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FACILITIES AND THE AIR FORCE SYSTEMS ACQUISITION
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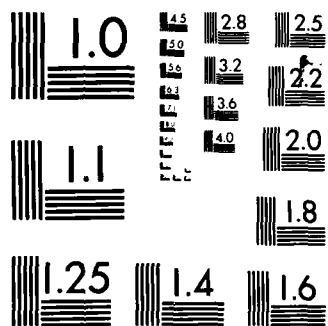
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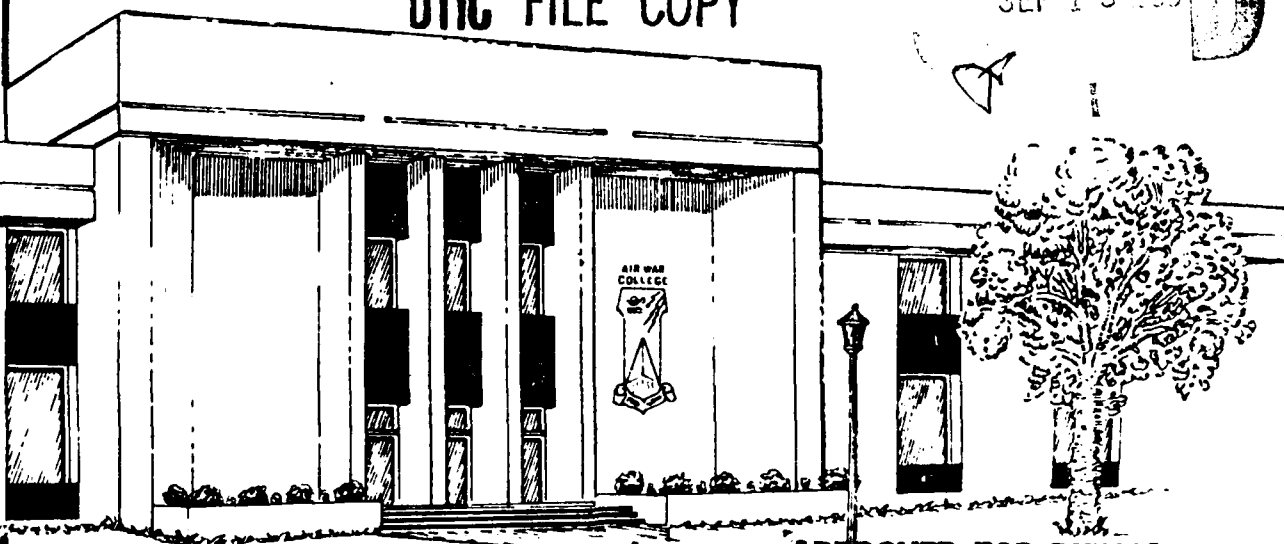
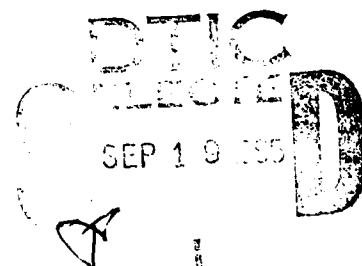
FACILITIES AND THE AIR FORCE SYSTEMS

ACQUISITION PROCESS

By LIEUTENANT COLONEL WAYNE T. FISHER

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UNITED STATES AIR FORCE
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FACILITIES AND THE AIR FORCE
SYSTEMS ACQUISITION PROCESS

BY

WAYNE T. FISHER

Lieutenant Colonel USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE RESEARCH REQUIREMENT

