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AN ANALYSIS OF THE O&M
 PROJECT PROGRAMMING PROCESS

THESIS

Jose L. Camps, Captain, USAF

AFIT/GEM/DEM/90S-3

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AN ANALYSIS OF THE O&M PROJECT PROGRAMMING PROCESS

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Engineering Management

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September 1990

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List of Acronyms

AAFES - Army and Air Force Exchange Service
AB - Air Base
ACF - area cost factor
A-E - architectural/engineering firm
AF - Air Force
AFAA - Air Force Audit Agency
AFB - Air Force Base
AFCOMS - Air Force Commissary Service
AFIT - Air Force Institute of Technology
AFM - Air Force Manual
AFR - Air Force Regulation
APF - appropriated funds
BCE - base civil engineer
CE - civil engineering
CECORS - Civil Engineering Contract Reporting System
CES - civil engineering squadron
DD, DoD - Department of Defense
EEIC - element of expense/investment code
EPRJ - engineering branch projects file in the WIMS
FB - Facilities Board
FY - fiscal year
GSA - General Services Administration
HQ - headquarters

HVAC - heating, ventilation, and air conditioning
IG - Inspector General
LE - Office of the Deputy Chief of Staff for Logistics
and Engineering
LEE - Directorate of Engineering and Services
MAJCOM - major command
MC - minor construction
MCP - Military Construction Program
MFH - military family housing
MFR - memorandum for record
MOU - memorandum of understanding
MWR - Morale, Welfare, and Recreation
NAF - nonappropriated funds
NCO - non-commissioned officer
O&M - operations and maintenance
PDC - Programming, Design, and Construction
RPIE - real property installed equipment
SAF - Secretary of the Air Force
TDY - temporary duty
USAF - United States Air Force
USAFE - United States Air Forces in Europe
WIMS - Work Information Management System

Abstract

The main objective of this thesis was to identify problem areas in the O&M project programming process by interviewing contract programmers actively involved in the O&M arena at the base and MAJCOM levels.

The study resulted in identifying 18 primary problem areas based upon their unsolicited frequency of mention throughout the interviews. The five most frequently mentioned problem areas are: the regulations and guidance, work classifications, the minor construction statutory limit, computer support, and the complexity of O&M project programming.

The main conclusions inferred are: the \$200,000 minor construction statutory limit is inadequate to meet present day needs and requirements, project programming information and lessons learned are not flowing efficiently between the various units, frequent changes in project programming guidance add to the confusion and misunderstanding, the quality and completeness of programming documents has decreased as more projects are approved at base level.

Recommendations include publish a revised AFR 86-1 and AFM 86-2 as soon as possible, reduce the number of work classifications, raise the minor construction statutory limit, improve computer support at the bases, celebrate

programming conferences and seminars regularly, demand better written programming documents, and improve training for non-CE personnel involved in the project programming process.

AN ANALYSIS OF THE O&M PROJECT PROGRAMMING PROCESS

I. Introduction

Chapter Overview

This chapter presents a brief justification of the research problem, gives background information on the project programming process, states the research problem, describes the purpose and objectives of the research effort, identifies the limitations of the study, and defines several basic terms.

General Issues/Justification

In recent years, audits have found irregularities with the way some United States (U. S.) Air Force facilities were programmed, funded, and built. A 1985 Air Force Audit Agency (AFAA) Report of Audit found that prohibited actions such as project splitting, incremental funding, misclassifying work, combining funds, and misclassifying costs had occurred at several bases (2:6-7). More recently, the final version of a Department of Defense (DoD) inspector general's (IG) audit maintains that "Air Force officials misspent millions of dollars of appropriated funds on

unapproved construction projects" at Ramstein Air Base, Germany (4:3).

Although the 1985 AFAA Report of Audit "determined that Air Force guidance was adequate and work properly classified (i.e., maintenance, repair, or minor construction)", it also states that this guidance "was not always followed and, as a result, congressionally imposed approval levels for minor construction projects were sometimes exceeded." These were not isolated incidents since the report discusses 21 projects involving seven Major Commands (MAJCOMs) (2:7-12).

Also, a new class of work, renovation, has been defined to help streamline the project programming process, "provide flexibility and relieve administrative workload at the lowest levels" (1).

These facts imply that the U.S. Air Force (USAF) is aware that the programming process needs to be improved to avoid misunderstandings and misinterpretation of the guidance and policy that govern it. What is probably not so clear is how the U.S. Air Force can improve the project programming process applying current programming guidance and policy in order to meet current needs and requirements, and avoid negative audit reports by providing clearer options.

Background

Project programming is just one of the many responsibilities of the base civil engineering organization. A typical base civil engineering squadron (CES) is composed of eight branches: readiness management, industrial engineering, family housing management, squadron section and administration, financial management, fire protection, operations, and engineering and environmental planning.

The engineering and environmental planning branch is usually further divided into four sections: engineering, contract management, real estate management, and environmental and contract planning (17:7-8). It is in this last section that the person directly responsible for project programming works: the contract programmer. The contract programmer must be knowledgeable of the myriad of public laws, regulations, and memoranda that dictate the rules to be followed in developing a project from conception to construction. He must be aware of what can and cannot be done in order to meet the user's needs.

Air Force Regulation (AFR) 86-1, Volume I, Programming Civil Engineer Resources - Appropriated Fund Resources, classifies, for purposes of approval, work on facilities as either maintenance, repair, construction, minor construction, or renovation. Work classified as minor

construction is subject to statute limitations specified by public law. Actions which hide the possible violation of limitations set by the Congress with respect to minor construction are not allowed. These include but are not limited to project splitting, incremental funding, misclassifying work, combining funds, and misclassifying costs (2:5-6; 9:8-11).

It is in the accomplishment of minor construction work funded with operations and maintenance (O&M) money and in meeting congressional statutory limits that the U.S. Air Force receives a large amount of criticism in construction audits. Many times these violations result from the pressure to accomplish minor construction projects within the limits of O&M funding due to the much shorter time needed to take a requirement from conception to construction. A typical Military Construction Program (MCP) project which requires congressional approval can take more than five years to fund and build whereas a minor construction project funded with O&M money can be accomplished in a year. This generates the additional pressure, when minor construction projects approach the congressional statutory limit, to do some "creative" programming which can result in the negative audit reports cited at the beginning of this chapter.

To have an idea of how the project programming process functions at base level, the following example is presented. It is based on the researcher's personal experience as the Chief of O&M Contract Programming for three years at Kadena Air Base, Okinawa Japan. The process, though, may vary slightly from base to base. Typically, a new requirement will be identified by a base unit or as a result of a CES survey or inspection. Once this requirement is identified, the unit or the appropriate CES section submits a Base Civil Engineering (BCE) Work Request (AF Form 332) to the CES Customer Service Unit.

