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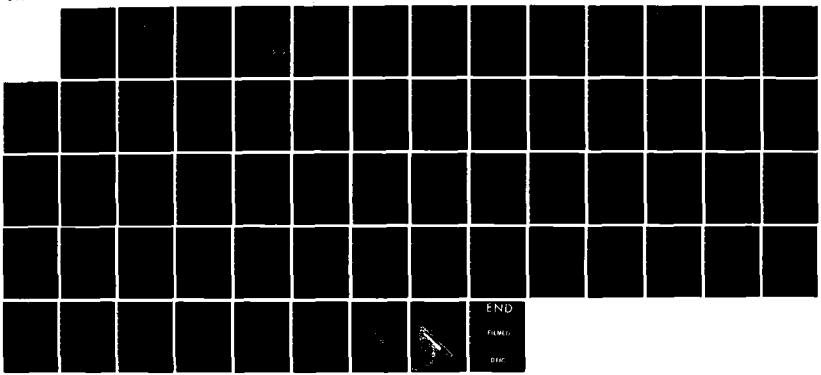

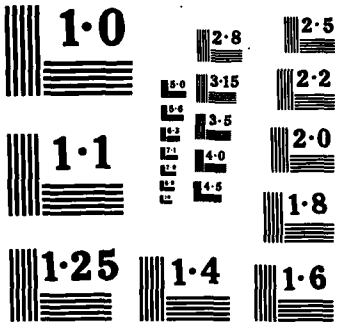

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AD-A156 091

AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

MONTANA AIR NATIONAL GUARD
F-16 STRATEGIC DEFENSE RESERVE
TRAINING UNIT FEASIBILITY STUDY

LT COL JAMES W. HIGGINS 85-1170

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REPORT NUMBER 85-1170

TITLE MONTANA AIR NATIONAL GUARD F-16 STRATEGIC DEFENSE RESERVE TRAINING UNIT FEASIBILITY STUDY

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Submitted to the faculty in partial fulfillment of requirements for graduation.

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This is a study of the feasibility of locating an ~~ANG~~ F-16 RTU for the strategic defense mission at Great Falls, Montana. The mission, airspace availability, weather, manning, host-tenant agreements, and availability of facilities are considered. Malmstrom AFB and Great Falls International Airport are evaluated as siting options. Selection of the best option is based on facility cost.

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PREFACE

This study of the feasibility of siting an Air National Guard F-16 Reserve Training Unit at Great Falls, Montana, could not have been completed without the help of several people. Lt Col Roger Steen of the Maintenance Staff at the National Guard Bureau provided advice and comments on the draft. Major John Gilbert spent many hours of his own time reading drafts and providing much needed advice. Many others too numerous to mention assisted in this project with information and advice. Finally, I would like to thank my wife, Ava, for her patience, proofreading, typing skills, and moral support. This paper could not have been completed without her help.

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ABOUT THE AUTHOR

The author began his military career by enlisting in the 120th Fighter Interceptor Group, Montana Air National Guard, at Great Falls, Montana. Lt Col Higgins was commissioned in 1969 and attended Undergraduate Pilot Training in 1970. On his return to the unit he performed squadron pilot duties until 1973 when he became Munitions Officer, and in 1979, Aircraft Maintenance Officer in the 120th Consolidated Aircraft Maintenance Squadron. He became Deputy Commander for Maintenance for the 120th Fighter Interceptor Group in August 1982. Lt Col Higgins has completed the Munitions Officer and Aircraft Maintenance Officer courses. He has also completed SOS by correspondence, ACSC by seminar, and is currently attending ACSC in residence.

TABLE OF CONTENTS

Preface ---------- iii
About the Author ---------- iv
List of Illustrations ---------- vii
Executive Summary ---------- viii

CHAPTER ONE - INTRODUCTION ---------- 1

CHAPTER TWO - DEFINE THE MISSION ---------- 3

CHAPTER THREE - OTHER FACTORS
- Airspace Availability ---------- 9
- Weather ---------- 11
- Manning ---------- 13

Coordination/Host-Tenant Agreements ---------- 14

CHAPTER FOUR - FACILITIES CRITERIA
- Aerodrome Facilities ---------- 18
- Operations Facilities ---------- 18
- Maintenance Facilities ---------- 19
- Supply/Storage Facilities ---------- 21
- Summary ---------- 22

CHAPTER FIVE - OPTION ONE (GREAT FALLS IAP)
- Operations Facilities ---------- 26
- Maintenance Facilities ---------- 27
- Supply/Storage Facilities ---------- 28
- Summary ---------- 29

CHAPTER SIX - OPTION TWO (MALMSTROM AFB)
- Operations Facilities ---------- 32
- Maintenance Facilities ---------- 32
- Supply/Storage Facilities ---------- 34
- Summary ---------- 34

CHAPTER SEVEN - OPTION THREE (JOINT SITING)
- Operations Facilities ---------- 37
- Maintenance Facilities ---------- 38
- Supply/Storage Facilities ---------- 41
- Summary ---------- 42

CHAPTER EIGHT - CONCLUSION ---------- 45

CONTINUED

APPENDICES:

Appendix A - Airspace ---------- 55
Appendix B - Map of Great Falls International Airport ---------- 56
Appendix C - Map of Malmstrom Air Force Base ---------- 57

LIST OF ILLUSTRATIONS

TABLES

TABLE 2-1 - Total Sortie Requirements ---------- 6
TABLE 3-1 - Summary of Airspace ---------- 9
TABLE 3-2 - Ceiling and Visibility ---------- 11
TABLE 3-3 - Days of Fog ---------- 12
TABLE 3-4 - Thunderstorms, Wind Speed, Precipitation ---------- 12
TABLE 3-5 - Temperature Summary ---------- 13
TABLE 4-1 - Cost Estimates ---------- 23
TABLE 4-2 - Facility Summary ---------- 23
TABLE 5-1 - Facility and Cost Summary Option One ---------- 30
TABLE 6-1 - Facility and Cost Summary Option Two ---------- 35
TABLE 7-1 - Estimate of Shop Requirements ---------- 39
TABLE 7-2 - Facility and Cost Summary Option Three ---------- 43

EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

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REPORT NUMBER 85-1170

AUTHOR(S) Lt Col James W. Higgins

TITLE Montana Air National Guard F-16 Strategic Defense Reserve Training Unit Feasibility Study.

I. Purpose: To evaluate the feasibility of placing an Air National Guard, F-16, Strategic Defense Reserve Training Unit (RTU) at Great Falls, Montana. Great Falls International Airport, Malmstrom Air Force Base, and split siting were considered as siting options.

II Problem: As the F-16 replaces older aircraft in Air National Guard Air Defense Tactical Air Command (ADTAC) units, a large number of aircrews will require conversion training. The Montana Air National Guard proposes to establish an F-16 RTU in Great Falls, Montana. Six factors were considered in evaluating this proposal: the mission, airspace availability, weather, manning, coordination/host-tenant relationships, and facilities. Because of the cost involved in new construction or renovation, facility selection is critical and was used to determine the best site option.

III Discussion of Analysis: To begin this analysis, four assumptions were necessary:

- There is a need for an Air National Guard RTU for the F-16 in the strategic defense mission.

- The Montana Air National Guard will retain its current strategic defense mission and assume the RTU role as a secondary mission.

CONTINUED

- The RTU can be located at Great Falls International Airport, Malmstrom AFB, or jointly sited.

- The RTU will have no operational mission other than aircrew training; therefore, munitions storage and maintenance are not necessary.

After establishing assumptions, six factors were developed which are important to RTU site development:

- The first factor considered was the mission. This analysis was necessary to determine sortie and aircraft requirements.

- Airspace availability was a consideration for RTU site development. Availability of airspace is dependent on volume of airspace and access to tactical control. Adequate airspace exists, but tactical control is uncertain; several solutions are presented.

- Weather was analyzed by comparing Malmstrom AFB with several other active and ANG RTU sites. Based on the data presented, Malmstrom AFB and central Montana have suitable weather for operation of an RTU.

- Manning is an important consideration in the operation of an RTU; however, little variation in personnel required is likely, regardless of where the RTU is located. More important is the ability of the local area to provide adequate personnel. Great Falls, Montana, is a relatively small community, but the opportunity for full-time employment will serve as an inducement for people to become members of the unit.

- The fifth consideration was coordination/host-tenant relationships. If this proposal is accepted by the National Guard Bureau (NGB), and Malmstrom AFB is considered a viable siting option, negotiations between NGB, Strategic Air Command, and Malmstrom AFB will be necessary to determine what support will be available. In addition, an environmental impact study, involving several state agencies, will be necessary.

- The final factor considered was facilities. Criteria were established, including facility requirements and square feet, and a cost for new construction or renovation was determined.

CONTINUED

Each siting option was then compared to the criteria to determine what existing facilities could be used and what new construction/renovation would be required. Based on the total cost of construction/renovation, one site was picked as the best option.

IV Conclusions: Based on the factors considered, no major limitations to siting an Air National Guard F-16 Reserve Training Unit at Great Falls, Montana were found. Evaluation of facilities at Great Falls International Airport and Malmstrom AFS indicated that joint siting is the lowest cost siting option.

development and operation of an RTU. The key element in this feasibility study is the evaluation and selection of adequate facilities to support an RTU. In the next chapter we will begin to address this question by establishing the criteria used to evaluate and select facilities.

In all options discussed, some level of support is expected, with small reductions in manning possible. Overall, personnel requirements should not vary significantly between potential RTU locations. However, recruitment potential is a factor that must be considered.

Great Falls is a relatively small community (approximately 65,000 people) located in Central Montana. The nearest sizable city is Helena located 90 miles away. Because of the size of the state and its small population, recruiting can present a problem. The Montana Air National Guard actively recruits throughout the state, and a good retention record enables the unit to maintain its strength. Approximately 65% of its military members perform part-time military duty and work full-time in the civilian community. As a result, recruiting depends on people who are going to school or working in the state. An RTU, however, does not need to recruit at a level required to support wartime tasking. It need only recruit sufficient personnel to complete its training mission. As a result, personnel recruited for the RTU can be offered full-time employment. Adequate manning is an important consideration in RTU site development, regardless of where it is located. The total numbers will remain relatively constant at any specific location; however, the ability of the community to provide the manning necessary is of concern. This factor will require careful study before a decision is made to begin RTU operations in Great Falls.