RESEARCH ADVISOR: Lieutenant Colonel RICHARD D. CLARK

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FACILITIES AND THE AIR FORCE SYSTEMS ACQUISITION PROCESS

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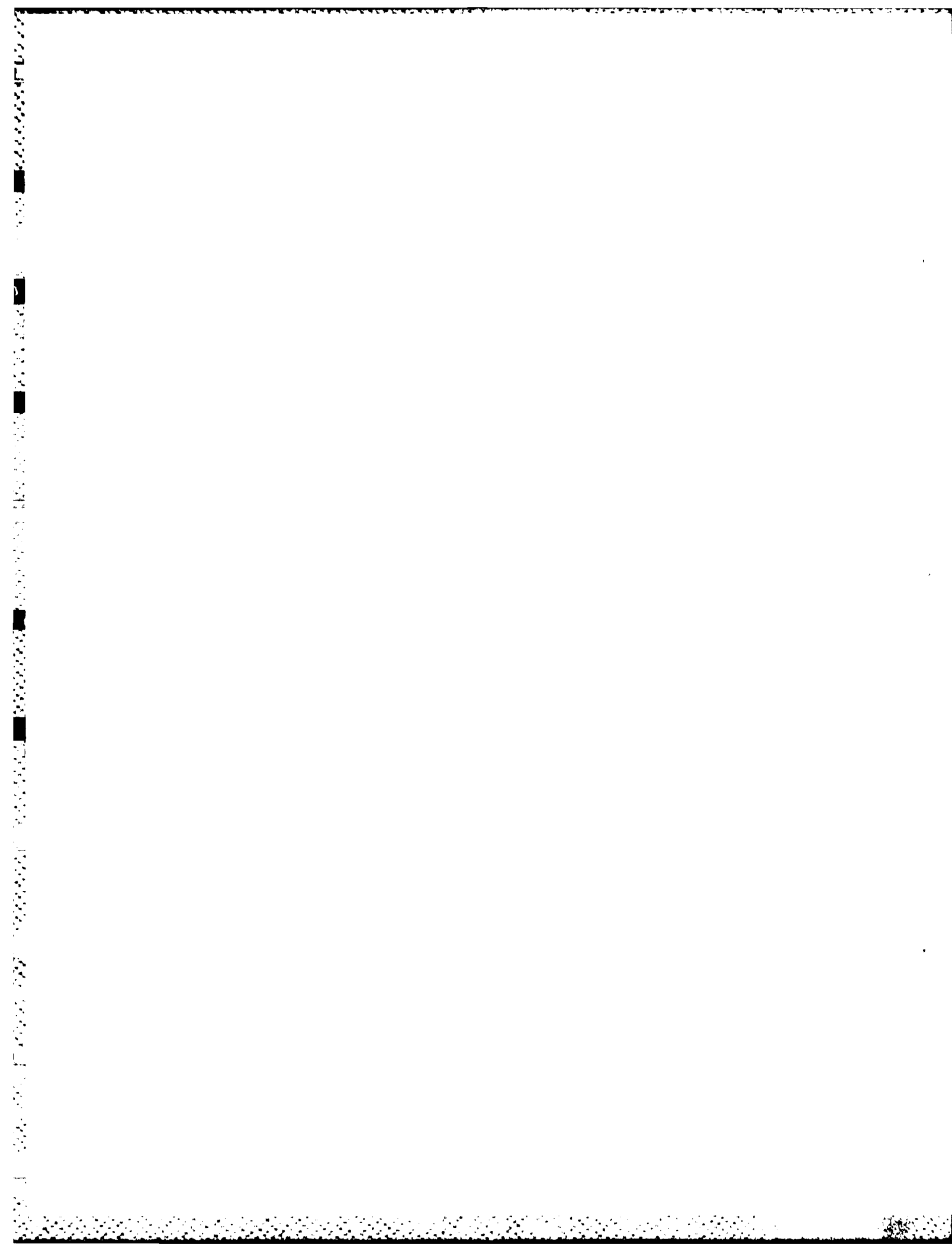
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AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Facilities and The Air Force Systems Acquisition Process

AUTHOR: Wayne T. Fisher, Lieutenant Colonel, USAF

This paper examines the relationship between the Air Force Systems Acquisition and Military Construction processes. An analysis of recent weapon system deployments is used to conclude, that although the Air Force system to anticipate, fund and construct facilities in support of new weapon systems is in place, crisis management efforts have been necessary to provide essential facilities by system Initial Operational Capability (IOC). And secondly, since the systems acquisition process is event driven and the Military Construction process is time driven, significant mismatches occur and is seen as a drawback to assuring that proper facilities are available when new systems are deployed. Several ways to overcome these drawbacks are suggested.



BIOGRAPHICAL SKETCH

Lieutenant Colonel Wayne L. Fisher (M.P.A., Webster College and B.S. Building Construction Engineering, University of Maryland) has been interested in facility construction in support of weapons system acquisition since he was stationed at Kadena A.B. Japan 1977-80. While there he served as Chief of Engineering and Construction Branch for the 18th Tactical Fighter Wing. He also served as the facility project officer for the F-15 and E-3A AWACS systems deployment. In his most recent assignment, at Headquarters Tactical Air Command, Engineering and Services, he served as chief of Programs Requirements Division. In that capacity he was responsible for assisting Tac Bases to identify facility requirements and program new construction to support systems deployment. Lieutenant Colonel Fisher is a graduate of Air War College, Class of 1985.

CHAPTER 1

INTRODUCTION

The Air Force is in the midst of its most extensive peacetime force modernization programs. Hundreds of new systems will be deployed over the next several years. Some are improved performance replacements for current systems with little facility impact. However, many although they are replacing current systems, are sufficiently different in performance, size or maintenance requirements and thus impose significant facility requirements on the using commands. Others are completely new systems which require new facility requirements from the ground up.

The purpose of this report is first to analyze the relationship between the Air Force Systems Acquisition and Military Construction processes. Secondly, a determination will be made regarding the adequacy of the interaction between them. And finally, I will recommend changes for the improvement of the interactions between them in order to assure that proper facilities are in place when the systems are deployed.

HYPOTHESIS

The hypothesis is that the basic process is in place to anticipate, fund and construct/modify the facilities required to support new weapon systems when deployed. However, since many recently deployed systems required extraordinary management actions (workarounds) to overcome the problems caused by late facilities, there may be some coordination actions, which are not receiving enough emphasis.