After being registered, the work request is forwarded to the Planning section in the Operations branch. The CES Operations branch "is responsible for the day-to-day maintenance and repair of the facilities and utilities on the base" (17:8). If the Planning section determines that the requirement is beyond the capacity of the Operations branch personnel, the work request is passed on to the Environmental and Contract Planning section of the Engineering and Environmental Planning branch for accomplishment as a contract project.

The work request is eventually forwarded to the contract programmer who evaluates it to determine its work classification. If the work is classified as minor

construction and adds space, the programmer must verify that the scope of work requested will not exceed the maximum square footage justifiable for that type facility on the base. He must also verify, with the Real Estate Management section, that the installation does not have available vacant space capable of meeting the requirement and the facility's condition code to ensure that minor construction work can be accomplished on that facility and that the facility is not scheduled for disposal. The contract programmer's main task at this point in the process is to substantiate that the work requested is legitimate and valid.

The next step in the programming process is to prepare a preliminary cost estimate. Together with the work classification and prevailing project approval levels, this preliminary cost estimate will help the programmer in determining what type funds will be used to accomplish the project and what the appropriate approval document will be. For example, if the project is for minor construction work and within the installation commander's project approval authority, AF Form 332 can be used as an approval document and the project can be included for funding with the base's O&M funds. If, on the other hand, the project is beyond the installation commander's project approval authority, then a

Department of Defense Form 1391 (DD Form 1391), Military Construction Project Data, must be prepared and forwarded to the appropriate MAJCOM for their approval or forwarding to the proper approval level. These approval documents provide the justification, cost, and size of the project as well as describing it.

Based upon the scope of work to be accomplished and the type of facility being worked on (base support; military family housing (MFH); Morale, Welfare and Recreation (MWR); etc.), the project is then programmed in the appropriate programming avenue (O&M, MCP, nonappropriated funds (NAF), MFH, etc.) and fiscal year (FY) for presentation to the base Facilities Board (FB) which will proceed to prioritize each project listing according to the needs of the base. This is a very critical step in the process. With the limited funds assigned to each MAJCOM it is impossible to fund every project programmed, therefore the MAJCOM assigns a bogey to each base under its command and only those projects with a high priority in their respective project listing stand a good chance of being funded, awarded, and constructed. As funds become available for each type of program, the high priority projects that are 100% designed are then funded and authorized to proceed to contract award for construction.

Projects classified as repair, maintenance, or renovation go through the same process with the only difference being approval authority levels specific to each class of work.

Statement of the Problem

Based on the above described problems identified in numerous audits and the continued occurrence of these problems, it can be seen that discrepancies exist between meeting current needs and requirements and the accurate application of current guidance and policy. Why are they occurring? What modifications to the U.S. Air Force project programming process applying current guidance and policy are needed to eliminate them?

How have recent approval level changes and the creation of a new class of work affected the project programming process? After all these years of modifying this process, why do some U.S. Air Force construction projects still result in negative audit reports? Why does a reluctance exist in most MAJCOMs to the use of the new renovation class of work?

All these questions lead to the specific problem to be researched: what does the U.S. Air Force need to change in order to improve the project programming process, avoid negative audit reports, and meet the user's needs?

Purpose/Objective

An analysis of the current O&M project programming process is needed to identify what, if any, shortcomings exist in the project programming process as it now exists, if project approval level changes which have been implemented in recent years have helped or hindered the project programming process and in what way, if the creation of a new class of work (renovation) has affected the process in any way, and if the end product of the project programming process (DD Form 1391 or AF Form 332) is adequate. For years, the U.S. Air Force has been aware that "(p)roject documentation must be improved" so that we are "able to tell those who question ... projects not only what we did, but why we did it at that time" (19).

Another objective of this research is to determine what the U.S. Air Force needs to change in order to improve the process, eliminate discrepancies, and avoid the audit problems of the past.

Limitations

This research will be limited to U.S. Air Force bases and MAJCOMs. It will also be limited to the application of programming guidance and policy with regards to O&M funded projects and compliance with the appropriate congressionally set statutory limits.

Terms

The following definitions are quoted directly from the indicated sources:

Contract programming: establishing and maintaining facility requirements needed to accomplish the installation mission; developing programming documents for the construction, maintenance, and repair of real property facilities; and developing and performing status reporting and control of related projects. (17:9)

Project splitting: creating two or more separate projects out of one project.

Incremental funding: funding a single project with appropriations of two or more successive fiscal years.

Misclassifying work: misclassifying construction work as repair or maintenance.

Combining funds: funding a single minor construction project with two or more different appropriations.

Misclassifying costs: not identifying all related funded costs (i.e., civilian labor costs, materials, transportation, etc.). (2:6)

Project: a plan of work necessary to produce a complete and usable real property facility or a complete and usable improvement to an existing real property facility. All of the work required to achieve the "complete and usable" result is one project and will be programmed as such.

Minor construction project: work required to erect, install or assemble a new facility; addition to, alteration, expansion or extension, conversion, or replacement of an existing facility; procurement and installation of real property installed equipment (RPIE); relocation of existing facilities, and relocation of RPIE from one installation to another.

Maintenance: recurrent, day-to-day, periodic, or scheduled work required to preserve a real property facility. It includes work required to restore components which have deteriorated from fair wear and tear, and other work on a facility to prevent damage or deterioration to that facility which otherwise would be more costly to restore.

Repair: restoration of a real property facility or components to such condition that it may be used effectively for its designated purpose, by overhaul, or processing, or replacement of constituent parts or materials that have deteriorated by action of the elements or wear and tear in use which cannot be corrected through maintenance. Includes restoring or replacing components of facilities damaged by fire, storm, explosion, the elements, and other disasters.
(8:V2,W2-W3)

Recent guidance from HQ USAF/LEE has restricted the scope of repair by replacement work as follows:

This removal and replacement of structural elements under repair authority is intended to be very limited in scope. The replacement of a substantial portion of any structural system of a building, including wall (loadbearing and non-loadbearing), will be categorized as construction. An exception to this limited replacement of structural systems under repair authority may be justified when damage is caused by fire, storm, explosion or other unique circumstances. (15)

Summary

Throughout the years, numerous U.S. Air Force construction projects have been the subject of audits which have determined that, during their accomplishment, programming guidance and policy were violated. The O&M project programming process is subject to a myriad of public

laws, regulations, and memoranda that must be obeyed. Mission requirements and financial constraints, though, create pressure to accomplish important projects now. To avoid the continued occurrence of programming guidance and policy violation, an analysis of the current O&M project programming process needs to be undertaken to determine what, if any, modifications are necessary.

II. Literature Review

Chapter Overview

This chapter discusses various sources of information and guidance on the project programming process. Among the sources to be reviewed are the various regulations, manuals, memorandums, letters, pamphlets, class handouts, etc. that have been issued to direct the project programming process.

Purpose/Benefits

The principal purpose of the literature review is to help the researcher attack the research problem. Benefits can also be derived from the effort to accomplish a literature review. Among them, a literature review can:

1. reveal data sources unknown to the researcher;
2. provide the researcher with new concepts and techniques he/she had not considered before;
3. reveal studies relevant to the researcher's problem; and
4. help the researcher evaluate his/her own research work, by comparing it with similar related endeavors (18:58-59).