COORDINATION/HOST-TENANT AGREEMENTS

If the proposal made in this feasibility study is accepted, a major factor in its implementation will be agreement with Strategic Air Command (SAC) to utilize facilities at Malmstrom AFB. The following information was provided by NGB/LGX:

> If the Montana Air National Guard decides to pursue this proposal, it should be forwarded to NGB/XO where it will be evaluated and coordinated with NGB staff organizations. After completion of coordination, NGB will begin negotiations with SAC and Malmstrom AFB on utilization of facilities and services. In addition, an Environment Impact Statement is required, which entails the coordination and involvement of various state agencies. (23:--)

Significant efforts will be necessary to complete coordination and host-tenant arrangements in a timely manner.

This chapter has taken a brief look at several factors which will require careful evaluation before implementation of this proposal. Airspace availability, weather, manning, and coordination/host-tenant agreements play a significant role in the

Table 3-5 shows mean monthly temperature in degrees Fahrenheit.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Malmstrom	20	27	31	43	53	61	69	67	57	48	35	27
McConnell	30	36	45	58	66	76	82	80	71	60	45	36
Kingsley	29	35	38	43	52	60	67	65	58	49	38	34
MacDill	61	62	67	73	78	82	83	83	82	76	68	63
Hill	27	32	39	48	58	67	76	74	64	52	39	30
Tucson Int'l	50	53	58	66	73	82	86	83	80	70	58	52

(4:194,154,248,283,126,77)

TABLE 3-5

Malmstrom AFB has the lowest mean temperatures of any site, particularly during the cold winter months. Cold winter temperatures usually occur after frontal system passage and are often associated with relatively clear, dry weather. In addition, warm "chinook winds" periodically develop on the lee side of the Rocky Mountains and have a strong influence on the weather in the Great Falls area. Generally, they bring above freezing daytime temperatures and remove surface accumulation of snow.

Based on the data presented, the weather in the Great Falls area compares favorably with other locations. The exception is mean temperature which is colder than any other location during the winter months. Winter temperatures in Great Falls can become extremely cold. Cold temperatures, in themselves, do not have a strong negative impact on flying operations because ceiling and visibility may be satisfactory. Central Montana generally has exceptional flying weather. Bad flying weather is usually associated with fast moving frontal activity which should not seriously hamper RTU operations.

MANNING

Sufficient numbers of adequately trained personnel to support the mission is an important consideration in development of an RTU. A manning document for ANG units equipped with the F-16 in strategic defense role has not been developed; however, preliminary efforts have begun. This document, along with operational experience, should provide the baseline for determining manning requirements for the RTU. Given the same number of aircraft, similar numbers of personnel will be required regardless of where the RTU is located. Any differences will be a result of how much support is available from the host base, parent ANG unit, or both.

less than 7 miles due to fog, also indicates that Malmstrom AFB does not have visibility problems.

Station	Days
Malmstrom	47
McConnell	97
Kingsley	49
MacDill	84
Hill	62
Tucson Int'l	2

(4:194,154,248,283,123,77)

TABLE 3-3

Table 3-4 displays mean annual data on days of thunderstorms, wind speed, and precipitation in inches.

Station	Days *	Knots **	Inches ***
Malmstrom	24	8	14.5
McConnell	52	8	32.3
Kingsley	12	5	12.2
MacDill	86	6	44.4
Hill	28	7	18.9
Tucson Int'l	39	7	10.9

* Mean annual numbers of days of thunderstorms
** Mean annual wind speed
*** Mean annual precipitation

(4:194,154,248,283,123,77)

TABLE 3-4

As table 3-4 shows, Malmstrom AFB has a relatively low number of thunderstorms and annual precipitation amounts each year. Mean annual windspeed is higher than most of the other sites, however, it is predominantly aligned with runway heading. (4:194)

any case, careful evaluation of control requirements, capabilities, and use of existing airspace, will be necessary prior to development of an RTU in the Great Falls area.

WEATHER

Weather is an important factor in selecting a suitable RTU site. When training is interrupted for an extended time, continuity is lost, and training must be reaccomplished. In addition, marginal flying weather can result in unproductive sorties, and have negative impact on flight safety. Weather data from several locations will be compared to Malmstrom AFB to characterize the weather in the Great Falls area.

The sites selected for comparison include McConnell AFB, Kansas; Kingsley Field, Oregon; MacDill AFB, Florida; Hill AFB, Utah and Tucson International Airport, Tucson, Arizona. These sites, with the exception of Hill AFB, were selected because they support an existing active or Air National Guard aircrew training facility. Hill AFB was selected because it is the location of an F-16 wing, and its climate is similar to Great Falls. The data is from the United States Air Force Air Weather Service and is based on 20 to 40 years observation. The data considers thunderstorms, ceiling and visibility restrictions, annual precipitation, temperature, and wind speed. This information does not provide a complete and comprehensive weather analysis, but does present key data with which a comparison can be made.

Table 3-2 shows the percentage of time, each month, the ceiling is less than 1000 feet and/or visibility is less than 2 miles.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Malmstrom	7	5	6	7	3	3	1	1	2	5	7	8
McConnell	14	14	13	6	4	3	1	2	8	6	11	12
Kingsley	12	5	2	1	0	0	0	0	0	6	11	11
MacDill	9	6	5	2	2	1	1	1	1	1	5	7
Hill	10	7	5	5	1	0	0	0	0	1	4	13
Tucson Int'l	1	0	0	0	0	0	0	0	0	0	0	0
												(4:194,154,248,283,123,77)

TABLE 3-2

From the data in Table 3-2, Malmstrom AFB compares favorably with the other sites. Table 3-3, mean annual days with visibility

Distance from Great Falls varies from approximately 50 to 75 miles, depending on the airspace used. Additionally, Canadian airspace which is 90 miles from Great Falls can be used when control is available. Airspace located in northeast Washington is also used. The Cutbank, Shelby, and Bearpaw ATCAA's are adjacent to each other and located along the northern border of the state. (See Appendix A) Together, they provide an airspace 280 miles long and from 50 to 90 miles wide. Combined with a substantial low altitude area, they will provide adequate airspace to absorb the additional sorties generated by the RTU. However, to use this training airspace, adequate control must be provided.

The development of an F-16 RTU at Great Falls will have a significant impact on total daily sorties generated in the area. As stated in Chapter Two, approximately 12 sorties per day will be required to support RTU training. Also, the 120th FIGp currently generates approximately 12 sorties per day with the F-106. This sortie rate should not change significantly after converting to the F-16, so approximately 24 sorties per day can be expected. Of the RTU generated sorties, approximately 50% are for transition, ins ment, or BFM/ACT. In addition, a portion of the sorties generated by the 120th FIGp fall in this category. These sorties could, to some extent, be conducted under autonomous conditions or with limited radar control. In any case, departure, recovery, and airspace coordination require participation by a controlling agency.

The 25th Air Division, McChord AFB, Washington, provides radar control, coordination, and management of the airspace used by the Montana Air National Guard during day-to-day training activities. This is accomplished through a Letter of Agreement between Salt Lake City Air Route Traffic Control Center, the 25th Air Division, Great Falls TRACON, and the 120th FIGp. This Letter of Agreement does not contain limitations on total sorties per day (16:--), however, the 25th Air Division provides the same services to several other ADTAC units, and the additional work load will undoubtedly have an impact. The problem was discussed with Colonel Jack Mason, Director of Operations, 25th Air Division. His initial evaluation indicated the additional workload would not be beyond the capabilities of the 25th Air Division, if adjustments, such as manning and scope availability, were made. (4:--) Other alternatives include augmenting the 25th Air Division with Air National Guard personnel, or development of a tactical control squadron at Malmstrom AFB in conjunction with the RTU.

A tactical control squadron would be able to provide the control necessary for operation of the RTU and, in addition, support the parent unit in its training effort. This unit could also provide support if surface attack training were added to the mission of the RTU. Five potential air-to-ground training sites were identified for preliminary research in the Great Falls Area Chamber of Commerce, Committee of the Eighties Report. (12:7) In

Chapter Three

OTHER FACTORS

Airspace availability, weather, manning, and coordination/host-tenant agreements will play a key role in the development of an RTU. These factors, in addition to facility cost, will impact on the efficiency of the organization, and therefore require consideration.

AIRSPACE AVAILABILITY

Without adequate airspace, the training mission of the RTU cannot be accomplished. Airspace availability is dependent on the volume of airspace and adequate tactical control. The Montana Air National Guard has access to airspace in several locations. The primary airspace is located along the northern border of Montana and is divided into several sections. The airspace includes Air Traffic Control Assigned Airspace (ATCAA) segments, with vertical and horizontal limits, and located within a positive control area; and, Military Operations Areas (MOAs), also vertically and horizontally defined, and located outside the positive control area. (5:4)

Established airspace includes the Cutbank ATCCA, the Bearpaw ATCAA, and the Shelby ATCAA. Low altitude airspace is located below the Bearpaw ATCAA and consists of the Loring and Hays MOAs. Table 3-1 summarizes the airspace.

AIRSPACE	SIZE (MILES)	ALTITUDE
Cutbank ATCAA	80 X 80	FL 180 - 500
Shelby ATCAA	80 X 50	FL 180 - 500
Bearpaw ATCAA	120 X 90	FL 180 - 500
Loring MOA	75 X 25	4000 MSL - FL 180
Hays MOA	120 X 45	300 AGL - FL 180

(16:Attch A)

TABLE 3-1

A total of 1256 direct and support sorties are required to complete a conversion program for a single unit, including an 8% attrition factor.

RTU instructor pilots are required to maintain currency and proficiency in the assigned aircraft. IPs in an RTU environment would likely get sufficient sorties, but would have difficulty completing proficiency requirements. Additional sorties are necessary to meet these requirements. (17:3) The NGB used a planning factor of 20% (251 sorties) for continuation training. (17:3) This brings the total to 1507 sorties generated by the RTU in support of a single conversion.

To spread out the workload at the RTU and provide continuity at the converting unit, aircrews will be scheduled to enter training over a period of several quarters. (17:3) If two units convert to the F-16 per year, 3014 sorties will be required to directly support the RTU. Based on 250 flying days per year, approximately 12 sorties will be needed per day. For planning purposes, the NGB used a 50% in-commission rate for the F-16. (17:2) To fly 12 sorties per day with that in-commission rate, approximately 24 aircraft will be required. This number will be used as the baseline in evaluating facility requirements.

This chapter provided a brief overview of F-16 training course syllabi requirements. Sortie requirements are based on air-to-surface attack and air superiority missions. Training requirements for the strategic defense mission have not been determined, but total sorties should not differ greatly. Total sortie and aircraft requirements for the RTU were calculated. In the next chapter, four other factors which impact on establishing an RTU at Great Falls, Montana will be considered.