PROBLEM

This research effort will answer the following questions:

- a. Are facility requirements anticipated and adequately scoped during the early phase of program development so that meaningful facility programming guidance can be issued prior to deployment?
- b. Does the planning, programming and budgeting cycle for the Military Construction (MILCON) align properly with the acquisition process of new weapon systems so that facilities can be funded and constructed before the systems are deployed?

STUDY APPROACH

The answers to the above questions were sought through the use of extensive discussions with members of the Air Staff; Headquarters, Air Force Systems Command; Headquarters, Tactical Air Command; Headquarters, Strategic Air Command; Headquarters, Air Training Command; and the Air Force Engineering and Services Center. Through these discussions and the study of pertinent regulations, reports, memos and other documents, I will first explain how the processes are intended to function. Additionally, I will discuss the determination of when and how systems acquisition and facilities construction interact. And finally, I will review those areas which were perceived by those involved in the processes as needing improvement.

STUDY FOCUS

This study is not intended to be a detailed analysis of the Air Force Systems Acquisition process nor the Air Force Military Construction Program and their management structures. Rather the focus is on their interrelationships. A radical restructuring of Air Force commands or management systems was not considered.

CHAPTER II

THE SYSTEMS ACQUISITION AND MILITARY CONSTRUCTION PROCESSES

To understand these two processes and their interrelationship, it is necessary to establish a baseline of information for comparison and analysis.

SYSTEMS ACQUISITION PROCESS

The systems acquisition process is divided into five phases with three major decision points. The five phases are the concept exploration phase, demonstration validation phase, the full-scale development phase, the production phase, and the deployment phase. The three major decision points are called Milestone I (Concept Selection), Milestone II (Program Go-Ahead/Approval), and Milestone III (Production Decision).

Mission Need Determination: A major systems acquisition program formally begins with the accomplishment of the mission need determination in the PPBS process. This determination is based on the Air Force's Justification of Major System New Starts (JMSNS) which is submitted with the Program Objectives Memorandum (POM) for review by the Office

facility needs early in the programs. In many cases facility issues are identified quite late. Facilities are only one line on a logistic chart during Program and Command Assessment Reviews. (PARs) (CARs). The Statements of Needs and Program Management Plans for many recently fielded systems did not adequately address facilities. A recent example of the failure to properly address facilities occurred in the fielding of the F-15 C/D with conformal fuel tank.

This version of the F-15 has a maximum take-off weight of 68,000 pounds and a tire pressure of approximately 355 psi (up from 54,000 pounds and 280 psi). Another mission change is being considered (using the F-15 in an air-to-ground role) which will increase the maximum gross weight to 75,000 pounds. Also, the F-15 is the Air Force selectee for the dual role fighter, which will increase the maximum gross weight to 81,000 pounds. Studies show that we can expect major problems on pavements constructed of Asphaltic concrete (approx. 25% IAC and most of USAFE primary pavements have asphaltic surfaces). (7:1) For the F-15 operating at 68,000 pounds, pavement life is reduced by 30-40 percent as compared to that anticipated using current design criteria (10-15 year life based on F-4 at 60,000

By the end of the concept exploration phase Milestone I, the program manager should have determined preliminary facility requirements and insured that using MAJCOMS have programmed them for construction. (5:12) By the end of the demonstration validation phase at Milestone II, facilities design should be under way on a schedule to be ready for construction contract award in the year construction funds will be appropriated. (5:13) At the end of the full scale development phase at Milestone III when the service makes the decision to go to production and deployment, facilities construction should be on a schedule to be completed in time to support the deployment. (5:19)

The ILS as defined by DOD Directive 5000.39 and guidance as prescribed by AFSCP 800-3, though lacking sufficient facility detail, establishes the methodology and mechanism for guaranteeing at least the potential for anticipating scoping and incorporating facility requirements planning into systems development and deployment.

However, the Integrated Logistics System as evolving in the Air Force is not meeting the intent of the ideal facilities requirements process. Logistic support plans for major weapon systems devote relatively little effort to

- f. Assist in guiding and monitoring the contractor's effort in the development of facilities design criteria.
 - g. Receive, record, analyze, and recommend positions regarding facility change orders.
 - h. Coordinate on facilities implications of activities related to ground support equipment, flight simulators and training programs.
- (1:13-1-13-2)

The anticipation and scoping of facility requirements is 1 of 15 elements under the Integrated Systems and Logistic Support (ILS) Program of Acquisition Management. DOD Directive 5000.39 prescribes policy and responsibilities for ILS for systems and equipment. The directive defines ILS as a disciplined approach to activities necessary to (a) cause support considerations to be integrated into system and equipment design, (b) develop support requirements that are consistently related to design and to each other, (c) acquire the required support, and (d) provide the required support during the operational phase at minimum cost.

criteria, writing design criteria, and writing design scopes of work. Along with providing liaison on facilities matters between the Program Office, HQ USAF, using commands, and other interested agencies; the system facilities engineer often provides the following support services to the Program Manager. (1:13-1)

- a. Furnish guidance on facilities requirements (R&D, operational and support) and estimates of funds required for development, design and construction of these facilities.
- b. Ensure the using command is advised of development changes to a system that will affect facility requirements.
- c. Advise on capabilities of existing R&D and test facilities.
- d. Advise on MCP procedures.
- e. Ensure timely programming of R&D and operational facilities.

