys and other indoor recreational facilities.
- **Community (Service):** Non-commercial activities important in day-to-day living such as schools, adult education facilities, post office, library, day care centers, chapel and other religious education facilities.
- **Medical:** Hospital, clinics, optometry, dental care, and related medical facilities.
- **Housing (Accompanied):** Attached and detached residential units occupied by enlisted and officer families.
- **Housing (Unaccompanied):** Bachelor officer housing, airmen's dormitories, and visiting officer and airman's quarters.
- **Outdoor Recreation:** Parks, playgrounds, picnic areas, running tracks, golf courses, swimming pools, and tennis courts.
- **Open Space:** Greenbelts or undeveloped buffer space, airfield's AICUZ, railroad rights-of-way, utility easements, hazardous waste safety limits, and security buffers.
- **Water:** Ponds, streams, lakes, and shorefronts.

These categories may overlap in certain aspects, but at the base-wide planning levels, these categories are useful ways of guiding the facility planner in his/her siting decision process.

What we intend to do in the following sections of the survey is find out the critical relationship between the Dining Services and the twelve major land use categories described above.

C.1 Airmen's Dining Hall (ADH)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Airmen's Dining Hall (ADH)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Airmen's Dining Hall (ADH)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
+1 :	<i>Separate whenever possible.</i>
+2 :	<i>Incompatible and should definitely be separated.</i>
+3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of AIRMEN'S DINING HALL (ADH) to:

-3	-2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
-3	-2	-1	0	-1	-2	-3	<i>Fire Station (FS)</i>
-3	-2	-1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
-3	-2	-1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
-3	-2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
-3	-2	+1	0	-1	-2	-3	<i>Fleet Services</i>
-3	+2	-1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
-3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
-3	-2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
-3	+2	-1	0	-1	-2	-3	<i>Other (please specify) _____</i>
-3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	-2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	-2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
-3	-2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
-3	-2	-1	0	-1	-2	-3	<i>Open Space</i>
-3	-2	-1	0	-1	-2	-3	<i>Water</i>

C.2 Carry Out Service (CS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Carry Out Service (CS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Carry Out Service (CS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
+1 :	<i>Separate whenever possible.</i>
+2 :	<i>Incompatible and should definitely be separated.</i>
+3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of CARRY OUT SERVICE (CS) to:

-3	-2	-1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
-3	-2	-1	0	-1	-2	-3	<i>Fire Station (FS)</i>
-3	-2	-1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
-3	-2	-1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
-3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
-3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
-3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
-3	+2	+1	0	-1	-2	-3	<i>Other(please specify)_____</i>
-3	-2	+1	0	-1	-2	-3	<i>Airfield</i>
-3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
-3	-2	+1	0	-1	-2	-3	<i>Water</i>

C.3 Fire Station (FS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Fire Station (FS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Fire Station (FS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
+1 :	<i>Separate whenever possible.</i>
+2 :	<i>Incompatible and should definitely be separated.</i>
+3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FIRE STATION (FS) to:

-3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
-3	-2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	-2	-1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
-3	-2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
-3	-2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	-2	-1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	-1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	-2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.4 Flight Kitchen (FK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Flight Kitchen (FK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Flight Kitchen (FK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FLIGHT KITCHEN (FK) to:

-3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.5 Alert Kitchen (AK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Alert Kitchen (AK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Alert Kitchen (AK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of ALERT KITCHEN (AK) to:

-3	-2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
-3	-2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
-3	-2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
-3	-2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
-3	-2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
-3	-2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
-3	-2	+1	0	-1	-2	-3	<i>Fleet Services</i>
-3	-2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
-3	-2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other(please specify)_____</i>
-3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.6 Satellite Facility or consolidated operation (SF)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Satellite Facility or consolidated operation (SF)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Satellite Facility or consolidated operation (SF)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
-3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
-2 :	<i>Close whenever possible.</i>
-1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
+1 :	<i>Separate whenever possible.</i>
+2 :	<i>Incompatible and should definitely be separated.</i>
+3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of SATELLITE FACILITY (SF) to:

-3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
-3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other(please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

IV. Ideal Relationship Matrix

A. Introduction/Purpose

In this part of the questionnaire, we are seeking to define the "ideal" relationship that should exist between Dining Services and the other land use activities on the base. This "flow" type of information is crucial to future siting of Dining facilities.

B. General Land Use Categories

In general there are 12 basic types of land use activities normally found on AFB's. Dining Services as we have defined them exists as a separate category of interest for which we need to define its relationship to all of the other major land use categories. Below is a brief description of each of the twelve major categories including the type of facility included within the category. Please refer to the following definitions when answering the remaining questions in this survey.