Instructor Pilot Upgrade Training Course consists of:

Duration
- 32 training days
  - 5 ground training days
  - 27 flying training days

Amount
- Flying sorties/hours - 18/25.2
- Direct support sorties/hours - 1/1.4
- Aircrew training device hours - 14.5
- Academic hours - 41.5 (8:1-1)

Sortie Structure

- IP training	18	
- Direct support	1	
- Attrition	1.9	
- Total	20.9	(8:1-2)

The courses outlined are those in use by TAC in their F-16 aircrew training programs. They include training sorties in the conversion phase, air-to-air phase, and the surface attack phase. No determination has been made concerning what, if any, surface attack sorties and skills will be required for Air Defense Tactical Air Command (ADTAC) gained ANG units. As stated earlier, the aircrew training program for the F-16 in the strategic defense role has not been fully defined. For planning purposes, the sortie requirements in the TAC syllabi will be used.

To determine ANG and AFRES F-16 training requirements, the NGB estimated 43 aircrews per converting unit will require F-16 training. (17:2) This included 18 aircrews in the Transition/Requalification Course, 12 in the Special Transition Training Course, and 4 in the Instructor Pilot Training Course. (17:2) Aircrews returning from UPT during conversion or who graduated from UPT during the previous 10 months, will attend the Basic Operational Training Course. (17:3) The remaining aircrews will accomplish home station checkout. The total sortie requirements are summarized in Table 2-1.

Course	Aircrews	Sorties	Total Sorties
Transition	18	37.6	676.8
Special Transition	12	16.2	194.4
Instructor Pilot	4	20.9	83.6
Basic	3	100.4	301.2
Total			1256

TABLE 2-1

- Surface Attack	26
- Direct Support	34
- Attrition	7.4
Total	100.4

(7:1-4)

Upon completion of this course, the graduate will "have fulfilled all requirements contained in TACM 51-50 for Initial Qualification Training (IQT)." (7:1-1)

Aircrew conversion can be accomplished through the use of the USAF Special Transition Training Course, such as the one developed for the 419th TFW (AFRES) conversion. The prerequisites for course entry include (1) 300 FP/IP hours in tactical fighter/attack aircraft and current within 42 months prior to course entry, or (2) 500 FP/IP hours in tactical fighter/attack aircraft and current within 5 years prior to course entry, or (3) 1000 FP/IP Hours in tactical fighter/attack aircraft and current within 8 years prior to course entry. (9:1-1) The USAF Special Transition Training Course includes:

Duration
- 28 training days
  - 13 ground training days
  - 15 flying training days

Amount
- Flying sorties/hours - 10/14.3
- Direct support sorties/hours - 5/6.5
- Aircrew training device hours - 13.5
- Academic hours - 134.1

Sortie Structure

- Transition	5
- Air-to-Air	3
- Surface attack	2
- Direct support	5
- Attrition	1.2
Total	16.2

(9:1-2)

Graduates are qualified to enter Mission Qualification Training (MQT), as outlined in MCM 51-50, Vol. VIII. (9:1-1)

Home station checkout can also be used for aircrew transition training. Some ANG aircrews will find it necessary to receive this training. Formal training will take place at the RTU and will include academic and Aircrew Training Device (ATD) training. Flying training will be accomplished at home station. Training sorties and IP resources will be provided by the converting unit, at home station.

An additional aircrew training requirement faced by the RTU is to provide instructor pilot upgrade training to each converting unit. Course prerequisites include currency in the F-16 and qualification IAW TACM 51-50, Vol. I, Ch 6. (8:1-1) The USAF

Track I training since Tracks II and III require previous currency in the F-16. (10:iii) Course entry prerequisites for Track I include: (1) 300 FP/IP hours in tactical fighter/attack aircraft and current within 42 months, or (2) 500 FP/IP hours in tactical fighter/attack aircraft and current within 5 years, or (3) 1000 FP/IP hours in tactical fighter/attack aircraft and current within 8 years of course entry. (10:1-1) Track I training is structured as follows:

Duration
-56 training days
-- 21 ground training days
-- 35 flying training days
Amount
- Flying sorties/hours - 22/30.5
- Direct support sorties/hours - 12.83/16.41
- Aircrew training device hours - 23.5
- Academic hours - 209.1

(10:1-2)

Sortie Structure

- Transition	7
- Air-to-Air	7
- Surface Attack	8
- Direct Support	12.83
- Attrition	2.8
Total	37.6

(10:1-3)

Upon completion of this course, aircrews will be qualified to enter Mission Qualification Training as outlined in MCM 51-50, Volume VIII. (10:1-1)

Air National Guard aircrews who do not meet minimum flying hour requirements to enter the transition/requalification or are recent Undergraduate Pilot Training (UPT) graduates, may enter the USAF Basic Operational Training Course. Prerequisites for entry into this course include F-16 assignment from UPT. (7:1-1) The USAF Basic Operational Training Course includes the following:

Duration
- 112 training days
- 19 ground training days
- 93 flying training days
Amount
- Flying sorties/hours - 59/78.1
- Direct support sorties/hours - 34/40
- Aircrew training device hours - 32.5
- Academic hours - 238.4

(7:1-2)

Sortie Structure

- Conversion	12
- Air-to-Air	21

Chapter Two

DEFINE THE MISSION

Air National Guard units must consider many factors when planning a conversion program that fits their mission needs. The conversion should be accomplished quickly to minimize the time the unit is unable to meet its OPlan tasking. A key element in planning is aircrew training, taking into consideration the availability of aircrews. Many Air National Guard aircrews work in the civilian community and may have difficulty making themselves availabile for an extended formal training program. Also, previous aircrew flying experience is an important factor that must be considered. Aircrews should receive a training program which recognizes previous experience and provides an adequate background on which to build experience in the new aircraft. Additionally, training must be accomplished as quickly as possible to provide continuity and enhanced learning as each sortie is flown. AFR 60-1 recommends formal aircrew training programs be completed in a four month time frame. (6:23) What's more, Tactical Air Command (TAC) formal training programs for the F-16 require reaccomplishment of the last sortie flown if "excessive delays (5 training days) occur between flights in any phase." (10:26) These factors recognize the need for a concentrated training program which will promote flying safety during and after training.

There are several options an Air National Guard unit can exercise to accomplish aircrew transition training. These options include involvement in a formal training program; AFR 60-1 states that "formal training is the preferred method for qualifying personnel" in a new aircraft. (6:23) TAC F-16 aircrew training programs currently include transition/requalification training, basic operational training, special transition training, and instructor pilot training. Additionally, aircrews can complete transition at home station. A brief description of each course will follow; however, these courses include air-to-surface attack and air superiority training. Training syllabi for the F-16 in the strategic defense role have not been developed.

The <u>USAF Transition/Requalification Training Course</u> is designed to train aircrews who have no previous experience in the F-16, or whose experience is several months to several years old. (10:iii) It is a three-track course, with Track I including "pilots with previous fighter experience" or "who have been non-current in excess of 5 years." (10:iii) ANG aircrews would enter

After establishing the assumptions on which the proposal is based, it was necessary to determine what factors will be used to evaluate it.

Many factors were considered in preparing this proposal, however, six stood out as important to RTU site selection and development. These factors are:

1. The mission
2. Airspace availability
3. Weather
4. Manning
5. Coordination/host-tenant agreements
6. Facilities

Because of the cost involved in new construction or renovation, facility selection is critical. For this reason, facility costs will be used to determine the best siting option. The other factors will be briefly discussed. After selection of the factors used to evaluate the proposal, possible siting options were considered.

In the first option, siting at Great Falls IAP, the RTU will function jointly with the operational unit, using shared facilities and equipment. In the second option, siting at Malmstrom AFB, the RTU will be self-supporting and will require facilities to house operations, maintenance, and supply functions. The third option will use facilities at both Malmstrom AFB and Great Falls IAP and will maximize use of existing facilities. In all options, the parent ANG unit will provide support in areas such as Personnel, Comptroller, and Clinic.

The Air National Guard has been involved in RTU functions including training for strategic air defense forces and has committed itself to self-sufficiency in aircrew training. This paper will examine the feasibility of locating an F-16 RTU at Great Falls, Montana. The RTU will be managed and operated by the Montana Air National Guard, and one of the three siting options will be selected based on facility costs. The next chapter will look at course syllabi and sortie and aircraft requirements, to establish a baseline for evaluation of the other factors considered in this proposal.

Chapter One

INTRODUCTION

The Air National Guard has entered an era of equipment and mission modernization which will continue throughout the remainder of this decade. As a part of this modernization program, the Air National Guard (ANG) has assumed responsibility for aircrew training at the unit level and at Air National Guard Reserve Training Units (RTU).

With the phase-out of the F-106, significant changes are occurring in the strategic aerospace defense mission. As the F-106 is removed from service in the Air National Guard, to be replaced by the F-16, it will become necessary to establish a viable aircrew training program for this aircraft. The National Guard Bureau (NGB) is continuing to work toward self-sufficiency in air crew training for all aircraft. Force modernization and NGB assumption of aircrew training responsibilities combine to enhance the concept of an Air National Guard Reserve Training Unit for the F-16 in the strategic defense mission.

The purpose of this paper is to evaluate the feasibility of locating an Air National Guard F-16 Reserve Training Unit (RTU) at Great Falls, Montana. The 120th Fighter Interceptor Group, located at Great Falls International Airport, will assume responsibility for management and operation of the RTU. This is a <u>feasibility study</u> and is not a comprehensive, detailed examination of all questions which surround this proposal. For example, a detailed site survey would be required to determine the suitability of specific facilities, and is beyond the scope of this paper.

The following four assumptions were made at the beginning of this study:

- There is a need for an Air National Guard RTU for the F-16 in the strategic defense mission.
- The Montana Air National Guard will retain its current strategic defense mission and assume the RTU role as a secondary mission.
- The RTU can be located at Great Falls International Airport (IAP); at Malmstrom AFB, Great Falls, Montana; or jointly sited with functions at both locations.
- The RTU will have no operational mission other than training; therefore, munitions storage and maintenance are not necessary.

Chapter Four

FACILITIES CRITERIA

The purpose of this chapter is to develop facility criteria and cost factors, to be applied to three F-16 RTU site options in Great Falls, Montana. Aerodrome, Operations, Maintenance, and Supply/Storage facilities will be considered.

The size and description of many small shop areas will not be included because they have no unusual requirements; however, the size and construction/renovation costs of these shops will be included in the summary. (See Table 4-2) Larger shops, because of size and/or complexity, will warrant individual treatment. The basic facilities criteria are taken from F-16 A/B and C/D Facilities Requirements and Design Criteria, dated 1 Aug 83. This report defines the facilities required "for support of the F-16 Weapon System at US Air Force main and forward operating bases." (3:xi) It provides the facility criteria to support a tactical fighter wing consisting of 72 aircraft. (3:xi) As a result, the scope (square feet authorized) of many facilities is more than needed to support 24 aircraft. The scope of Air National Guard facilities was provided by NGB/DEP. In some cases, it was necessary to estimate shop size. These estimates were based on the size of shops at the Montana Air National Guard and other units. Cost of new construction and renovation will be determined by using information provided by NGB/DEP. The figures provided in Table 4-1 are used to estimate costs and include engineering services, etc.