CHAPTER III

ANTICIPATION AND SCOPING OF FACILITY REQUIREMENTS DURING WEAPONS SYSTEM ACQUISITION

Now that a general understanding of the weapon systems acquisition and military construction processes, have been presented, I will focus on the first question in the problem statement. Are facility requirements anticipated and adequately scoped during the early phase of program development so that meaningful facility programming guidance can be issued prior to deployment?

As stated in AFSCP 800-3, the facilities project engineer is a technical specialist assigned to the civil engineering activity on the production division staff. He is responsible for a particular weapon system to provide support to the program manager and correlation of the Real Property Facilities acquisition to that of the overall system. The civil engineer project officer serves as project manager for the facilities portion of the system acquisition, obtaining support from the civil engineering staff and contract specialists to carry out specific tasks related to the acquisition process; such as compiling design

CONSTRUCTION PHASE

This phase begins as soon as the invitations for bids (IFB) are distributed to interested contractors. After bids are received and the contract awarded, a preconstruction conference is held to acquaint the contractor with any constraints that must be met e.g. - site access, security, safety and material storage. The facility is then constructed under the supervision of the government construction agent. After the basic contract is complete, a prefinal inspection is held during which all known deficiencies are identified to the contractor for corrective action. When all corrective action is complete, a final inspection is held and if the facility is acceptable, the Air Force assumes responsibility and accountability.

After the 35 percent design stage is completed, HQ USAF sends the MCP to OSD for review, and then to Congress for authorization and appropriation. The MCP is sent to Congress on or about the 15th of January each year. Congress then holds hearings on it, with approval usually occurring in the following September. Authorization and Appropriation is obtained after the President signs the bill.

DESIGN PHASE

This Phase begins after HQ USAF has selected the supported program and issues design instructions. The MAJCOM or AFRCE commences the design with an in-service design effort or contracts the design by an Architectural Engineering (A-E) Firm. Congress has mandated that all projects must be at least 35 percent design complete before the project is forwarded for their review. (3:26-27) Consequently the design phase occurs concurrently with the latter elements of the programming phase. The objective is to have the facility project 100 percent designed and ready for contracting when the MCP bill is signed and funding is apportioned.

using major command. Often this phase procedure is accomplished by a joint facility site survey team containing the following representatives: SPO Civil Engineer Advisor, SPO Logistics Support Advisor, MAJCOM Plans Civil Engineer, and logistics representatives. This team, along with the host base civil engineer, determines which facilities will have to be modified and what new facilities will have to be constructed.

PROGRAMMING PHASE

This phase begins with the host base civil engineer's preparation and submission of its annual MCF as specified in AFR 86-1 (Programming Civil Engineer Resources). The package includes essential project information to support review requirements at higher command levels. The MAJCOM reviews the base submittal for accuracy and completeness, and then forwards the MAJCOM-supported program to HQ USAF. HQ USAF reviews the submittals and selects the projects that will be included in the PDM and forwards them for OSD and Congressional review, authorization and appropriation. After HQ USAF has selected the supported program, design instructions are issued to the MAJCOM or the Air Force Regional Civil Engineer (AFRCE), so that 35 percent design completion can be accomplished before the MCF is presented to Congress.

DEPLOYMENT PHASE

The deployment phase covers the introduction of the new system into the field for operational use. In this stage all support facilities and equipment must be fully developed and ready for use. This includes activation and operation of depot support for the system as well as all required support at operational bases.

THE MILITARY CONSTRUCTION PROCESS

The Military Construction Program (MCP) is the means by which facilities to support weapon system deployments are acquired. There are essentially four phases to the MCP. They are: Requirements Identification and Justification; Programming and Funding; Design; and Construction. The process tends to take a 5-year look after the formal facility requirements have been established.

REQUIREMENTS PHASE

The facility requirements to support the new weapons are generated by the weapons system prime contractor, who then forwards them to the host base Civil Engineer via Systems Program Office (SPO) Civil Engineer Advisor and the

The IOT&E is an operational assessment of a system where the whole system is evaluated against operational criteria. IOT&E is the complete system-testing conducted before a production decision.