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- **Community (Commercial):** Shopping, gas stations, recreation, base exchange, commissary, clubs, and other personal services such as barber shops, bowling alleys and other indoor recreational facilities.
- **Community (Service):** Non-commercial activities important in day-to-day living such as schools, adult education facilities, post office, library, day care centers, chapel and other religious education facilities.
- **Medical:** Hospital, clinics, optometry, dental care, and related medical facilities.
- **Housing (Accompanied):** Attached and detached residential units occupied by enlisted and officer families.
- **Housing (Unaccompanied):** Bachelor officer housing, airmen's dormitories, and visiting officer and airman's quarters.
- **Outdoor Recreation:** Parks, playgrounds, picnic areas, running tracks, golf courses, swimming pools, and tennis courts.
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- **Water:** Ponds, streams, lakes, and shorefronts.

These categories may overlap in certain aspects, but at the base-wide planning levels, these categories are useful ways of guiding the facility planner in his/her siting decision process.

What we intend to do in the following sections of the survey is find out the critical relationship between the Dining Services and the twelve major land use categories described above.

C.1 Airmen's Dining Hall (ADH)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Airmen's Dining Hall (ADH)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Airmen's Dining Hall (ADH)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of AIRMEN'S DINING HALL (ADH) to:

+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Flight Kitchen (FK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other (please specify) _____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.2 Carry Out Service (CS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Carry Out Service (CS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Carry Out Service (CS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of CARRY OUT SERVICE (CS) to:

+3	+2	+1	0	-1	-2	-3	
							<i>Airmen's Dining Hall (ADH)</i>
							<i>Fire Station (FS)</i>
							<i>Flight Kitchen (FK)</i>
							<i>Alert Kitchen (AK)</i>
							<i>Satellite Facility or consolidated operation (SF)</i>
							<i>Commercial Outlet's [e.g. Burger King's]</i>
							<i>Fleet Services</i>
							<i>Troop Issue (perishable)</i>
							<i>Troop Issue (semi-perishable)</i>
							<i>Central Preparation Facility</i>
							<i>Other (please specify) _____</i>
							<i>Airfield</i>
							<i>Aircraft Operations & Maintenance</i>
							<i>Industrial</i>
							<i>Administrative</i>
							<i>Community (Commercial)</i>
							<i>Community (Service)</i>
							<i>Medical</i>
							<i>Housing (Accompanied)</i>
							<i>Housing (Unaccompanied)</i>
							<i>Outdoor Recreation</i>
							<i>Open Space</i>
							<i>Water</i>

C.3 Fire Station (FS)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Fire Station (FS)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Fire Station (FS)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FIRE STATION (FS) to:

+3	+2	+1	0	-1	-2	-3	
							<i>Airmen's Dining Hall (ADH)</i>
							<i>Carry-Out Service (CS)</i>
							<i>Flight Kitchen (FK)</i>
							<i>Alert Kitchen (AK)</i>
							<i>Satellite Facility or consolidated operation (SF)</i>
							<i>Commercial Outlet's [e.g. Burger King's]</i>
							<i>Fleet Services</i>
							<i>Troop Issue (perishable)</i>
							<i>Troop Issue (semi-perishable)</i>
							<i>Central Preparation Facility</i>
							<i>Other(please specify)_____</i>
							<i>Airfield</i>
							<i>Aircraft Operations & Maintenance</i>
							<i>Industrial</i>
							<i>Administrative</i>
							<i>Community (Commercial)</i>
							<i>Community (Service)</i>
							<i>Medical</i>
							<i>Housing (Accompanied)</i>
							<i>Housing (Unaccompanied)</i>
							<i>Outdoor Recreation</i>
							<i>Open Space</i>
							<i>Water</i>

C.4 Flight Kitchen (FK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Flight Kitchen (FK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Flight Kitchen (FK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of FLIGHT KITCHEN (FK) to:

+3	+2	+1	0	-1	-2	-3	<i>Airmen's Dining Hall (ADH)</i>
+3	+2	+1	0	-1	-2	-3	<i>Carry-Out Service (CS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Fire Station (FS)</i>
+3	+2	+1	0	-1	-2	-3	<i>Alert Kitchen (AK)</i>
+3	+2	+1	0	-1	-2	-3	<i>Satellite Facility or consolidated operation (SF)</i>
+3	+2	+1	0	-1	-2	-3	<i>Commercial Outlet's [e.g. Burger King's]</i>
+3	+2	+1	0	-1	-2	-3	<i>Fleet Services</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Troop Issue (semi-perishable)</i>
+3	+2	+1	0	-1	-2	-3	<i>Central Preparation Facility</i>
+3	+2	+1	0	-1	-2	-3	<i>Other(please specify)_____</i>
+3	+2	+1	0	-1	-2	-3	<i>Airfield</i>
+3	+2	+1	0	-1	-2	-3	<i>Aircraft Operations & Maintenance</i>
+3	+2	+1	0	-1	-2	-3	<i>Industrial</i>
+3	+2	+1	0	-1	-2	-3	<i>Administrative</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Commercial)</i>
+3	+2	+1	0	-1	-2	-3	<i>Community (Service)</i>
+3	+2	+1	0	-1	-2	-3	<i>Medical</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Accompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Housing (Unaccompanied)</i>
+3	+2	+1	0	-1	-2	-3	<i>Outdoor Recreation</i>
+3	+2	+1	0	-1	-2	-3	<i>Open Space</i>
+3	+2	+1	0	-1	-2	-3	<i>Water</i>