Facility	New Cost	Renovation cost
High Bay Hangar	150.00 sq ft	75.00 sq ft
High Bay Maintenance Shop	125.00 sq ft	62.50 sq ft
Low Bay Maintenance Shop	100.00 sq ft	50.00 sq ft
Supply Facilities	125.00 sq ft	62.50 sq ft
Squadron Operations	100.00 sq ft	50.00 sq ft
Concrete Ramp	100.00 sq ft	

(21:--)

TABLE 4-1

Because of the inaccuracies involved in determining square footage of the facilities, and the use of standard cost estimates, total cost of each option will be an estimate. They will, however, provide a basis for comparison of the options.

AERODROME FACILITIES

Aerodrome facilities include runways, taxiways, arresting gear, navaids, and other facilities of this nature. Both Great Falls International Airport and Malmstrom AFB meet or exceed requirements, such as taxiway and runway dimensions. To save space, those criteria will not be provided in detail. Instead, at the beginning of the discussion of each option, a description of these facilities will be incorporated.

OPERATIONS FACILITIES

Squadron Operations, F-16 Flight Simulator, and an Operational Apron will be considered in this evaluation.

Squadron Operations

Squadron Operations has several functions: operations management, command post, operations dispatch center, mass briefing room, classroom space, and individual flight briefing rooms. In addition, it houses the Aircrew Personal Equipment Shop, the Egress Procedures Trainer (EPT), and Cockpit Familiarization Trainer (CFT). (14:74) In an RTU environment, emphasis will be placed on classroom and individual briefing areas. The scope of this facility is 14,310 square feet. (15:4)

Flight Simulator

The Flight Simulator is housed in a secure facility and must meet Tempest construction requirements. A Flight Simulator Building is currently programmed at Great Falls IAP. The scope of this facility is 5500 square feet. (15:4)

Operational Apron

The Operational Apron provides aircraft parking and must be in good condition to avoid foreign object damage (FOD). Normal parking requires approximately 46 feet between aircraft. (3:1-26) Separation between rows using jet engine blast deflectors requires 100 feet, or 355 feet without deflectors. (3:1-26) Assuming quantity distance criteria will not be met, and blast deflectors used, a ramp approximately 1200 feet by 225 feet or 30,000 square yards is required.

MAINTENANCE FACILITIES

An Air National Guard Consolidated Aircraft Maintenance Squadron consists of 5 branches: Maintenance Management, Organizational Maintenance, Field Maintenance, Avionics Maintenance, and Munitions Maintenance. Organizational Maintenance accomplishes aircraft launch, recovery, servicing, and phase inspection. Field Maintenance accomplishes intermediate level maintenance and specialist support to Organizational Maintenance. The Avionics Branch maintains and calibrates electronic components/equipment. Munitions Maintenance accomplishes munitions storage and handling, loading, and weapons release system maintenance.

Maintenance Management

An administrative area is required to house Maintenance Control, Quality Control, and Management Support. The scope is 6000 square feet. (15:5)

Organizational Maintenance

Organizational maintenance facilities consist of aircraft maintenance docks used for scheduled and unscheduled maintenance, a shop area, and support equipment storage and maintenance. Additionally, space is provided for a ready room and management and administration. The hangar area requires 480 VAC, 60Hz, 3-phase power, in addition to standard electrical service. (3:7-16) A tentative estimate of the number of docks authorized can be obtained by multiplying 0.27 by number of aircraft assigned, which in this case is 7 dock spaces. (3:7-16) Organizational Maintenance is authorized 1600 square feet for administration, shop area, and storage, along with 4008 square feet per dock (15:4).

Field Maintenance

Field Maintenance has four sections which include Fabrication, Aerospace Systems, Support Equipment, and Engine Maintenance. The Fabrication Section and Aerospace Systems Section are usually co-located in a General Purpose Aircraft Maintenance Shop. The shops within these two branches include:

- Metal Processing
- Electrical Systems and Battery
- Machine
- Structural Repair
- Environmental Systems
- Pneudraulics
- Corrosion Control
- Egress Systems
- Non-Destructive Inspection (NDI)

- Survival Equipment
- Fuel Systems Maintenance
- Repair and Reclamation

These shops perform a variety of on-aircraft and in-shop maintenance. In general, the shops require 480 VAC, 60Hz, 3 phase electrical power, in addition to normal services. (3:7-40) A scope of 17,051 square feet is authorized for these functions. (15:4)

Aerospace Systems Section. The Aircraft Fuel System Maintenance facility provides shop and dock space for fuel system repair. The structure must have a combustible and toxic gas alarm system, and an AFFF fire protection system. (3:7-97) The scope of this facility is 11,500 square feet. (15:4) An H-70 Hydrazine Storage and Handling facility is required and must be properly sited IAW AFR 127-100. The scope of this facility is 780 square feet. (15:1)

Fabrication Section. A composite repair area is required, where bonding of F-16 structural components can be accomplished. The area must be under positive pressure and have a filtered exhaust system. (3:7-53)

The Non-Destructive Inspection shop has a scope of 2900 square feet (15:4)

F100 Engine Maintenance Section. This facility provides for intermediate maintenance of engines and engine components. It consists of a large shop area with overhead crane system, support equipment and module storage, and a bearing cleaning/inspection room which provides a dust-free environment. (3:7-126) Additional areas include a Jet Fuel Starter/Small Gas Turbine Engine (JFS/SGTE) area, and administrative areas. (3:7-130) The scope of this facility is 11,800 square feet. (15:4)

Engine Trim. Engine trims are accomplished uninstalled or installed in aircraft. The use of a hush house, or other type noise suppressor, provides the capability to run engines, either installed or uninstalled.

Support Equipment Maintenance Section. The scope of this facility is 4320 square feet. (15:1)

Avionics Branch

Avionics Maintenance will accomplish organizational and intermediate level maintenance on avionics systems and associated equipment. (3:7-164.7) Space requirements include a work bay designed to house Avionics Intermediate Shop (AIS) test stations, and space for an AN/TSM-138 Electrical Standards Set (ESS), which is a Type IVB Precision Measuring Equipment Laboratory. (3:7-259)

Additionally, space should be provided for reparable asset control and administrative areas. (3:7-177) Special requirements include the following:

- Electrical requirements include both 60Hz and 400Hz, with tolerances established for both frequency and voltage. This requires the use of dedicated transformers and generators. (3:7-185)
- Air conditioning is required throughout the facility, and the ESS area requires careful temperature control to 70-79 degrees Fahrenheit and humidity to 15-55%. (3:7-259)
- Fire protection, utilizing a HALON 1301 or dry pipe sprinkler system, along with automatic electrical and ventilation system cut-offs is required. (3:7-183)
- Additional requirements include acoustical control, a compressed air system, and a grounding system. (3:7-181)

The scope of this facility is 12,700 square feet. (15:4)

Munitions Branch

As stated in Chapter One, it is assumed the RTU will have no operational tasking which will require missile storage and loading capability. There will be a requirement to maintain the full operational capability of the system, and to store, maintain, and load captive training munitions.

Weapons Release Systems Section "Organizational and intermediate level maintenance is performed on the gun system, gun feed system, and weapons release systems." (3:7-288) A large bay area with overhead doors is required, along with secure storage and administrative areas. The scope of this facility is 3000 square feet. (15:4)

SUPPLY/STORAGE FACILITIES

Base Supply Storage and Administration

This facility provides administrative support and warehouse space for the base supply function and should include a secure storage vault. (3:7-354) Scope is 25,200 square feet. (15:2)

JP-4 Fuel Storage. Fuel storage must be adequate to meet sortie generation requirements. NGB requires 200,000 gallons storage at ADTAC gained, ANG units. (14:77)

Oxygen/Nitrogen Storage. Storage capacity must meet the requirement of 30 days peacetime supply. (3:7-388)

SUMMARY

Table 4-2 provides a summary of facilities and their scope. In this chapter, the specific criteria and the scope of Operations, Maintenance, and Supply/Storage facilities were defined. In the next chapter, Option One (Great Falls IAP) will be evaluated against the criteria to determine whether adequate facilities can be developed to support an RTU.

FACILITY	SCOPE (square feet)
<u>Ops Facilities</u>	
Squadron Ops	14,310
Flight Simulator	5,500
Operational Apron	30,000 sq yds
<u>Maintenance Facilities</u>	
Maintenance Management	6,000
Organizational Maintenance	
Maintenance Docks	4,008 per dock
Administration & Shops	1,600
Field Maintenance	
General Purpose Maint. Shops	17,051
Engine Maintenance	11,800
Engine Trim	
Non-Destructive Insp.	2,900
Fuel System Maintenance	11,500
Hydrazine Storage &Handling	780
Support Equipment	4,320
Avionics	12,700
Calibration Barn	8,355
Munitions Maintenance	
Weapons & Release Systems Shop	3,000
<u>Supply/Storage</u>	
Base Supply	25,200

(15:1-6)

TABLE 4-2 Facility Summary

Chapter Five

OPTION ONE
GREAT FALLS INTERNATIONAL AIRPORT

In Chapter Four, the criteria and cost factors used for option evaluation were presented. In this chapter, facilities at Great Falls IAP will be evaluated, using the established criteria to determine if an additional 24 F-16 aircraft can be based there. We will begin with a general discussion of the airport and community.

Great Falls IAP is located on the western edge of Great Falls, Montana. Runway 21-03, 10,502 feet by 150 feet, is the main runway. (1:1) There is a BAK 14 barrier located 2500 feet from the approach end of runway 03, which has no overrun, and a BAK 12 barrier, located on the approach end of runway 21, which has a 1000 foot overrun. (2:187) Runway 16/34 is 1701 feet by 150 feet, but has no arresting gear. (1:1) A TACAN is located 1.6NM southwest of the field, and provides TACAN approaches to RW 21 and 03. (2:188) TACAN/ILS approaches are available to both runway 03 and 34, and the field is served by radar approach control. Great Falls IAP has low traffic density with 200 flight operations per day. (19:--) The only other airport operating in the Great Falls area is Malmstrom AFB, which has extremely low traffic operations. In general, traffic in the Great Falls area is very light, but the mix of private and high speed military jet aircraft requires attention and concern from both parties. Cooperative efforts to increase awareness are already in existence and appear effective.