The Project Programming Process

All projects for the maintenance, repair, or construction of real property on U. S. Air Force bases must start with the identification of a facility requirement to

accomplish that project. These requirements can be identified during facility surveys performed by Civil Engineering (CE) personnel, as a result of a new mission or mission change, or by the using activity. Facility requirement identification is "the key step in the programming process." Although shared with other civil engineering and base personnel, this is just one of the many responsibilities of the contract programmer. It is essential that the contract programmer "work closely with the using activities to accurately and clearly identify and express needs."

Requirements determination is only one of the three major elements of a frequently long and complicated process called project programming. Once this determination has been made, the next step is evaluating existing assets to ascertain the least costly method of meeting the requirement. Only when existing assets cannot economically satisfy the requirement should a new facility be programmed. This is the second major element in the project programming process. An important consideration in this step is determining if the current condition of existing facilities supports keeping them as is, modernizing or replacing them, or just razing the facility to satisfy mission requirements (9:6.1; 10:32). When a facility has a Real Property

Condition Code of 3, 4, 5, or 6, the work that can be done on the facility is limited and depends on the condition code assigned (9:12-13). The purpose is to "avoid unnecessary expense for upgrading a substandard facility" (9:17).

Lastly, the third major element in programming is procuring the additional facilities required or the work to be done on existing facilities. Determining if in-house resources can be used or if the work is to be accomplished by contract must precede the procurement decision.

Although comprehensive planning is not his primary responsibility, the contract programmer must be aware of the base's long-range plans and make sure that the projects programmed contribute to the accomplishment of these long-range needs (9:6.1).

AFR 86-1, Volume I, is very explicit with regards to being complied with closely:

This regulation [AFR 86-1] is not intended to be liberally construed. When it says an act is not permitted, it means "no", and ingenious formulations to evade this result will not be sanctioned. (9:7)

CE organizations are strongly warned to strictly adhere to this regulation's guidance to avoid embarrassment and wasted effort.

One of the first steps a contract programmer must take when programming a project is deciding which class of work

applies: maintenance, repair, minor construction, or renovation. This is an extremely important step in the project programming process because it directly affects the scope of work that can be performed in one undertaking, approval authority levels, and statutory spending levels. To make this decision, the contract programmer must thoroughly understand the work to be accomplished. If there is any doubt as to the proper classification of a project, detailed information must be sent to the MAJCOM for a decision (9:11).

Of special concern to the contract programmer is what constitutes funded, unfunded, and excluded costs. Project approval authority levels depend on funded costs and costs allocated as unfunded or excluded will not affect the approval level required. Included in funded costs are labor costs (except U. S. military labor), materials, real property installed equipment items (except when the project's only purpose is to relocate the RPIE within the same installation), second-destination transportation costs, contractual services, construction agency overhead, travel and per diem, the equivalent rental costs of government-owned mobile equipment, etc. Unfunded costs, on the other hand, include items such as military labor, depreciation costs of government-owned mobile equipment, etc. (9:13-14).

The presence of a tenant unit on an installation adds another dimension to the project programming process. In this situation the contract programmer now has to coordinate with and obtain the concurrence of, in many cases, an additional MAJCOM in addition to preparing the programming documents. The tenant unit, though, has to help its own projects and mission by providing sufficient requirements information and justification data to support their projects (9:14.1).

When programming, the contract programmer must make sure that the proposed work results in a "complete and usable real property facility, or a complete and usable improvement to an existing real property facility." This is to prevent the prohibited actions of pyramiding, project splitting, and incrementing (9:16.2).

The contract programmer must also determine, together with the using activity, the appropriate FY for each project. Normally, this means including it in a construction program two years before it affects the mission to allow for ample construction time. Each facility project should be judged on its own when making this determination, taking into account factors such as "specific deployment dates, design and construction times, and construction seasons."

Also of primary importance is verifying facility quantity requirements as established in Air Force Manual (AFM) 86-2, Standard Facility Requirements. This manual, though, provides guidance only and not automatic authorization. Therefore, local conditions and operating procedures will determine the adequacy and actual need of a quantity greater or less than the manual allowance (9:17). Assuring adequate, yet not excessive, facilities is the goal. An Existing Facilities Deficiency Detailed Data (D³) Sheet (on a DD Form 1391c) is used to document the calculations justifying the requirement.

The contract programmer needs to identify to the base comprehensive planner, as soon as possible, all projects relating to facilities "used for storage, handling, testing, maintenance, and so forth, of explosive, or explosive-related items." The programmer must also be aware of unique characteristics pertaining to other individual facilities or systems such as air conditioning systems, automatic data processing facilities, administrative facilities, aircraft arresting systems, unaccompanied personnel quarters, commissary facilities, command posts, dining facilities, heating and power plants, hydrant fueling systems, laundry and dry cleaning facilities, health facilities, warehouse facilities, liquid fuel facilities, security fences and

lighting, intrusion and detection alarm systems, training facilities, relocatable buildings, and fire protection systems. He also needs to be familiar with other special limitations concerning air space; information systems support; command unique responsibilities; General Services Administration (GSA) facilities; historic properties; access for the physically handicapped; improvement to newly constructed facilities; leased facilities; pollution abatement; religious and morale, welfare, and recreation facilities; floodplains and wetlands; explosive quantity-distance siting; energy conservation; conventional hardening; chemical protection; camouflage, concealment and deception; and special facility protection for electronic equipment (9:18-23).

Minor construction class work has the most restrictive stipulations of any of the different classes of work. Approval authority levels for minor construction work are much lower than for maintenance and repair work. Maintenance and repair work can be phased out over more than one fiscal year but minor construction work cannot be accomplished in an incremental manner. Minor construction work cannot be combined with any other class of work in a project whereas maintenance and repair can be combined in a single project. Although minor construction and maintenance

or repair work can be accomplished as a single undertaking, the minor construction portion must "be treated and processed as a separate project." In addition, "(i)f the maintenance or repair work cannot be separately identified from the construction work", the entire project must be classified as minor construction subject to all the limitations this classification must adhere to. For many special situations, specific guidance (applicable only to that situation) exists. For example, similar upgrades in several facilities constitute a separate project for each facility, yet for single-purpose facilities "all construction work on a single building in a 12-month period ... [comprises] a single project." This means that the total amount of minor construction work that can be accomplished in that period is limited to the current statutory limit of \$200,000 in O&M funds without higher headquarters approval and Congressional notification. For a multi-purpose building, on the other hand, unrelated, noncontiguous work can total up to \$500,000 in a year before written approval from HQ USAF is required. Another policy restriction relating to minor construction work is that, for each command, minor construction cannot account for more than fifteen per cent of the command's O&M funded contract project program (9:61-62).