Milestone III

The production decision is delegated to the Air Force, provided the thresholds established at Milestone II are met. The production decision may be redelegated to the level in the Air Force which a comprehensive view of the program rest. (6:5)

PRODUCTION PHASE

During this period the system is produced and delivered as an effective, economical, and supportable system. Entering into the deployment phase signifies that the system has reached its operational ready state and is turned over to the using command, and program management and support responsibility transferred to Air Force Logistics Command. (1:1)

A major effort during this phase is development test, and evaluation (DT&E). The purpose is to:

- Demonstrate that engineering design and development are complete.
- Demonstrate that design risks have been minimized.
- Demonstrate that the system or equipment meet specification, and
- Verify that proposed design changes do not degrade overall system performance. (2:37)

Another type of testing conducted during this phase is initial operational test and evaluation (IOT&E). The objectives of IOT&E are to:

- Estimate military utility, operational effectiveness and suitability.
- Provide feedback prior to key milestone decisions.
- Demonstrate that the system can be supported logistically in a deployment status.
- Identify new uses for the system and
- Reshape tactics. (2:39)

Force, through source selection, narrows the competition to the most promising options and signs contracts for design development, prototype development or both. Objectives of this phase include reduction of technical risk and economic uncertainty surrounding candidate solutions.

Milestone II

The second Secretary of Defense major decision is program go-ahead and approval to proceed with full-scale development. (6:5) This decision is based on the assurance that the mission need remains valid, the system concept sound, and that the system approved has demonstrated the capability to fulfill the mission need. In addition, the plans to develop and procure the system must be sound and funds to cover development must be projected in the POM.

FULL SCALE DEVELOPMENT PHASE

During the third phase, the design, fabrication and testing of pre-production prototypes are completed. Cost are assessed to ensure that the program is ready for the production phase. (1:1)

Milestone I

This first Secretary of Defense major milestone decision is concept selection and entry into the demonstration and validation phase. This decision is based on a System Concept Paper (SCP), prepared by the program manager. The Milestone I decision is a validation of the requirement, based upon preliminary evaluation of concepts, cost, schedule, readiness objectives and affordability. It provides authority to proceed with the demonstration and validation phase and to develop the system sufficiently to support a Milestone II decision. The Milestone I decision also establishes thresholds and objectives to be met and reviewed at the next milestone, the acquisition strategy for the recommended concepts, and a "not to exceed" dollar threshold to carry the program through the next milestone. (6:4-5)

DEMONSTRATION AND VALIDATION PHASE

This phase includes extensive studies and analysis of alternatives and may include development of prototypes or other hardware with subsequent test and evaluation of the products. Competing contractors present their proposals detailing their approach, costs, schedule, management plans, additional options and various other information. The Air

of the Secretary of Defense. The Secretary of Defense provides appropriate program guidance in the Program Decision Memorandum (PDM). This action provides official sanction for a new program start and authorizes the Air Force, when funds are available to initiate the next acquisition phase. (6:4)

CONCEPT EXPLORATION PHASE

This phase explores the various alternatives to satisfy the mission need. Considerable emphasis is placed on developing program objectives in mission need terms. The Air Force seeks alternatives from existing military or commercial sources first, modifications of existing equipment next, and finally, new developments when satisfactory solutions are unavailable elsewhere. The outputs of this phase are the candidate solutions and their characteristics e.g. risks, cost, schedules, performance and support parameters, and concepts. The System Concept Paper (SCP) summarizes the results, outlines the acquisition strategy, business planning information and program uncertainties required for the Milestone I decision. (9:4)

pounds and 265 psi.) If the aircraft is increased to 81,000 pounds, pavement life would be reduced by 60-70 percent compared to that anticipated using current data. The civil engineering community was not involved in the early stages of the F-15 C/D development planning. Analytical studies could have been conducted to minimize the pavement stress levels and preclude the need for significant modification to airfield pavements, or surface the problem early in the acquisition process to permit timely budget actions to fund pavement modification before the F-15 C/D was fielded. When the SP0 was contacted by Air Staff civil engineer representatives, they indicated that the effects on flotation was evaluated using a computer program, and that it was felt that there would be no problem for operating at contact pressures below 350 psi (7:1-2).

In recognition of the complexity and magnitude of the facility problems cited above, the DCS for Engineering and Services HQ AFSC has established a division devoted to acquisition civil engineering. Four people are assigned, three engineers and one real property officer (acquisition of land to support systems). This newly created division is working with Acquisition Logistics to create generic SONs and PMDs to adequately address facilities and insure that

facility requirements and design criteria are identified early in the acquisition process. This section intends to take an active role in obtaining and tracking status of facilities during PARs and CARs. They are reviewing SONs and PMDs. They will also interface with other MAJCOMS or beddown systems. (8:20-21)