Noise pollution is a great concern to the community and the Air National Guard. The F-106, with its afterburning engine, draws some attention, particularly during late evening and weekend activities. The Montana Air National Guard installed an aircraft and engine noise suppressor system several years ago, which dramatically improved community relations. It is an absolute must to have a noise suppressor system installed with any new aircraft conversion; this facility is in the planning stages. A significant increase in military flights generated by an RTU will require careful evaluation to ensure noise pollution does not increase beyond what is acceptable in the community. In addition, traffic conflict will remain of concern. These problems are manageable and do not have a significant impact on the proposal to locate an RTU at Great Falls IAP.

A site survey, designed to determine the adequacy of existing facilities, has been completed at Great Falls IAP. This site survey assumed a total of 20 assigned aircraft. This proposal would add an additional 24 aircraft, which will have a significant impact on facilities. Only those facilities requiring renovation or new construction will be specifically addressed. However, all facilities in the three categories described in the preceding chapter will be accounted for in Table 5-1.

Management will play a key role in this proposal. Because of the difference in purpose and goals, RTU Operations will be placed in a separate facility. Maintenance and Supply on the other hand, can be co-located and intermingled because of the common purpose. (See Appendix B)

OPERATIONS FACILITIES

Squadron Operations

The present facility is in excellent condition, relatively new, and is adequate to meet the needs of current tasking: Classrooms, briefing rooms, and administrative areas already receive heavy use and could not absorb the additional workload of an RTU. New construction is required.

Flight Simulator

ADTAC ANG units will receive later versions of the F-16 and simulator. An RTU for the strategic defense mission should also utilize the later version. If this is not the case, the simulator facility programmed for Great Falls IAP will not match the RTU aircraft. An analysis is necessary to determine if this will have a negative impact on RTU training. In any case, a simulator facility is already programmed for Great Falls IAP.

Operational Apron

The present apron (460 feet by 1320 feet) provides adequate parking for 18 aircraft in normal conditions. (14:73) If aircraft force generations are accomplished, insufficient parking is available. (14:73) No aircraft parking is available for an RTU. Since quantity distance criteria need not be met, an apron approximately 1200 feet by 225 feet (3000 square yards) is required. Single row parking is necessary if the new apron is located adjacent to the existing apron.

MAINTENANCE FACILITIES

Maintenance Management

Expansion is required, but a complete duplication of facilities is not necessary. Existing space will not be sufficient to house the additional personnel needed to provide maintenance management to the RTU. Maintenance Control, Quality Control, and Management Support will require additional personnel and facilities. An estimated 2000 square feet of additional space will be required.

Organizational Maintenance

Existing dock and hangar space is fully utilized. For the additional 24 aircraft, a minimum of 7 docks, or 28,056 square feet, will be required. (3:7-16) Another 1600 square feet is authorized to house shop areas, equipment storage, a ready room, and administration and management. (14:47) The existing alert area is scheduled for reconstruction at a different location. If this area is abandoned, the alert crew quarters can be renovated for an Organizational Maintenance Shop.

Field Maintenance

Fabrication Section. The Fabrication Section has adequate facilities to accomplish RTU support if additional personnel and shifting is utilized. No construction or additional renovation, beyond what is currently programmed as a result of the initial site survey, will be necessary.

Aerospace Systems Section. The new Fuel Cell/Corrosion Control Shop, which includes two dock spaces, is adequate for the added workload in the Fuel System Maintenance and Corrosion Control shops. The initial site survey found the existing Egress Shop inadequate and recommended a move to obtain additional space. The proposed move will not provide sufficient space to support the additional 24 aircraft. The site survey proposed 780 square feet for 20 aircraft. (14:48) An estimated 1600 square feet will provide adequate space to support 44 aircraft. New construction or renovation is required. The other Aerospace Systems shops occupy space that is adequate to support 44 aircraft. The Fuel System Maintenance Shop has responsibility for hydrazine storage and handling. The hydrazine facility identified in the ANG site survey is adequate to support both functions.

F100 Engine Maintenance. The Engine Shop, with some modifications, was considered adequate to support engine maintenance on the F100 engine with 20 aircraft. (14:7) Additional space will be required to support the RTU. Options include renovation of the simulator area, adjacent and in the same building, or construction of an entirely new engine maintenance complex. With renovation,

construction of an adequate component storage facility, and transfer of J-33 engine maintenance to another area, adequate space can be made available. The simulator area has 4000 square feet which will require renovation.

Engine Trim Area. A hush house is currently programmed for July 1988. (14:13)

Support Equipment. Existing facilities are adequate.

Avionics Maintenance

Existing facilities, with programmed modifications, are adequate to support the operational squadron. However, the additional workload of the RTU will require the utilization of an additional Avionics Intermediate Shop (AIS) and Electrical Standards Set (ESS). (22:--) Insufficient space is available in the existing shop area in its present configuration. Alternatives include utilization of the calibration bays, utilization of the entire Avionics Shop by removal of interior walls, or new construction. Avionics management and administration will then require relocation. For planning purposes, renovation of 4000 square feet of the calibration bays will provide the required additional space.

Munitions Maintenance

A new munitions facility is planned and adequate space will become available in the old facility to house the Weapons and Release Systems Section.

SUPPLY/STORAGE FACILITIES

Base Supply Storage and Administration

The existing facility has 24,640 square feet and is adequate to meet current needs. (14:77) An RTU will require additional storage, however, management and administration space should be adequate. The present warehouse has 14,080 square feet of storage space. (14:77) Approximately 24,000 square feet is required for 24-40 aircraft, creating a need for an additional 10,000 square feet. (3:7-354.4) New construction, or addition of a mezzanine in the existing facility will be required. For planning purposes, 10,000 square feet of new construction is needed.

JP-4 Fuel Storage. Additional storage is programmed to meet the requirement for 200,000 gallons at ADTAC ANG bases. (14:77)

Oxygen/Nitrogen Storage. Three 250 gallon LOX tanks are available which provides adequate storage; nitrogen storage is programmed. (14:75)

SUMMARY

Table 5-1 is a summary of major facilities required to support an F-16 RTU, and indicates whether existing facilities are adequate or renovation/new construction is necessary. In the next chapter, the facilities at Malmstrom AFB will be evaluated.

FACILITY	Renovate (sq ft)	New Const. (sq ft)	Cost Factor (dollars)	Cost Total (dollars)
<u>Ops Facilities</u>				
Squadron Ops		14,310	100.00	1,431,000
Flight Simulator				
Operational Apron		30,000	100.00	3,000,000
<u>Maintenance Facilities</u>				
Maint Management		2,000	50.00	100,000
Organizational Maint				
Maint Docks		28,056	150.00	4,208,400
Admin & Shops	1,600		50.00	80,000
Field Maint				
Gen Pur Maint Shops		1,600	100.00	160,000
Engine Maint	4,000		62.50	250,000
Engine Trim				
Non-Destructive Insp.				
Fuel System Maint				
Hydrazine Stor & Handling				
Support Equipment				
Avionics	4,000		62.50	250,000
Calibration barn				
Munitions Maint				
Weapons & Release Systems Shop				
<u>Supply/Storage</u>				
Base Supply		10,000	125.00	1,250,000
<u>TOTAL</u>				10,829,400

(21:--; 15:1-6)

TABLE 5-1. Facility and Cost Summary - Option One

Chapter Six

OPTION TWO
MALMSTROM AIR FORCE BASE

Malmstrom AFB, located on the eastern edge of Great Falls and approximately four miles from Great Falls IAP, has a field elevation of 3526 feet. (1:2) It has one main runway, Ø3/21, which is 11,5ØØ feet by 2ØØ feet. (1:2) Runway Ø3 has a 13Ø foot overrun on the approach end and a BAK 12 arresting gear at 1375 feet. (2:281) The approach end of runway 21 has 131 feet of overrun with BAK 12 arresting gear 128Ø feet down the runway. (2:281) BAK 14 barriers are recommended due to limited clearance from centerline stores. (3:7-6) Malmstrom AFB is served by a TACAN which is located on the field, and a TACAN approach to both runways. Runway 21 is also served by a TACAN/ILS approach. Traffic at Malmstrom AFB is extremely light. No flying units, with the exception of a helicopter detachment, operate from the field. Commercial and private aircraft operations in the Great Falls area are generally light and interfere very little with Malmstrom AFB operations. Arriving and departing military aircraft do not overfly the city, therefore, noise pollution is not a problem. No aircraft or engine noise suppression equipment is installed at Malmstrom AFB, but some equipment will be necessary to protect the base population from extended engine testing.

The objective of this analysis of facilities at Malmstrom AFB is to determine what renovation or new construction may be required to support an F-16 RTU. This proposal envisions an essentially self-supporting organization in Operations, Maintenance, and Supply.

Command and management of the operation will be the responsibility of the Montana Air National Guard. Day-to-day management will be accomplished by ANG personnel stationed at Malmstrom AFB with support provided by the 12Øth FIGp in areas such as Personnel, and Accounting and Finance.

Many facilities previously occupied by an ADTAC Fighter Interceptor Squadron (FIS) are being used for base functions unrelated to flying. These activities could be located elsewhere on the base, making existing facilities available. Since all the facilities are old, renovation will be necessary. Vacant facilities, or those programmed to be vacant, will be used for RTU

ould be necessary; as a result, the total cost of Option Two was 14,763,375. Many facilities adjacent to the flight line are ccupied by unrelated organizations. In these cases, new con-truction elsewhere on base may be appropriate, to make facilities djacent to the flight line available for an RTU. By limiting the equirement for facilities at Malmstrom AFB, through joint siting, he most economical use of existing facilities can be obtained.

With Option Three, Operations, along with the aircraft, will e located at Malmstrom AFB. Maintenance, however, can be split; nscheduled maintenance will be accomplished at Malmstrom AFB and cheduled maintenance at Great Falls IAP. In addition, supply/ torage capacity can be split. Utilization of facilities at almstrom AFB and Great Falls IAP avoids duplication and will inimize cost. As a result, total cost of this option is 8,118,325. Another cost to be considered is the loss of opera-ional efficiency which will result from split siting. Movement f personnel, material, and equipment is inevitable and can reduce he efficiency of the effort. Trips to Malmstrom AFB for LOGAIR ickup are a daily occurrence and can be expanded to meet addi-ional requirements. Before specific siting decisions are made, areful evaluation of the cost of split siting is essential.