Other restrictions and criteria, though, apply to all minor construction projects. Of special note is the fact that obligation of funds for minor construction projects in violation of AFR 86-1 "violates the Anti-Deficiency Act [and] may result in personal civil liability, criminal prosecution, or disciplinary action against all responsible officials." Another constraint is that a minor construction project, in a single undertaking, must "result in a complete and usable facility or a complete and usable improvement to an existing facility", hence the prohibition against splitting or incrementing a minor construction project. Minor construction projects are also subject to the O&M minor construction threshold established by the Congress, presently fixed at \$200,000. If this threshold is exceeded, the project must then "be submitted to HQ USAF/LEE for unspecified minor construction consideration." In addition, these projects "must satisfy congressional notification requirements" and the accompanying documentation must provide extra detailed information not normally required. Using a simultaneous minor construction project to maintain the cost of an MCP project within cost variation notification limits is also prohibited. In yet another situation where more stringent restrictions apply to minor construction work, when additional unanticipated minor

construction work is needed within 12 months of an MCP or minor construction project's completion, HQ USAF approval is required. Yet, a requirement cannot be planned beforehand to be partially fulfilled with a minor construction project and then completed 12 months later with a separate project. It is mandatory that the total known requirements be programmed for accomplishment as a single undertaking (9:62).

Similar constraints exist for minor construction work costing less than \$15,000. This scope of minor construction work is considered a work order and not a project. Yet the "work orders must be reviewed before approval to ensure incremental construction or alteration is not being accomplished by a series of work orders which will circumvent the \$15,000 threshold." This means that the same care is required to avoid incrementing minor construction work orders as is required to avoid minor construction projects. Similarly, work orders cannot be combined with minor construction projects to evade approval authority levels or statutory limits. Compliance with this limitation demands close coordination between the contract programmer and the planners working in the Planning Section of the Operations Branch to ensure that total minor construction

work on a facility does not exceed the applicable statutory limits (9:63).

For certain categories of facilities or situations, such as medical, religious or leased facilities, forest management projects, land acquisition, facilities scheduled for disposal or declared as excess, etc., additional special limitations exist (9:63-64).

MWR facilities present another special situation where minor construction work is concerned. One constraint is that appropriated and nonappropriated funds cannot be combined in one project.

Minor construction projects will be financed from one of the following budget programs: (1) unspecified minor construction program (budget account P-341) for minor construction projects with a funded cost greater than \$200,000 and less than or equal to \$1 million; (2) industrial funds for qualifying projects with a funded cost less than or equal to \$200,000; and (3) O&M funds managed by each MAJCOM for projects not covered in (1) or (2) above and with a funded cost less than or equal to \$200,000. P-341 funds cannot be combined "with other type funds in a single minor construction project" (9:64.1-65).

For minor construction projects within the installation's approval authority level, the only approval

document required is AF Form 332. When approval authority resides at a higher headquarters, though, DD Form 1391 and DD Form 1391c (when required) as well as single line drawings, project site plan, existing facilities/deficiency detail data sheet, applicable certificates, plus any other required documentation must be submitted to the appropriate approval authority (9:65). If MAJCOM approval is required, provide the MAJCOM with original plus five complete copies of the documentation. If HQ USAF/LEE approval is required, send five copies of completed documents to the MAJCOM who will then forward "to HQ USAF/LEE for project validation and design authorization" (9:67).

For minor construction work, MAJCOMs have approval authority for projects with a funded cost less than or equal to \$200,000. This approval authority, though, has been totally or partially delegated by the MAJCOMs down to the bases. For minor construction projects in the P-341 program over \$200,000 but less than or equal to \$500,000, HQ USAF/LEE has approval authority. Finally, the Secretary of the Air Force (SAF) has approval authority for minor construction projects up to \$1,000,000. As any of these thresholds are approached, it is important that cost estimates be evaluated carefully to ensure that the proper

approval is obtained. For all minor construction projects over \$200,000 Congress must be notified.

Bases and MAJCOMs have higher project approval authority levels for maintenance and repair projects than for minor construction projects. MAJCOMs have "unlimited approval authority per project" for maintenance work and delegate a portion of this approval authority to the installation commander. The MAJCOMs also have a \$3,000,000 per facility approval authority for repair work which was delegated to them by HQ USAF; the MAJCOMs have, in turn, delegated \$1,000,000 per facility approval authority to the installation commanders (9:16; 11:22). For maintenance and repair work, projects are normally approved on an AF Form 332 when the project's funded cost is within the installation commander's approval authority. If the funded cost exceeds the installation commander's approval authority, then a DD Form 1391 is required for approval and the project must have a project number.

When the funded cost of a project involving repair work, or maintenance, repair and construction work, exceeds 70 percent of the replacement cost of the complete facility or system and is within the approval authority level of the MAJCOM, the whole project must be classified as a minor construction or construction project. In these cases, the

USAF Pricing Guide can be used to calculate replacement costs for standard-type construction. For other type construction, the replacement cost can be calculated by modifying the guide data for the special conditions or by using up-to-date construction costs and procedures for the locale and facility or system type involved. The replacement cost calculations and results should be shown on a DD Form 1391/1391c or AF Form 332, whichever is appropriate.

When combining maintenance and repair work in a project, and if each class is identifiable, the amount of work of each class determines the project approval authority. The highest project approval authority level required is then the approval level for the entire project. Except for renovation class work, construction class work cannot be combined with maintenance and/or repair work in a single project. If minor construction is done at the same time as maintenance or repair, the construction work is programmed as a separate, class minor construction, project subject to all the requirements and limitations that entails. All work, though, can still be done under one contract. If it is not possible to separately identify the maintenance or repair work, then all of the work must be classified as construction or minor construction.

Unlike minor construction projects, maintenance or repair projects can be phased in increments when the scope of work or funding requirements warrant it. In these instances, total project cost determines approval level and total project approval is obtained at the same time for all phases.

Whereas for minor construction work separate projects per facility are required when accomplishing similar work at the same time in different facilities, similar maintenance or repair work performed at the same time in more than one facility can be done under one project. The approval level, though, is determined by the funded cost for a single facility.

For maintenance and repair projects "funded from the operations operating budget" DD Form 1391 is used to justify and approve "individual projects and AF-wide programs." It is therefore very important to carefully prepare and "provide complete, accurate, and essential information" on the DD Form 1391.

In item 10, Description of Proposed Work, of the DD Form 1391, "(d)escribe in detail the major work elements to be done" allowing verification of assigned work classification. When maintenance and repair work are combined, describe each work separately (9:71-72.1).

Renovation class of work provides for combining maintenance and repair work with alteration (minor construction) in one project. The main purpose is to bring our aging facilities or major functional areas of a facility "up to present-day standards and to improve living and working conditions while concurrently eliminating maintenance problems and energy waste." Renovation does have its limitations, though. The minor construction portion of the project is still limited to \$200,000, the total cost of the project cannot exceed \$1,000,000 nor 75 percent of the calculated replacement cost of the facility, renovation can be used only on existing facilities, an addition to a facility cannot be built, it is for interior work only, and the facility's functional use remains the same (9:11).