CHAPTER IV

INTEGRATION OF MILITARY CONSTRUCTION INTO WEAPON SYSTEMS ACQUISITION

Now that question number one of the problem statement has been explored, I will now review how successful the Air Forces Military Construction Program integrates with the systems acquisition process. In the systems acquisition process, the IOC Milestones often do not recognize MILCON milestones. The IOC is driven by events and need dates. Conversely military construction is primarily constrained by the calendar. Projects must be submitted on a particular date; design instructions are issued one to two months after project submission; projects are submitted to Congress on 1 January and final approval cannot be obtained until 30 September of the same year. Another constraint is that facility requirements and design criteria come after design has started and sometimes as late as during construction. These changes cause redesign and construction changes resulting in delays and increased cost. Figure 1 shows the average system acquisition life cycle for 19 weapon systems. (8:10) Also shown at Figure 1 is the Facility Acquisition Milestones based on taking the

amount of time necessary to properly program design and construct required facilities. The facilities requirements plan and design criteria provided by the systems contractor are normally not provided until the full scale development phase. (B:9) Ideally, Civil Engineering would not start the environmental or programming process until design criteria is available. However, if they waited, the construction completion would be well after the IOC. To meet the IOC, Civil Engineering quite often has to stack actions and submit projects without fully developed requirements. Additionally design is commenced without final design criteria. (Figure 2) These actions frequently result in a redesign to bring actual cost into alignment with programmed cost and accomplishment of follow on requirements by emergency minor construction and O&M projects.

In the case of the B-1B for an example, the deployment decision was made October 81 and the basing approved January 82. The base facility survey for the purpose of project identification was conducted May 82. Three projects were accepted by the Air Staff (CCTS, Munitions Facilities, and Fuel Cell Repair Facility) in Jun 82 as late starters for the FY 94 MCP. Other requirements were put in FY 85 and beyond MCP due to lack of facility criteria. The results have been redesigns of the 84 MCP

ACQUISITION CIVIL ENGINEERING

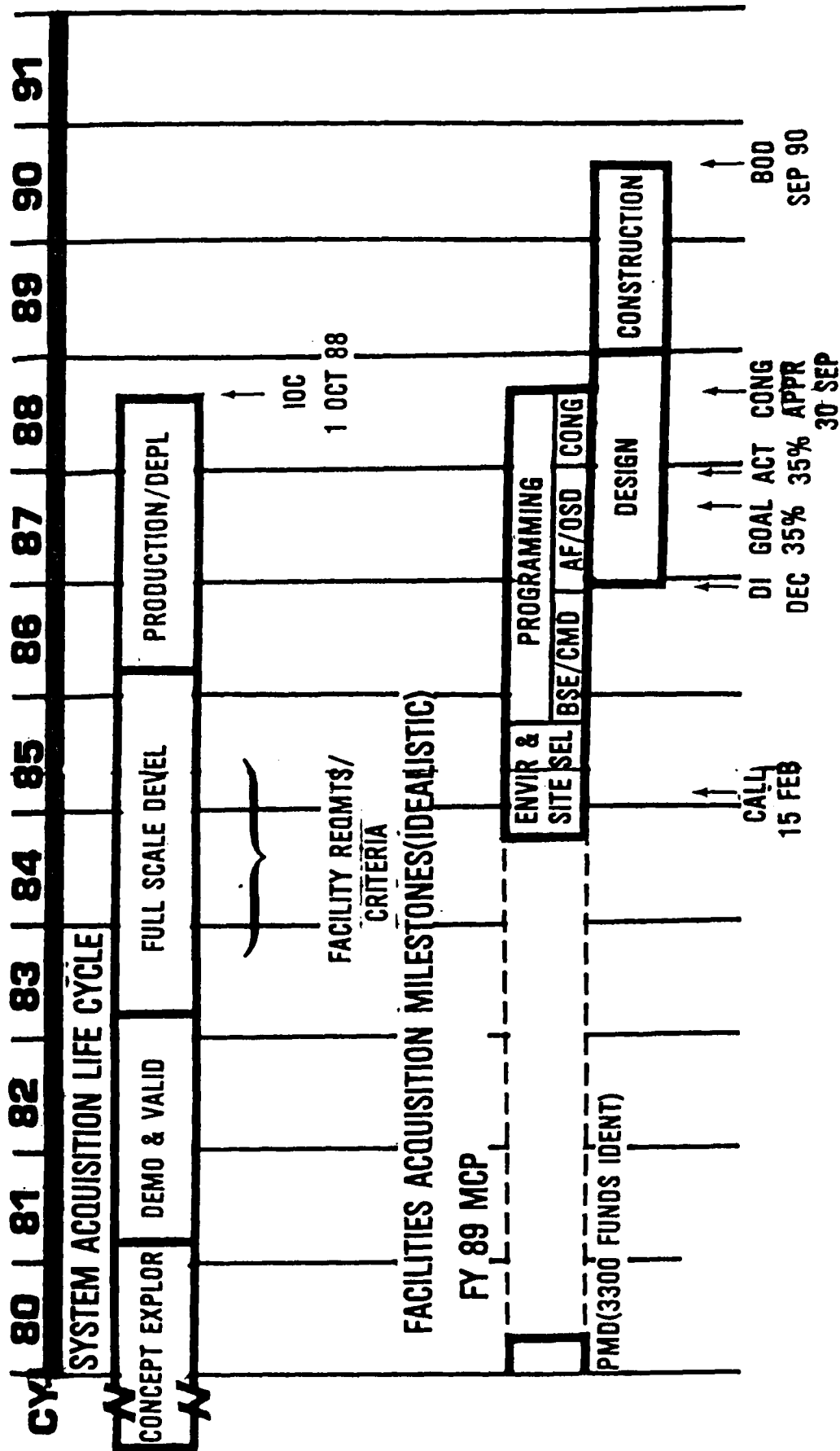


FIG - 1

projects to stay within the quickly developed programmed amounts, and the initiation of extraordinary management procedures (workarounds) using smaller projects within Air Staff and MAJCOM Approval Authority. (8 projects @ \$2.8 mil) (8:13)