After evaluation of each of the factors cited in Chapter One, o major limitations that will impact on siting an RTU in Great alls, Montana, have been found; also, joint siting is the most ffective option. Based on the absence of major limitations and vailability of facilities, siting of an Air National Guard eserve Training Unit at Great Falls is feasible.

and at a USAF F-16 base. Although this is not a comprehensive analysis of the weather, it does provide a basis for comparison. Weather data at Malmstrom AFB compares favorably with the other sites with the exception of temperature. Cold weather, in itself, is not a strong negative factor, particularly when moderated by warm "chinook winds", Based on the data, Malmstrom AFB will provide excellent flying weather for an RTU.

Manning was the fourth factor considered in determining the feasibility of placing an RTU at Great Falls. The personnel needed to operate an RTU will not vary to any extent, regardless of whether it is sited at Great Falls or some other location. The only variable is the extent of support provided by the parent ANG unit and/or host base. Another consideration, however, is the recruiting base in the community. Great Falls is a relatively small city, geographically separated from other population centers in the state. As a result, the capability of the area to provide adequate personnel requires careful evaluation. Since the RTU has no tasking beyond aircrew training, personnel are not needed to support wartime sortie generation levels. Because of this, fewer people are required than is necessary to support a similar size unit with wartime tasking. As a result, most RTU personnel will be full-time employees, which will ease recruiting problems. Access to a sufficient number of qualified personnel is a factor which can have severe negative impact on the success of an RTU. This factor must be carefully evaluated before any decision to locate an RTU at Great Falls is made.

Two of three siting options involve the use of facilities at Malmstrom AFB. This proposal is contingent on agreement with Strategic Air Command and Malmstrom AFB over their use. NGB has the responsibility to begin negotiations if this proposal is accepted.

The last factor evaluated in this proposal was facilities. Three siting options were considered. Criteria was established, based on specific facility requirements and the square feet authorized for the facility. An estimate for renovation or new construction was used to determine the cost for each facility. The three potential sites were evaluated using the criteria, and a total cost for each option was calculated. Option One, siting at Great Falls IAP, will cost $10,829,400. The unit has excellent facilities, but in some cases, new construction for Operations, Maintenance, and Supply will be required. In addition, existing ramp space is inadequate. Very little room for expansion is available on the scale necessary to support 24 aircraft. Size of the facilities and lack of room for expansion limit this option.

A different set of problems were encountered at Malmstrom AFB. Enough space is potentially available to house the entire RTU, but most facilities are old and their suitability for renovation is questionable. Because of this factor, many new facilities

Chapter Eight

CONCLUSION

The purpose of this paper was to evaluate the feasibility of locating an Air National Guard, F-16 Reserve Training Unit at Great Falls, Montana. Several factors were considered in this study: the mission, airspace availability, weather, manning, coordination/host-tenant relationships, and facilities. To determine the feasibility of this proposal, we will review each of the factors.

To begin an evaluation of this proposal, it was necessary to establish a baseline of sorties and aircraft needed to support an RTU. This was established using TAC F-16 course syllabi to provide sortie requirements. The expected number of ANG aircrews trained in each course was multiplied by its sortie requirements to obtain total sorties. In addition, other planning factors such as attrition and IP continuation training were added, providing total sorties required for a unit conversion. Daily sortie requirements and aircraft OR rate were used to determine RTU aircraft requirements. Based on this information, other factors, such as airspace availability, could be evaluated.

As stated earlier, the availability of training airspace is essential to an RTU operation. Two factors must be considered in this determination. The first, size of the airspace, will determine how many aircraft can use it an one time. The volume of airspace used by the Montana Air National Guard is large, and with Canadian airspace available, provides more than adequate airspace. The second factor, availability of tactical control, is more restrictive. The 25th Air Division provides radar control, coordination, and management of airspace used by the Montana Air National Guard. Addition of an RTU will have an impact on these activities. Several steps can be taken to alleviate this problem; such as, adjustments to manning and scope availability at the 25th Air Division, autonomous operations, or location of a Tactical Control Squadron at Malmstrom AFB. (20:--) Availability of tactical control will require further study.

The third consideration was the weather in central Montana. Good weather is a valuable asset for an RTU because of the inexperience of aircrews and the need for continuity in training. Data from <u>USAF Air Weather Service Climatic Briefs</u> was presented to compare the weather at USAF and ANG Reserve Training Unit sites

FACILITY	Renovate (sq ft)	New Const (sq ft)	Cost Factor (dollars)	Cost Total (dollars)
Ops Facilities				
Squadron Ops		14,310	100.00	1,431,000
Flight Simulator				
Operational Apron				
Maint Facilities				
Maint Management	4,000		50.00	20,000
Organizational Maint				
Maint Docks	26,941		75.00	2,020,575
Admin & Shops	1,000		50.00	80,000
Field Maint				
Gen Pur Maint Shops	5,200		50.00	260,000
Engine Maint	4,600		62.50	287,500
Engine Trim				
Non-Destructive Insp				
Fuel System Maint	9,475		75.00	710,625
Hydrazine Storage & Handling		780	100.00	78,000
Support Equipment		4,320	125.00	540,000
Avionics		8,000	100.00	800,000
Calibration Barn	9,475		75.00	710,625
Munitions Maint				
Weapons and Release Systems Shop		3,000	125.00	375,000
Supply/Storage				
Base Supply	10,000		62.50	625,000
TOTAL				8,118,325

(21:--; 15:1-6)

TABLE 7-2 Facility and Cost Summary - Option Three

Oxygen/Nitrogen Storage. Malmstrom AFB has storage for 2500 gallons of liquid oxygen. (13:137) Nitrogen storage is available. (18:--)

SUMMARY

A summary of facilities and costs for this option is in Table 7-2. Each siting option has been described and the cost calculated. The final chapter will provide a short review, and discussion of the best option based on the costs.

AFB. They will be transported to Great Falls IAP for test and repair by the intermediate level repair activity. An estimated 2000 square feet will be required at Malmstrom AFB to provide shop space for avionics functions.

An alternative to expansion at Great Falls IAP is the placement of the AIS test station and supporting equipment at Malmstrom AFB. This alternative avoids the long-term cost of transportation of components, and will improve avionics support. Space is available in Building 210 at Malmstrom AFB, but its layout and cost of renovation may preclude use as an avionics shop. If an avionics shop is located at Malmstrom AFB, an estimated 8000 square feet of renovation or new construction will be required. For planning purposes, new construction will be considered necessary. Renovation of 9,475 square feet in Building 219 will provide a calibration barn. (11:2)

Munitions Maintenance

The RTU will have no operational tasking beyond aircrew training. As a result, there is no requirement to store, maintain, or load munitions. The only facility requirement will be a Weapons and Release Systems Section and storage for captive munitions. Three thousand square feet will be required for Gun Services, Weapons Release, and storage requirements. (15:4)

SUPPLY/STORAGE FACILITIES

Base Supply Storage and Administration

Supply requirements will be generated from both locations, but the relative volume from each site is undetermined and will require further analysis. Stocks of material will not increase proportionately with the increase in aircraft. To support 24 to 40 F-16 aircraft, an additional 10,000 square feet of storage is necessary. (3:354.5)

Building 500 at Malmstrom was a SAGE site and may be usable for a supply warehouse. In addition, the commissary, located in Building 1434, will be relocated in the future. (18:--) This facility would provide space for a supply function. Additional study is required to determine where the material can best be located and what facility will provide the best support. In any case, 10,000 square feet will be required.

JP-4 Fuel Storage. Malmstrom AFB has 625,000 gallons of JP-4 storage and handling facilities available to meet the requirements of the RTU. (1:2)

square feet is necessary. (15:2)

F100 Engine Maintenance. Scheduled engine removal, installation, and maintenance will be performed at Great Falls IAP. The additional workload will require more shop area than is available. Four thousand square feet can be obtained by using the simulator area adjacent to the Engine Shop. A 2400 square foot cold storage structure was programmed in the initial ANG site survey. (14:12) Additional storage can be created by expanding this structure, or by utilizing existing munitions storage if a new munitions maintenance complex is constructed. Additional space can be generated within the shop by moving J-33 engine maintenance to another area. Unscheduled engine removals at Malmstrom AFB will generate the problem of transporting an engine from Great Falls IAP to Malmstrom AFB. Engine changes at Malmstrom AFB should be kept to an absolute minimum. Engine Shop technicians will be located at Malmstrom AFB to perform unscheduled maintenance. This area will require a careful analysis to determine if the proposed solutions are workable. An estimated 600 square feet in Building 210 at Malmstrom AFB and 4000 square feet in Building 30 at Great Falls IAP will require renovation.

Engine Trim. A hush house is programmed for Great Falls IAP. (14:12) This facility is adequate to accomplish all installed and uninstalled engine runs at Great Falls IAP.

The only facility to run engines at Malmstrom AFB is a helicopter power check pad located to the east of the main runway. (18:--) A power check pad must have a deadman rated 60,000 pounds thrust and a blast deflector. (3:7-125) Unsuppressed engine runs are extremely irritating, and consideration should be given to a suppressor system at Malmstrom AFB if extended engine run activity is anticipated. Further study is required.

Support Equipment Maintenance Shop. The Support Equipment Shop located at Great Falls IAP is adequate to support increased activity generated by the RTU. New construction or renovation of an existing facility at Malmstrom AFB is required. Shop areas in Building 210 are not suitable for use as a Support Equipment Shop because of the need for overhead doors, ventilation systems, etc. New construction of 4320 square feet is necessary. (15:1)

Avionics Maintenance

An all purpose avionics shop is programmed at Great Falls IAP. This facility will house one avionics intermediate shop (AIS) and electrical standards set (ESS) which will be inadequate to support the additional workload. (22:--) Additional space can be gained by utilizing the calibration bay for a test station, by removal of partitions to increase the size of the present shop area, or by relocating the entire avionics shop. Avionics flight line technicians will remove and replace components at Malmstrom

Fabrication Section. Well equipped shops are available at Great Falls IAP for Metal Processing, Machine, Structural Repair, NDI, Corrosion Control, and Survival Equipment shops. A significant portion of the workload in each of these shops occurs during scheduled maintenance, which will be accomplished at Great Falls IAP. The additional workload can be accomplished by adding personnel and establishing work shifts. A shop area and contingent of technicians will be located in Building 210 at Malmstrom AFB to accomplish unscheduled maintenance. As estimated 1000 square feet of renovated space is required in Building 210 at Malmstrom AFB.

Aerospace Systems Section. The workload of these shops is also split between scheduled and unscheduled maintenance. Additional manning, utilizing existing shop space at Great Falls IAP, will compensate for the increased workload generated by the RTU. No additional facilities or equipment will be required. To accomplish unscheduled maintenance at Malmstrom AFB, shop space in Building 210 will be renovated to provide work areas. Table 7-1 provides an estimate of requirements.