The use of nonappropriated funds for minor construction work on MWR community facilities is similarly regulated, although not as strictly as appropriated funds. Where NAF is the required funding source, for example, MAJCOM has unlimited approval authority for MWR, Army and Air Force Exchange Service (AAFES), and Air Force Commissary Service (AFCOMS) construction projects within authorized space criteria; although construction "projects with funded costs over \$200,000 require Congressional release in an annual NAF

Construction Report to the Congress." Also, construction projects with over \$500,000 in funded costs "require SAF review/oversight in addition to [the above mentioned] Congressional release...." For these projects, MAJCOMs and HQ USAF use AF Form 1241, Engineering and Services Project Approval, for authorization. MAJCOMs may delegate down to base level specific amounts of their approval authority for projects within criteria. For those NAF construction projects requiring exception to criteria, MAJCOM's project approval authority is limited to \$100,000. The SAF has unlimited project approval authority for those construction projects requiring exception or waiver to criteria, subject to the Congressional release requirements stated above. As stated above, project approval authority limits are based on the funded cost of the project, which are similar to the funded costs for APF projects (10:37-38,46,73).

Since USAF policy is to build facilities to "need" and "not necessarily to authorized space criteria", "a waiver is required when the authorized space criteria in AFM 86-2, or other approved NAF agency criteria, is exceeded" and "(a)n exception is required when no criteria exists in AFM 86-2 or other approved NAF agency criteria." However, in a conversion project that does not involve an addition to existing, the space criteria may be exceeded by up to 20

percent without the need to request a waiver. The main purpose in these cases is to make optimum, economical, and efficient use of existing facilities (10:29,32).

On the other hand, SAF prior approval is required for repair, combination maintenance and repair, or renovation projects costing more than \$500,000 "on an MWR facility for which NAF is the authorized fund source for construction."

This requirement has been established because the:

SAF is concerned with repair projects companion to NAF construction that some of the elements of the repair should more appropriately be classified as construction. (10:14)

For new installations or where new missions will increase the base population by at least 25 percent in less than two years, "NAF and surcharge facilities may be programmed from APF [appropriated funds] resources" (10:28).

Also, limited instances exist when NAF and APF "can be mixed in a single construction project and not violate the fund source policy...." For example, using APF to remove asbestos in an MWR facility in conjunction with a NAF construction project. In all such cases, the SAF has approval authority (10:12).

Just as in the APF arena, repair projects and associated repair/construction projects accomplished as a single undertaking on a building cannot surpass 70 percent of the replacement cost of the facility, except under

justifiable circumstances which must be submitted to HQ USAF/LEE for approval. Also similar to APF criteria, "all construction work on a single building in a 12-month period will be treated as a single project" and any additional construction project in a facility within 12 months of the original construction project must be approved by AF/LEE. In addition, if the total funded costs of these construction projects surpass \$200,000, SAF approval must be obtained and Congress must be notified.

If any (NAF or APF) facility project is in the neighborhood of a NAF construction project, and can be perceived to be related to the NAF construction project, it must be explicitly "identified on the programming documents for the NAF construction project." In addition, "a complete set of approved programming documents" for APF repair projects companion to NAF construction projects must accompany the NAF project submittal. For other associated projects mentioned in the NAF project document, front page DD Forms 1391 are to be included in the NAF submittal.

Except for golf course ground maintenance, and some AAFES and AFCOMS exceptions, maintenance and repair of MWR community facilities shall be funded with APF. On the other hand, interior, non-structural work required in support of

revenue-generating activities, and not the facility itself, is paid for with NAF in most instances.

For private organizations, banks, and credit unions, all costs for their facility projects, from design through construction to maintenance and repair, must be assumed by that entity unless the pertinent regulation states otherwise. MAJCOMs have approval authority under certain conditions for bank and credit union projects that do not exceed \$200,000. Any portion or all of this approval authority may be delegated down to base level. On the other hand, HQ USAF/LEE is the approval authority for all construction projects "in support of private organizations" (10:16-24, 27-28, 42, 53-54).

In spite of the extensive guidance that exists for project programming, audit reports in the last several years have determined that prohibited activities such as project splitting, incremental funding, misclassifying work, combining funds, and misclassifying costs often occur. Project splitting has happened at Kelly Air Force Base (AFB), Little Rock AFB, Mather AFB, and Tinker AFB; misclassifying work at Bergstrom AFB, Little Rock AFB, Luke AFB, Offutt AFB, and Ramstein AB; incremental funding at Kelly AFB, Little Rock AFB, and Luke AFB; combining funds at Elmendorf AFB and Mountain Home AFB; and misclassifying

labor costs at Ramstein AB. In addition, ten other projects in United States Air Forces in Europe (USAFE) bases would have exceeded the congressional statutory limit for minor construction if accomplished as planned due to misclassification of labor costs. At Hill AFB, the AFAA determined that project splitting and work misclassification occurred but base management nonconcurred with the report's findings and a resolution letter is pending (2:7-10,12; 13:1; 14:2; 20:3-4).

An audit report also found that funds were spent at Hickam AFB to upgrade a World War II vintage substandard wooden facility assigned a Real Property Condition Code 3. An AFAA review at eight other AF bases revealed plans to upgrade 31 World War II wooden facilities classified as condition code 3 and scheduled for disposal. As a result of these incidents, HQ USAF/LE issued clarification guidance in July 1985 for work on "all [USAF] facilities ... in Real Property Condition Codes 3, 4, 5, and 6 (including those planned for disposal)" which was subsequently incorporated into AFR 86-1 (2:16-17; 21:1).

More recent incidents, such as a controversial project to upgrade the officers' club at Ramstein AB, have prompted additional guidance changes. This project "grew from a \$525,000 interior decoration plan to a \$12.8 million

construction project." This amount "included \$8.4 million in appropriated funds spent without congressional approval" and, to accommodate club activities while the club was closed, a temporary facility costing \$796,000. An additional \$395,000 is expected to be spent removing this temporary facility (5). Officials at Ramstein AB also failed to notify Congress of an NCO club NAF construction project that will cost at least \$322,000. Investigators believe that overruns plus "two associated repair projects have driven the cost up to \$1.5 million..." (6).

As a result, HQ USAF/LEE revised programming policy for O&M and NAF projects. In a message providing guidance that supersedes the corresponding portions of AFR 86-1, Air Staff indicated that:

If a temporary building is required to accommodate activities displaced by a project to add to, alter or replace an existing building, the construction or leased costs will be included in the construction project. In these cases the full cost of the lease during the period when the building to be altered/replaced will not be available shall be included in the cost of the construction project. This applies to construction projects programmed with either appropriated (MCP or O&M) or nonappropriated funds.