The impact of delays on the MCP is shown at Figure 3. Because two of the MCP projects are going to be late, workarounds are planned involving crowding new requirements into existing facilities and scheduling of B-1B fuel cell repair requirements to avoid conflicts at the B-52 fuel cell facility. Six of the eight workaround projects are projected to be completed on time. However, two projects will be late. The Field Training Facility Alteration facing a 9 month slip is being phased to meet individual trainer dates. Because the modification to a Site Activation Task Force Facility (SATAF) is 6 months behind, an existing administrative area will be used. (8:13-17)

ACQUISITION CIVIL ENGINEERING

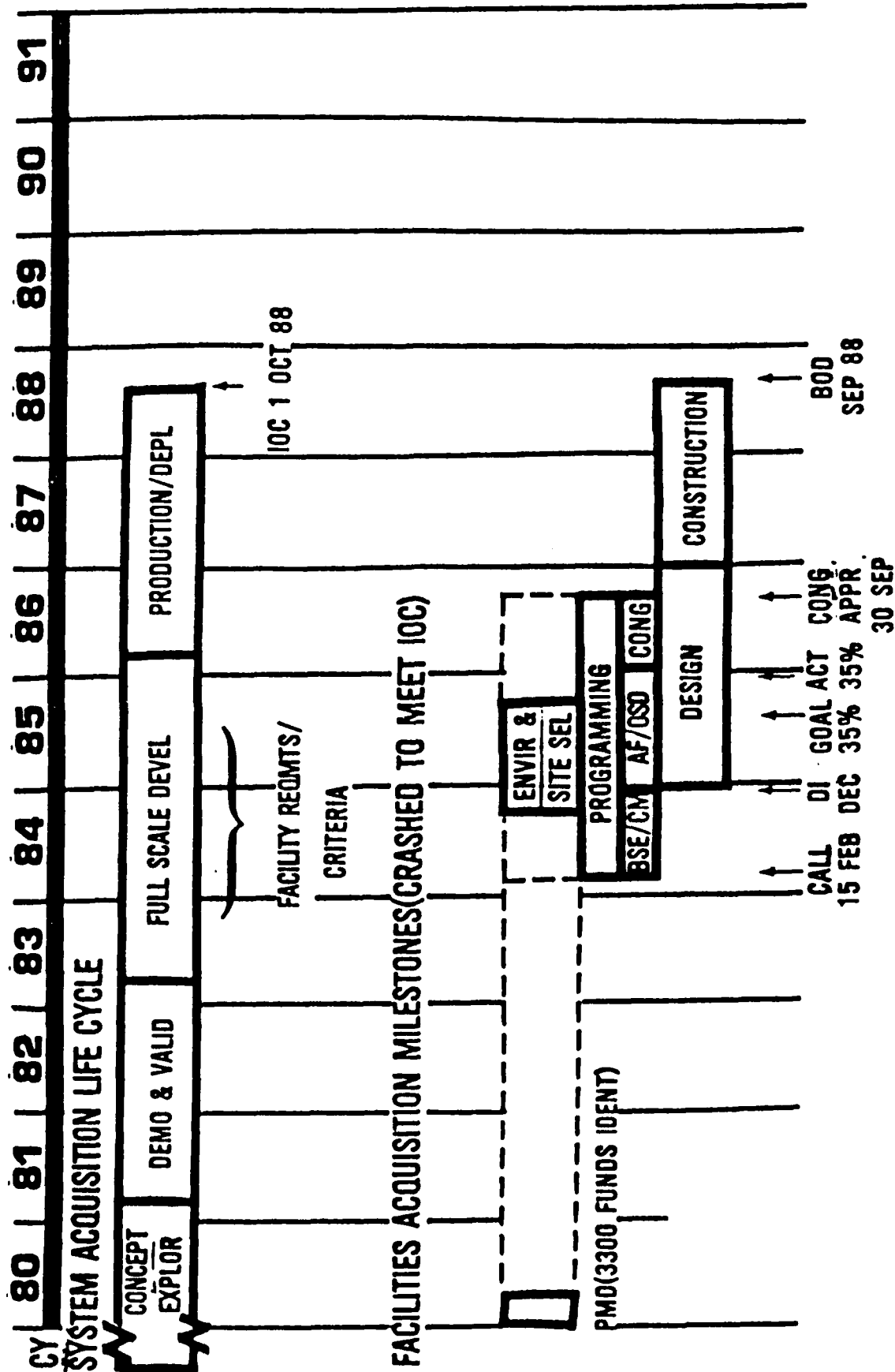


FIG - 2

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

After analysis and evaluation of directives, regulations, manuals and other information gathered during the research, I make the following conclusions and recommendations:

CONCLUSIONS

- a. The Air Force's system to anticipate, fund and construct/modify the facilities required to support new weapon systems when deployed is generally in place, even though there have been problems requiring crisis management. This conclusion is based on the fact that no beddown has reportedly been delayed due to late facilities.
- b. Facility requirements have not, in general, been anticipated and adequately scoped during new systems development to insure facilities availability during system deployment.