Facility	Square Feet
Pneudraulic Shop	600
Egress Shop (includes storage)	1,000
Environmental Shop	600
Electrical Systems Shop (includes Battery Shop)	800
Fuel System Maintenance Shop	600
Wheel and Tire Shop	600
TOTAL	4,200

TABLE 7-1

Aircraft fuel system maintenance requires two docks, which must be equipped with a grounding system, combustible and toxic gas alarm system, water flush system, and fire protection system. (3:7-29) Building 219, a four-bay aircraft shelter, provides adequate space, but renovation of 9475 square feet is necessary to meet required standards. (11:2) H-70 hydrazine storage is not available at Malmstrom AFB. A properly sited facility to store and handle this material is required. New construction of 780

arrangements to be considered, and quantity distance criteria in AFR 127-100, Explosives Safety Criteria can be met if necessary. Although the apron is considered in good condition, it should be carefully examined for FOD potential. (1:2) In addition, grounding system capabilities require test and evaluation. The apron meets the criteria established in Chapter Three.

MAINTENANCE FACILITIES

As stated earlier, maximum use will be made of existing facilities at Great Falls IAP. Facility requirements at Malmstrom AFB can be met by using Building 210 or Building 1441-43-45, which are World War II vintage structures. (11:2) Building 210 has approximately 26,941 square feet of hangar space and 18,974 square feet of shop area. (13:64) Building 1441-45 has approximately 230,000 square feet. (13:76)

Maintenance Management

Adequate space is available in Building 210. The authorization of 6000 square feet is not required, since some management support will be provided by the 120th FIGp. An estimated 4000 square feet will require renovation.

Organizational Maintenance

Organizational level maintenance will be accomplished at Malmstrom AFB, with the exception of phase inspection requirements. Aircraft will be flown to Great Falls IAP for extended inspections.

Maintenance Docks. The requirement for 7 maintenance docks, established in Chapter 3, can be met by utilizing the hangar bay of Building 210. Adequate hangar space is available at Great Falls IAP to provide inspection docks and shop space for RTU phase inspection requirements. Renovation of Building 210 is required.

Organizational Maintenance Shop. This facility provides space for administration, shop area, and support equipment storage and maintenance. Approximately 1600 square feet is authorized and can be established in the shop area of Building 210 at Malmstrom AFB.

Field Maintenance

Field Maintenance activities will take place at both locations. Those located at Malmstrom AFB will primarily be oriented toward unscheduled maintenance, while scheduled maintenance will be accomplished at Great Falls IAP.

Chapter Seven

OPTION THREE
JOINT SITING

Option three will use facilities at Great Falls International Airport and Malmstrom AFB to obtain optimum utilization of existing facilities at both sites. This will minimize the cost of siting an RTU. Optimum utilization requires trade-offs in convenience and efficiency, but these negatives can be kept to a minimum through careful management. Some supporting functions, particularly in Maintenance, will be located at Great Falls IAP, rather than Malmstrom AFB. Movement of parts, equipment, and personnel between the two sites has a cost in terms of transportation, time, and operational capability. Careful analysis of each function will be necessary to weigh these costs against lower initial investment. In this option, a wide variety of sub-options exist in determining the most viable siting arrangement. Adequate space is available at Malmstrom AFB to allow more shops to be located there, but will result in an increase in initial investment. For this study, maximum use of existing facilities at Great Falls IAP is planned.

OPERATIONAL FACILITIES

Squadron Operations

This facility will be located at Malmstrom AFB and will house the Aircrew Personal Equipment Section, Egress Procedures Trainer, and Cockpit Familiarization Trainer. The scope of this facility is 14,310 square feet. (15:4)

Flight Simulator

A flight simulator facility is programmed to be located at Great Falls IAP, but with siting of an RTU at Malmstrom AFB, further study of location is necessary. Factors to be considered include utilization, ease of access, and the long-term workload of the RTU.

Operational Apron

Malmstrom AFB has a large concrete apron which is in good condition. (1:2) The size of the ramp allows several parking

FACILITY	Renovate (sq ft)	New Const. (sq ft)	Cost Factor (dollars)	Cost Total (dollars)
Ops Facilities				
Squadron Ops		14,310	100.00	1,431,000
Flight Simulator				
Operational Apron				
Maint Facilities				
Maint Management	4,000		50.00	200,000
Organizational Maint				
Maint Docks	26,941		75.00	2,020,575
Admin & Shops	1,600		50.00	80,000
Field Maint				
Gen Pur Maint Shops	17,051		50.00	852,550
Engine Maint		11,800	125.00	1,475,000
Engine Trim				3,300,000
Non-Destructive Insp	2,900		50.00	145,000
Fuel System Maint	9,475		75.00	710,605
Hydrazine Stor & Handling		780	100.00	78,000
Support Equipment		4,320	125.00	540,000
Avionics		12,700	100.00	1,270,000
Calibration Barn	9,475		75.00	710,625
Munitions Maint				
Weapons & Release Systems Shop		3,000	125.00	375,000
Supply/Storage				
Base Supply		25,200	62.50	1,575,000
TOTAL				14,763,375

(21:--; 15:1-6)

TABLE 6-1 Facility and Cost Summary - Option Two

store and load munitions. As stated earlier, the weapons system will require testing and maintenance. A facility for a Weapons and Release Systems Section and secure storage of captive training missiles will be required. New construction is needed. The scope of this facility is 3000 square feet. (15:4)

SUPPLY/STORAGE FACILITIES

Base Supply Storage and Administration

The authorization for an ANG supply facility is 25,200 square feet. (15:3) This requirement can be met by new construction, renovation, or utilizing existing Malmstrom AFB supply facilities, contingent upon availability. Building 500, which is a retired SAGE facility, and Building 1434, which currently houses the commissary, could be renovated. (11:2)

JP-4 Fuel Storage. Malmstrom AFB has a storage capacity of 625,000 gallons of JP-4, which is adequate. (1:2)

Oxygen/Nitrogen Storage. Malmstrom AFB has storage for 2500 gallons of oxygen. (13:137) Nitrogen storage is available. (18:--)

SUMMARY

Table 6-1 is a summary of major facilities required to support Option Two. In the next chapter, we will examine the feasibility of Option Three (joint siting).

house the General Purpose Aircraft Maintenance Shops. Additional space is available in Building 1441-43-45.

Fabrication Section. Shops within this branch will be located in Building 210 or Building 1443. Building 1443 is better suited to house large shops, such as the Machine Shop, Metal Processing Shop, and Structural Repair Shop. Smaller shops, such as NDI and the Survival Equipment Shop, will be located in Building 210. The shop areas included in the General Purpose Aircraft Maintenance Shop total will require renovation.

Aerospace Systems Section. Building 210 will house all Aerospace Systems shops included in the General Purpose Aircraft Maintenance Shop authorization. The Fuel System Maintenance Shop is authorized two maintenance docks. This space can be obtained by renovating one bay in Building 219 which is a four-bay fighter aircraft shelter. (11:1) Each bay is capable of holding two aircraft and contains 9,475 square feet. (13:65) The Fuel Shop also has responsibility for H-70 hydrazine storage and handling. A facility meeting the criteria for this function is not available. New construction of 780 square feet is required. (15:2)

F100 Engine Maintenance. Building 1443 could house the Engine Maintenance Shop, but extensive renovation will be required to provide an adequate facility. New construction of 11,800 square feet is a more suitable alternative. (15:4)

Engine Trim Area. No facilities remain for installed or uninstalled operation of jet engines. The best course of action is installation of a hush house, which can be used for installed or uninstalled F100 engine runs.

Support Equipment Maintenance Shop. No vacant facilities are available. A building was constructed for use by the FIS, but is currently utilized. Because of requirements such as a wash rack, ventilation system, and overhead doors, utilization of shop space in either large hangar is not feasible. New construction of 4,320 square feet is required. (15:1)

Avionics Maintenance

Building 1709 was originally constructed as an Avionics Shop, but is in use by a helicopter detachment. (11:2) Shop areas in Building 210, because of their layout, are inadequate for an avionics shop. In addition, because of the many special requirements, such as electrical power and air conditioning, renovation of a portion of Building 1443 is not considered feasible. New construction of 12,700 square feet is necessary. (15:4)

Munitions Maintenance

The tasking of the RTU does not include the requirement to

planning. Some new construction will also be required. (See Appendix C)

OPERATIONS FACILITIES

Squadron Operations

Building 1708, previously used for squadron operations, has been renovated and is currently utilized by the 341st Strategic Missile Wing. (11:2) No other structure close to the flight line has been identified as available for renovation. New construction is required.

Flight Simulator

A flight simulator facility is programmed at Great Falls IAP. Due to the limited number of F-16 simulators available, this one can be shared. Careful scheduling will be necessary to minimize the impact on either operation.

Operational Apron

Malmstrom AFB has 353,455 square yards of concrete apron, in good condition. (1:2) Ramp condition should be verified, and the need for blast deflectors will require study.

MAINTENANCE FACILITIES

Maintenance Management

Adequate space for this function is available in Building 210, which is a wood frame hangar. An estimated 4000 square feet will require renovation.

Organizational Maintenance

Existing facilities include Building 210, which contains 26,941 square feet of hangar space and 18,974 square feet of shop space. (13:64), and Building 1441-43-45, which has approximately 230,000 square feet. (13:76) Both facilities need major renovation, but will provide the required shop space and dock space sufficient for 7 aircraft. Renovation will be required for 26,941 square feet of dock area and 1600 square feet for shop and administration areas.