In the situation where the undertaking involves both a nonappropriated fund construction project and an appropriated fund repair project (companion repair project), the cost of the temporary facility will be included in the construction project. (15)

In addition, the definition of repair work was substantially modified when the repair by replacement of structural elements and electrical and mechanical systems was restricted as follows:

This removal and replacement of structural elements under repair authority is intended to be very limited in scope. The replacement of a substantial portion of any structural system of a building, including walls (loadbearing and non-loadbearing), will be categorized as construction. An exception to this limited replacement of structural systems under repair authority may be justified when damage is caused by fire, storm, explosion or other unique circumstances. (15)

Previously, this work could be classified as repair work as long as the cost did not exceed 70 percent of the replacement cost of the structural system or facility (9:71).

The revised guidance also provided more specific guidelines on calculating the replacement cost of a building to assure that "the total funded cost of a repair project on a building or a combination of construction and repair projects on a building" does not exceed 70 percent of the replacement cost.

Finally, to assure that congressional notification requirements for NAF projects are complied with, new guidance on the disclosure of NAF construction projects is:

Nonappropriated fund (NAF) construction projects require the full and complete disclosure of all (appropriated fund (APF) or NAF) facility projects

which are (or could be perceived to be) associated with the NAF construction. These projects will be clearly identified on the programming documents for the NAF construction project. If the NAF construction project has a companion (APF) repair project, a complete set of approved programming documents for that repair project will be included with the NAF project submittal. Front-page DD Forms 1391 for each of the other associated projects identified in the NAF project document will also be included with the NAF submittal. The location of all related projects will be clearly identified on site plans submitted with the NAF project. (15)

Summary

O&M contract programming is a complicated process. The myriad of regulations and guidance together with the many different types of facilities and funding avenues that the contract programmer must be familiar with just add to the complexity of his work and responsibilities.

This chapter presented an overview of the main sources of information and guidance on the project programming process.

III. Methodology

Chapter Overview

This chapter will discuss why the telephone interview method was selected to gather primary source data from persons occupying O&M programming positions at MAJCOM and base level and the factors to consider when using this method. It also presents the interview questions used in this research effort.

Interview Justification

In deciding the appropriate research method to use it was first necessary to determine the nature of the data to be used. This is extremely important because data and the research method used to analyze it are intensely related.

In general, four kinds of data exist:

1. Historical data - written records of past events;
2. Normative or descriptive survey data - direct researcher observations subsequently described according to his understanding of the properties of the data;
3. Analytical survey or statistical data - quantified observations which need to be evaluated through statistical methods;

4. Experimental data - observations which result from comparing a set of observations with another, each obtained under different conditions.

Each of these kinds of data requires a particular research approach for proper analysis and interpretation. For example, the analytical survey method is the appropriate approach for data quantitative in nature and requiring statistical processes for its interpretation.

The data to be studied in this research effort will consist mostly of answers to interview questions. These answers are based on the respondent's experiences, observations, and perceptions relating to O&M project programming. The descriptive survey method is therefore the appropriate method to use in this research effort (18:68).

Furthermore, two methods can be used to obtain primary source data: observation and surveying or questioning persons on the topic of interest.

Although most of what we know is learned by observation, a researcher is extremely limited in the number of events he/she can personally witness. Predicting where and when a desired event will occur is practically impossible. Patience and time would be required to assure witnessing an event by observing for an extended time period

until the desired event transpired. This process, though, would be slow, expensive, and limited in scope.

An advantage of observation, on the other hand, is the researcher can collect original data as it happens and, thus, would not need to depend on another person's report. Also, the researcher can obtain information important to him/her that other observers might ignore. In addition, for some types of information, observation is probably the only viable data gathering method.

Surveying or questioning is the other major method for acquiring primary source information. In his book, *Business Research Methods*, Emory defines surveying as "to question persons and record their responses as the data for analysis."

As with observation, surveying has several advantages and disadvantages. Among its strengths are versatility, efficiency, and economy. Abstract information, such as opinions, attitudes, intentions and expectations, can rarely be obtained by observation, if ever. A minimum number of precise questions can provide as much or more information than could be obtained by observation, and with much less effort. Finally, telephone or mail surveys can greatly increase geographic coverage at a relatively small expense when compared with the cost of observation.

Surveying's weaknesses include a heavy reliance "on the ability and willingness of respondents to cooperate" in assuring quality information. Reasons a respondent may be unwilling to cooperate include if he/she sees no value in participating in the survey, fears the interview experience, or considers "the topic as too sensitive."

Another surveying weakness is that, even when the respondent is willing and able to participate, he may not possess the information or experience the researcher seeks. In addition, the respondent may not understand the query or idea in the same manner as the researcher, consequently, his/her answers may not address the issues of interest to the researcher. One final surveying disadvantage is that a respondent might provide false information in order to deliberately misinform the researcher. It is therefore essential to be cognizant of the fact that survey responses are just "statements by others which may be true or untrue."

One of the more suitable situations for the use of questioning as a data gathering method is when the respondents are particularly knowledgeable in the subject matter being studied. This is especially true for this research effort where the proposed respondents work as contract project programmers and are therefore highly familiar with the subject matter. It is therefore extremely

likely that they have information, opinions, and perceptions about the project programming process based on their own personal experiences. Similarly, it is expected that this same familiarity with the research topic should make their answers more accurate and acceptable.

Several methods exist for surveying or questioning persons on a subject. They include personal interviewing, telephone interviewing, mail surveys, or a combination of any of these methods.

Personal interviewing allows the researcher to obtain information in greater depth and detail, and of greater complexity, than that obtained by telephone interviewing or mail surveys. It also lets the interviewer achieve more control during the interview than with any other type of questioning. Another advantage of personal interviewing is that the interviewer is not limited to just those people on a mailing list or a telephone directory, he/she can go to the respondent's home or workplace.

Yet, in terms of both time and cost, personal interviewing is very expensive. Another disadvantage of personal interviewing is the possibility of the interviewer introducing bias into the survey through nonverbal messages or some other manner. Also, respondents might not be willing to provide personal, sensitive information during a

personal interview. Some respondents might consider an interview as an intrusion and, therefore, not cooperate fully. Finally, the time allotted for an interview might not be sufficient to permit the respondent the opportunity of providing a precise and complete answer (3:231; 7:100-101; 12:157-161).

Although usually regarded as the best survey method (7:101), personal interviewing was ruled out as impractical since the contract programmers to be interviewed are spread out throughout the world.

Mail surveys, on the other hand, are usually less expensive than personal interviews. When anonymity is provided, they are also more suitable for handling particularly sensitive or personal topics. Since an interviewer is not required, interviewer bias cannot be introduced into the survey. Furthermore, mail surveys enable the researcher to contact otherwise unreachable people. In addition, they also permit respondents time to investigate facts and ponder their answers, time that is normally unavailable with the other kinds of survey methods (3:231; 7:95; 12:172). To provide this benefit to the contract programmers being interviewed, introductory letters were sent to them beforehand explaining the purpose of the

research effort and the telephone interview and providing them with the questions to be asked during the interview.