C.5 Alert Kitchen (AK)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Alert Kitchen (AK)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Alert Kitchen (AK)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of ALERT KITCHEN (AK) to:

+3	+2	+1	0	-1	-2	-3	
							<i>Airmen's Dining Hall (ADH)</i>
							<i>Carry-Out Service (CS)</i>
							<i>Fire Station (FS)</i>
							<i>Flight Kitchen (FK)</i>
							<i>Satellite Facility or consolidated operation (SF)</i>
							<i>Commercial Outlet's [e.g. Burger King's]</i>
							<i>Fleet Services</i>
							<i>Troop Issue (perishable)</i>
							<i>Troop Issue (semi-perishable)</i>
							<i>Central Preparation Facility</i>
							<i>Other(please specify)_____</i>
							<i>Airfield</i>
							<i>Aircraft Operations & Maintenance</i>
							<i>Industrial</i>
							<i>Administrative</i>
							<i>Community (Commercial)</i>
							<i>Community (Service)</i>
							<i>Medical</i>
							<i>Housing (Accompanied)</i>
							<i>Housing (Unaccompanied)</i>
							<i>Outdoor Recreation</i>
							<i>Open Space</i>
							<i>Water</i>

C.6 Satellite Facility or consolidated operation (SF)

Below is a series of flow relationship questions concerning the general proximity relationship of the *Satellite Facility or consolidated operation (SF)* activity to all other major dining services and land use activities on the base. Please *circle* the desired relationship between the *Satellite Facility or consolidated operation (SF)* and the other land use activities on the base where the following reasons obtain: (n.b. The larger positive number indicates *Degree of closeness* whereas, the smaller negative number indicates *Degree of separation*)

Score Value	Degree of Proximity
+3 :	<i>Absolute Closeness Essential, i.e. Direct adjacency.</i>
+2 :	<i>Close whenever possible.</i>
+1 :	<i>Compatible but not essential.</i>
0 :	<i>Indifference or no relationship.</i>
-1 :	<i>Separate whenever possible.</i>
-2 :	<i>Incompatible and should definitely be separated.</i>
-3 :	<i>Absolute Separation Required, i.e. no functional linkage.</i>

(n.b. If a land-use category or activity is non-applicable to your base, please skip the question)

DEGREE of PROXIMITY of SATELLITE FACILITY (SF) to:

+3	+2	+1	0	-1	-2	-3	
							<i>Airmen's Dining Hall (ADH)</i>
							<i>Carry-Out Service (CS)</i>
							<i>Fire Station (FS)</i>
							<i>Flight Kitchen (FK)</i>
							<i>Alert Kitchen (AK)</i>
							<i>Commercial Outlet's [e.g. Burger King's]</i>
							<i>Fleet Services</i>
							<i>Troop Issue (perishable)</i>
							<i>Troop Issue (semi-perishable)</i>
							<i>Central Preparation Facility</i>
							<i>Other (please specify) _____</i>
							<i>Airfield</i>
							<i>Aircraft Operations & Maintenance</i>
							<i>Industrial</i>
							<i>Administrative</i>
							<i>Community (Commercial)</i>
							<i>Community (Service)</i>
							<i>Medical</i>
							<i>Housing (Accompanied)</i>
							<i>Housing (Unaccompanied)</i>
							<i>Outdoor Recreation</i>
							<i>Open Space</i>
							<i>Water</i>

V. Miscellaneous Information

The final section of the questionnaire elicits information on new or remodeled dining facilities you are planning on in the near or immediate future.

(Please check the appropriate response or fill in the blank line as best as possible.)

yes no n.a. Are you planning on siting or relocating a new dining facility in the near future?

If you answered yes to the previous question, when do you foresee construction of the facility to begin?

- FY89 FY90 FY91 FY92 FY93 or later

If you are planning on a new facility will the facility be a separate facility or a multi-purpose consolidation of facilities such as Troop Issue, Fleet Services and an ADH?

- Separate Consolidated Other (Please Specify): _____

In the following section, please give us your *GENERAL* opinion as to what other factors or concerns you feel are important or that we may have overlooked and omitted, or that have not been addressed by the previous sections and questions of the questionnaire. You may use the back of this sheet if necessary.

[Lined area for handwritten response]

THANK YOU FOR YOUR PARTICIPATION IN THIS QUESTIONNAIRE

END