Field Maintenance

Approximately 5600 square feet of Building 210 will be utilized for Maintenance Management and Organizational Maintenance Shop areas. The remaining 13,374 square feet will be used to

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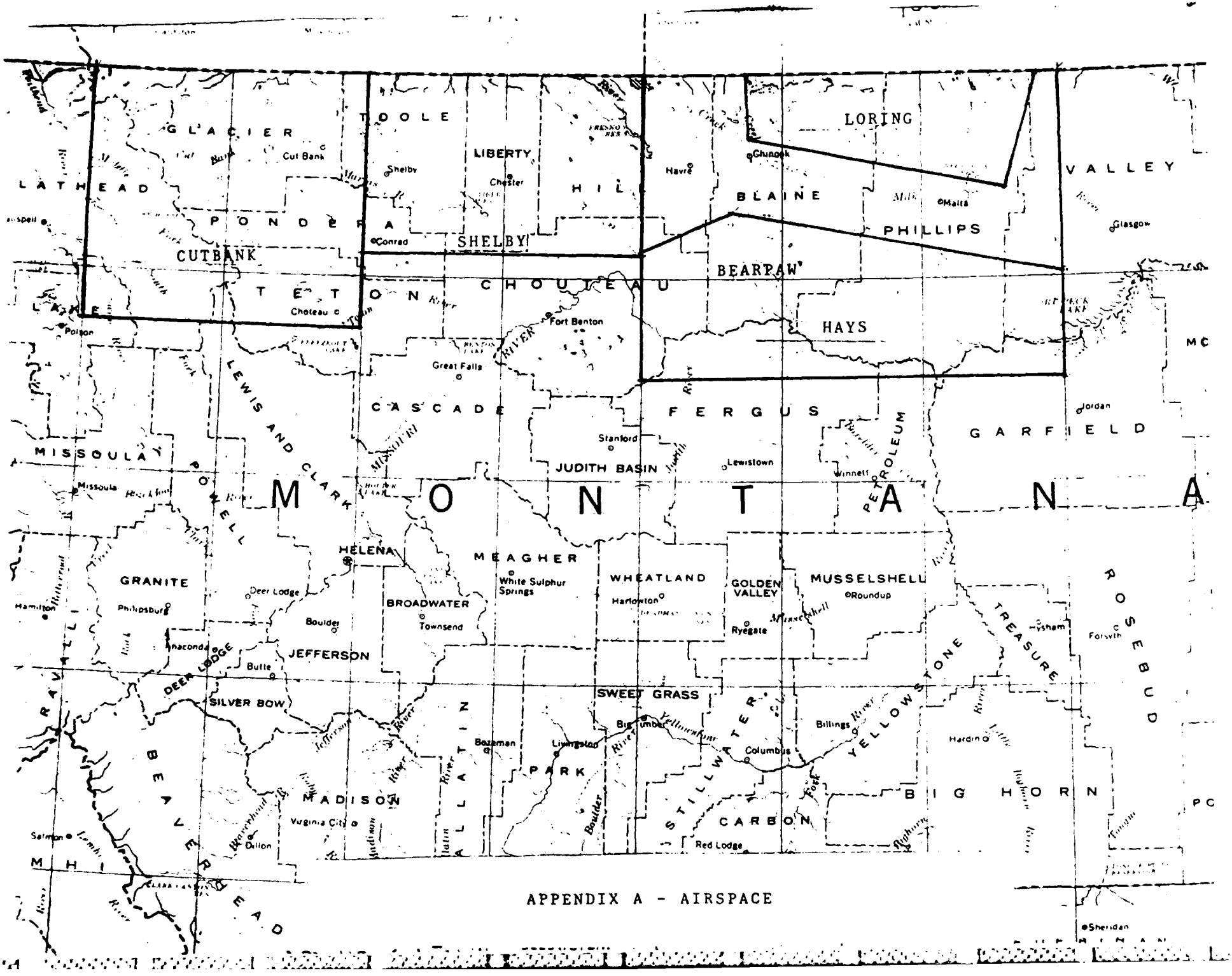
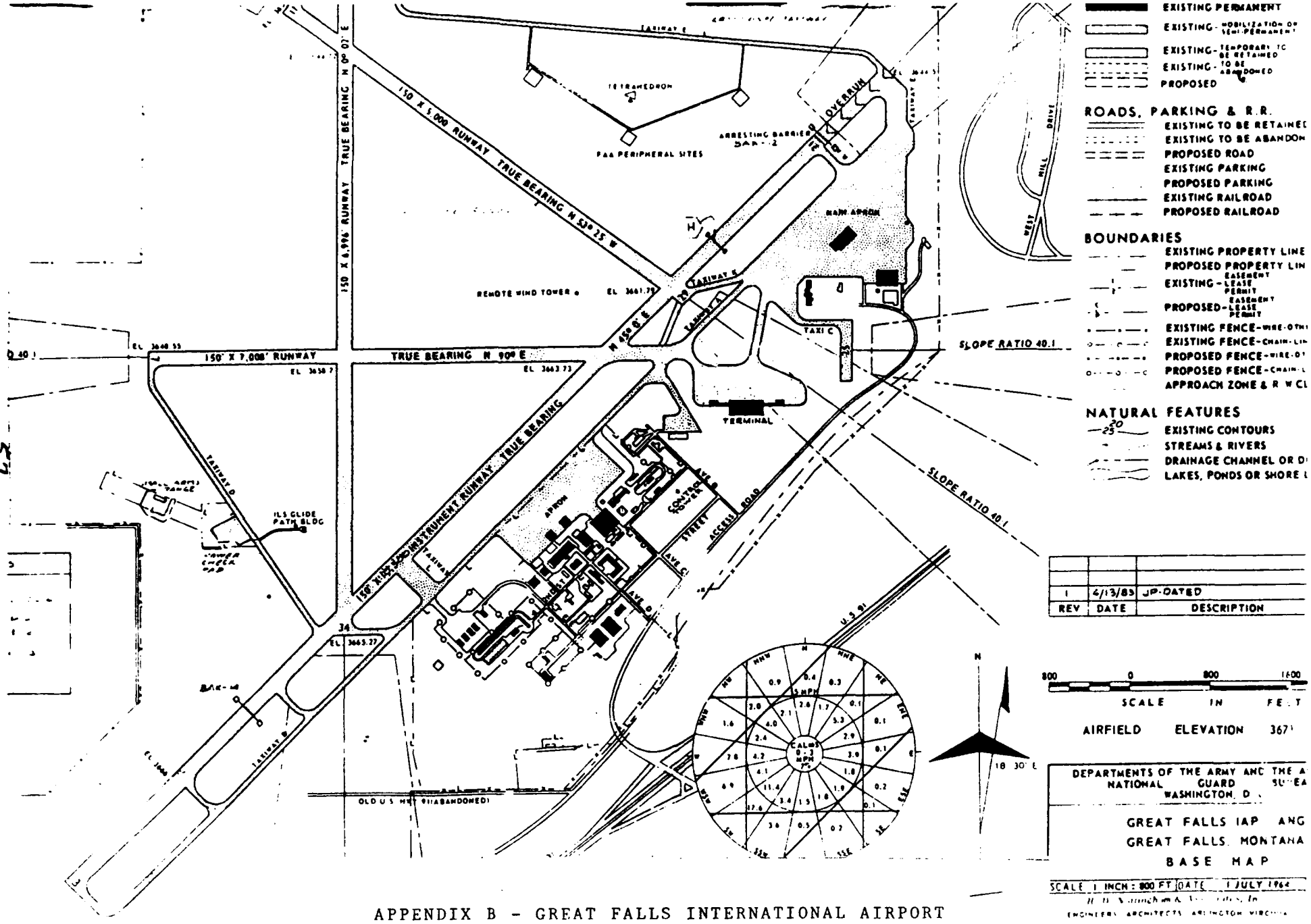
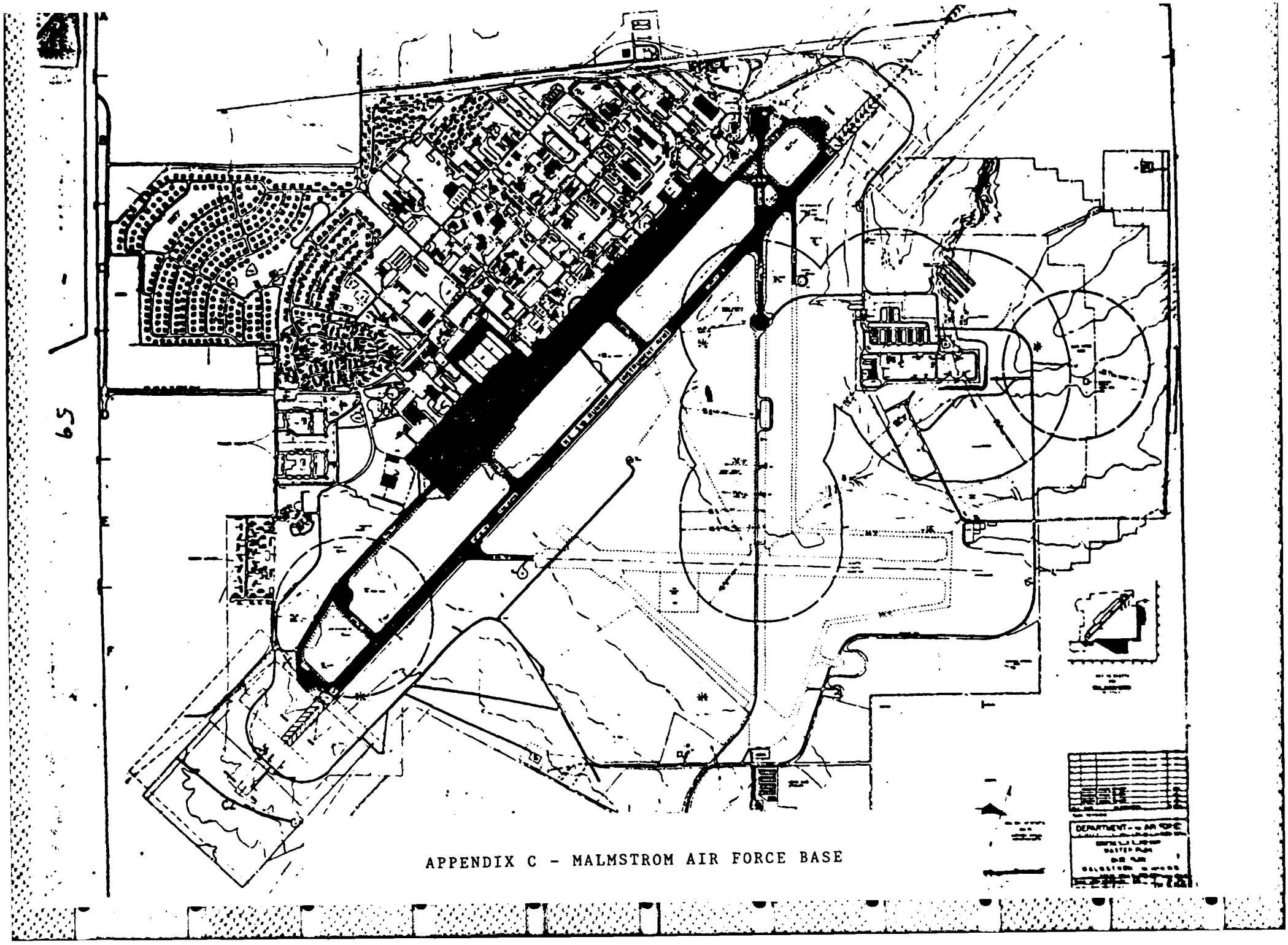
APPENDICES



APPENDIX A - AIRSPACE



APPENDIX B - GREAT FALLS INTERNATIONAL AIRPORT



APPENDIX C - MALMSTROM AIR FORCE BASE

REPRODUCED AT GOVERNMENT EXPENSE

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