Yet, mail surveys are limited by their high rate of nonresponse and by the nature, quality, and quantity of information this method can provide, since questions can be ignored or answered inaccurately if misunderstood.

Mail surveys are also more appropriate when the questions asked can be easily answered with a yes or no, checking off an answer, or selecting a number from a list of alternative answers (7:96; 12:172). The questions asked in this research effort were all open-ended and it was therefore decided that a mail survey would not provide the best instrument for achieving the desired detail and completeness in the responses.

Telephone interviewing has the advantage of less cost when compared with personal interviewing, this advantage greatly increases in value the more geographically spread out the respondents are. This questioning method also takes much less time to complete than either personal interviewing or mail surveys. An additional strength possessed by telephone interviewing is the lesser likelihood of interviewer bias. Since the information is obtained by telephone, the interviewer is not influenced by the

respondent's appearance, gestures, and other nonverbal forms of communication and vice versa.

Telephone interviewing is not the perfect questioning method, though, and also has its weaknesses. One is that "the respondent must be available by phone." Another disadvantage normally associated with telephone interviewing is that, due to moves, many outdated phone numbers are always in the phone book plus many new phone numbers have not yet been included. Also, many telephone users have unlisted phone numbers. These were not determining factors in this research effort, though, since all contract project programmers can be contacted either through the Autovon system or commercial telephone lines, their office phone numbers do not change often, and one can always contact the base operator to obtain the desired phone number. Telephone interviews are also restricted in the possible limited length of the interview although this can vary widely depending on how concerned and interested the respondent is with the research issue. Also, the use of charts and other visual aids is practically eliminated and the complexity of questions restricted when using the telephone interview method. The fact that respondents can easily terminate an interview sometimes leads to a low response rate. Telephone interviews can also result in less complete answers and less

rapport between interviewer and respondent. Since the research topic is closely related to the respondent's official duties, it is not expected that these possible drawbacks will affect this research effort (3:229; 7:104-105; 12:169-171).

Research Approach

O&M contract programmers at MAJCOMs and bases throughout the U.S. Air Force will be interviewed on the present status of the project programming process, current guidance and policy, and the future of contract programming in the U.S. Air Force.

Respondents for the telephone survey were chosen by contacting the O&M program manager at various MAJCOMs and requesting the names of several O&M contract project programmers at base level within their commands. The intent was to gather in-depth insights of a relatively small group of active O&M contract programmers and not necessarily have a representative sample of all O&M contract programmers in the U.S. Air Force. Both the MAJCOM O&M program managers and the referred base-level contract programmers were then sent a letter, with the interview questions attached, explaining the purpose of the research and the telephone interview. Subsequently, they were called to set up a date and time for the actual telephone interview.

The telephone interview was performed in a structured manner with all respondents asked the same specific questions in the same order. The individual questions asked, though, were open questions which allowed the respondents to express themselves freely. This method has the further advantage of not limiting the respondent to a list of answers which might not include what the respondent had in mind and avoiding possible bias through suggested replies as in dichotomous and multiple-choice questions. In formulating the questions, care was taken to avoid misleading, ambiguous, and uninformative questions (7:129,134).

The telephone interview questions asked are:

1. What is your name, rank or civilian pay grade, and position?
2. Do you work at base or MAJCOM level?
3. How long have you worked as a contract programmer?
4. What do you think is presently the biggest problem in the project programming process? Why?
5. Do you think the new class of work, renovation, has helped improve the project programming process? Why?
6. Does your MAJCOM use this new class of work (renovation)? Why?

7. Do you think the U. S. Air Force needs to modify the project programming process in order to avoid negative audit reports? Why?
8. Do you think the U. S. Air Force needs to modify the project programming process in order to meet current needs and requirements? Why?
9. Do you think current programming guidance and policy lends itself to misunderstandings and misinterpretations? Why?
10. Should the current definitions for work classifications (maintenance, repair, minor construction, and renovation) be modified to reduce misinterpretations? How?
11. Should Congress raise its statute limitations on minor construction work? Why and, if so, to what level?
12. How can Civil Engineering improve its project programming process to better document and justify its selection of a particular work classification for a project?
13. What is your opinion of higher base level approval authority limits for minor construction projects? Do you think it has helped or hurt the project programming process?

14. How does the AF Form 332/DD Form 1391 work to document the logic trail in the decision-making process when determining work class, condition code, rules interpretation, and to prevent audits?
15. Should we have other required documentation to document this decision-making process?
16. What recommendations do you propose to improve the project programming process?
17. Do you have any other comments on the project programming process that you would like to add?

Summary

This chapter discussed why the telephone interview method was selected for this research effort and the factors considered in making that decision. It also described how this method would be applied in this research effort, explained why open questions were used, and presented the interview questions to be asked in the telephone interviews.

IV. Results

Chapter Overview

This chapter explains how the research methodology was accomplished. This is followed by the results of the telephone interviews. The chapter briefly presents a demographic profile of the O&M programmers interviewed including a statistical comparison of the experience level of various subgroups within the O&M programmers interviewed. It then presents the results of the responses to each interview question, including proposed solutions to the problems identified and improvements to the project programming process. Finally, an analysis of those responses is provided.

Data Collection

Initially, data was to be collected by interviewing project programmers who had attended the AFIT Project Programming course. For this purpose, the researcher obtained the roster for several course offerings dating back to 1987. Since there was no guarantee that these project programmers were still actively involved in the project programming process, and specifically in the O&M arena, the researcher also contacted the O&M program manager at the major commands. First, a memo was sent through the WIMS to

the Programs Development Division of the major commands. Response to this memo was extremely slow suggesting the possibility that the electronic transmission might have been unsuccessful. Therefore, a letter was then sent to the major commands requesting their cooperation. This was followed a week later by a telephone call to the O&M program manager, who then referred project programmers at bases within their command for the interviews in addition to accepting to participate in the research themselves. The prospective interviewees were then sent a letter explaining the purpose of the interview and including the interview questions. Due to the complexity of the project programming process, the research questions were provided to the interviewees in advance so that they could review the questions and provide well thought-out answers during the interview. Once again, the letter was followed a week later by a telephone call. Upon obtaining their consent to participate in the research, an appointment was set up for the actual interview.

Through a series of 51 telephone interviews using open, structured questions, data was collected. An additional project programmer submitted his answers to the interview questions by mail. To facilitate data collection, the researcher obtained permission to access the AUTOVON system

from his residence. The interviews lasted an average of 23 minutes, with the shortest interview lasting six minutes and the longest one lasting 90 minutes. Almost 20 hours were needed to complete the 51 interviews. After obtaining the respondent's permission, each interview was recorded on audio tape to reduce errors in compiling the results.