- c. Too much crisis management effort has been necessary to provide minimum essential facilities by System IOC.
- d. Management control mechanisms for facilities are not sufficiently developed and are not receiving enough visibility to insure that facility requirement milestones are met.
- e. The systems acquisition process which is event driven and the military construction program which is time driven have significant potential mismatches. Extraordinary management measures have been required to minimize these mismatches.
- f. System acquisition regulations guidance concerning facilities are too general.
- g. More interaction of acquisition civil engineers with SPO's at the product divisions is needed.

RECOMMENDATIONS

Building facilities takes time. For every kind of facility there is an irreducible minimum length of time

B-1B EXPERIENCE

● ● CONSTRUCTION IMPACT

● ● MCP PROJECTS

● ● ● CCTS FACILITY - 6MONTHS SLIP

**● ● ● ● WORKAROUND - USE EXISTING SQUADRON OPERATIONS
FACILITY**

● ● ● MUNITIONS FACILITIES - ON TIME

● ● ● FUEL CELL REPAIR FACILITY - 2 MONTHS SLIP

● ● ● ● WORKAROUND - USE EXISTING B-52 FUEL CELL

required from the realization of the need and decision to construct it, to the completion of a facility ready for use. Increased emphasis on the earliest possible detailed development of facility requirements and criteria is advocated. To aid this process, greater involvement of acquisition civil engineers at the SPO's product division is suggested. Their involvement in formulation and development of system documents will assure that facility limitations/capabilities are provided to the acquisition community. This measure will insure that new and modified systems are compatible with existing facilities or funds are included in the POM to alter facilities.

In addition, acquisition civil engineers day to day interface with the SPOs, their provision of detailed facility status during assessment reviews, and their interface with the operating MAJCOM is necessary to improve the anticipation and scoping of facility requirements. Early anticipation and scoping of facility requirements will permit the development of detailed criteria necessary for more responsive facility design and construction.

Another measure required to assist in making facility construction more responsive, is the expansion of assessment review charts to include more detailed status on

facilities. This action will allow system acquisition decision makers to review and take action periodically on facility matters e.g., facility criteria need dates and status of facility programming, design and construction.

System acquisition publications should be reviewed and updated to include more details on facilities. The changes should include the measures cited above and require that facility requirements be identified in system documents, e.g. SON/FMD/PMP.

Although the implementation of the measures cited above will contribute significantly to improve facility responsiveness, the system acquisition and military construction program processes will still have potential mismatches. To correct this shortfall Air Staff should submit a legislation change proposal to OSD, to recommend authorization of construction funds exclusively for systems acquisition. This change will remove the current military construction calendar constraint and allow facilities to be constructed when criteria is available. This legislation will also speed up the programming process and will result in less facility design and construction changes.

In summary, the successful deployment of a new system is the result of good planning, close cooperation and hard work by all parties. Weapon system acquisition consumes over one-third of the Air Force budget and provides all our fighting assets. The operators, maintainers and supporters of those assets deserve the availability of quality facilities when the system is deployed.

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GLOSSARY

A E FIRM	Architectural Engineering Firm
AFRCE	Air Force Regional Civil Engineer
AFSC	Air Force Systems Command
AIRSTAFF	Headquarters, Department of Air Force
BOD	Beneficial Occupancy Date
CAR	Command Assessment Review
CCTS	Combat Crew Training Squadron
DCP	Decision Coordinating Paper
DCS	Deputy Chief of Staff
DT & E	Development Test and Evaluation
IFB	Invitation for Bids
ILS	Integrated Logistics System
IOC	Initial Operational Capability
IOT & E	Initial Operational Test and Evaluation
JMSNS	Justification of Major System New Starts
MAJCOM	Major Air Command
MCP	Military Construction Program
MILCON	Military Construction
Milestone I	The first Secretary of Defense major decision in major system acquisition <u>concept selection</u>
Milestone II	The second Secretary of Defense major decision <u>program go-ahead</u> and approval to proceed to full scale development
Milestone III	The <u>production decision</u> delegated to the Air Force provided thresholds established at Milestone II are met

OSD	Office of Secretary of Defense
PAR	Program Assessment Review
PDM	Program Decision Memorandum
PMD	Program Management Directive
PMF	Program Management Plan
POM	Program Objective Memorandum
PPBS	Planning Programming and Budgeting System
R & D	Research and Development
SATAF	Site Activation Task Force
SCP	System Concept Paper
SON	Statement of Need
SPD	Systems Program Office
USAFE	United States Air Force, Europe

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