Demographics

A total of 52 contract programmers actively involved in the O&M project programming process were contacted. Seventeen of them (32.7%) worked at MAJCOM level and 35 (67.3%) worked at base level. The 52 respondents represented the Air Force Communications Command (1), Air Force Logistics Command (6), Air Force Space Command (5), Air Force Systems Command (5), Air Training Command (4), Alaskan Air Command (1), Electronic Security Command (1), Military Airlift Command (7), Pacific Air Forces (4), Strategic Air Command (9), Tactical Air Command (8), and USAFE (1).

The MAJCOM O&M programmers interviewed have an average of almost six years experience whereas the base-level O&M programmers interviewed have more than seven and a half years average experience in contract programming. At a significance level of .05, there is no significant difference between the level of experience found among the

MAJCOM O&M programmers interviewed and the level of experience among the base-level O&M programmers interviewed. The most experienced MAJCOM O&M programmer interviewed has 14 years of experience while 23 years was the maximum experience encountered in the base-level O&M programmers interviewed. O&M contract programmers with as little as three months experience were interviewed at both MAJCOM and base level. The overall average experience of the O&M programmers interviewed was just over seven years.

The respondents included 42 civilians and just ten military personnel, seven captains and three first lieutenants. The 42 civilians included GM-13 (12), GS-12 (17), GS-11 (12), and GS-8 (1) personnel. The average O&M contract programming experience of the civilians interviewed is just over eight years while the military O&M programmers interviewed have an average experience of just over two years. At a significance level of .05 this constitutes a significant difference between the level of experience of the two groups. This is to be expected since military personnel are more susceptible than civilians to occupying different positions in a civil engineering squadron within a relatively short period of time.

Open-ended Response Results

Question No. 4. What do you think is presently the biggest problem in the project programming process? Why?

Only one of the 52 O&M project programmers interviewed indicated that he did not see any big problem in the project programming process. All of the others (98.1%), though, mentioned numerous aspects of the project programming process which they considered as big problems, see Table 1. One of the most frequently mentioned problems was dealing with the regulations and guidance. Problems relating to the governing regulations and guidance were mentioned by 22 (43.1%) of the 51 programmers interviewed who presented a problem. Problems relating to the regulations and guidance include the minor construction limit of \$200,000, lack of guidance and frequently changing interpretations of work classifications, age and incompleteness of the regulations (specifically mentioned more than once in this aspect was AFM 86-2), reading and understanding the regulations and guidance due to their lack of clarity and the complexity of the work we do, frequently changing guidance, and too many regulations governing the project programming process.

Identifying valid user facility requirements is another problem mentioned by five of the project programmers interviewed. Many times this happens late in the systems

acquisition process and results in inadequate facilities. Also, users are often very vague and uncertain as to what they want and need for their facilities. Many times the scope identified by the user is unrealistic, especially with current budget constraints. A similar situation occurs when a downward directed project is assigned to a base and comes with little information, not as a complete package. It is then up to the project programmer to determine exactly what the user's true needs are and differentiate these from his perceived needs. A lack of sincere and effective communication with the user can contribute greatly to the existence of these situations.

Another problem, mentioned by eight of the programmers, is the lack of knowledge and understanding of the project programming process, including its capabilities and its limitations, demonstrated by auditors, who are supposed to validate it, and by senior base management, who have the authority to make important decisions affecting the project programming process both in the short- and long-term. One MAJCOM O&M program manager indicated that he has encountered this problem even among the project programmers themselves and attributes it to a lack of experience and reading on their part. From conversations with project programmers in his major command, he perceives that the project programmers

in the field are not reading the regulations and guidance. This situation and lack of familiarity with other regulations that affect the project programming process are his biggest concerns.

Other problems pertaining to project programming regulations and guidance include trying to differentiate between all the fund sources (MCP, MFH, O&M, NAF, AAFES, AFCOMS, medical, tenant units, etc.), each with its own rules, which affect the O&M project programming process plus the general use and emphasis of project programming as just a project approval process and not as a planning process with its implied predictive, long-range focus. One result is that very few people in the command structure outside of CE take the project programming process seriously, as stated by a project programmer with more than nine years experience.

Another problem, lack of money, has several effects on the project programming process. First, it results in an excessive backlog of unfunded requirements, delaying projects way beyond their required completion time frame. We therefore never keep up with our true needs as maintenance projects become repair projects and repair projects become replacement projects. Second, funding fluctuations keep us from establishing a consistent, dependable, and executable

program. It is difficult to know from year to year how much money you will receive and in what funding avenue it will be made available, making it hard to plan and program properly. Lastly, lack of money results in a lack of manpower to run the project programming process. With more manpower, we could provide better customer support in addition to establishing and programming user requirements well in advance of their needed date.

Minor construction with O&M funds also presents several problems to the project programmers. One is trying to keep track of minor construction work and costs in a facility within a 12 month period. With in-house and self-help minor construction work being accomplished in some facilities in addition to contract work, a coordinated effort rarely exists between the operations and engineering branches to ensure that the statutory limit for minor construction work in a facility is not exceeded. Also, nine programmers indicated that the \$200,000 statutory limit for minor construction with O&M funds is a very big problem and is not enough to meet today's needs and provide the users with an adequate facility. Four programmers also indicated that, in their major command, sufficient minor construction project approval authority has not been delegated to base level.

The low quality of the programming documents being produced was mentioned by three programmers as another big problem in the project programming process. Apparently there are not that many programmers working at base level with the experience needed to produce quality project programming documents. This relates back to the situation mentioned above, lack of manpower, which results in less people being available to accomplish the same workload and the subsequent decreased quality in some or all aspects of the job.

Problems with the Work Information Management System (WIMS) were also mentioned by six project programmers. These included the need for better computer support at base level, problems using the CE Contract Reporting System (CECORS) since it was not real-time reporting, MAJCOMs and HQ USAF frequently assuming that every base has WIMS capability which is not yet true, and bases without WIMS trying to keep up with requests from MAJCOM. The Programming, Design, and Construction (PDC) software in the WIMS was also mentioned as a problem by several base-level programmers. They indicated that it affected communication between themselves and their MAJCOM because once they input a project into the PDC and transmitted it to their MAJCOM they lost all updating rights to that project. This in turn affected the

coordination process with the MAJCOM. One programmer indicated that this affected several squadron reports because MAJCOM made changes to the project which the base was unaware of.

Also mentioned as a project programming process problem was the difference in philosophy between the senior base management and the CES. Whereas CE is concerned with maintaining and repairing the facilities and infrastructure of the base, the base and wing commanders are more concerned with building new facilities or making sure the base looks nice.

The lack of established and well-defined procedures for project programmers was also indicated. New project programmers learn the contract programming process in a haphazard manner, by trial-and-error and experience.

Other problems reported by the project programmers include relations between the programming and design sections and methods for prioritizing projects.

Question No. 5. Do you think the new class of work, renovation, has helped improve the project programming process? Why?

This question was answered by 51 of the 52 project programmers interviewed. One project programmer stated that

TABLE 1
 PRIMARY PROBLEM AREAS BY FREQUENCY OF MENTION IN
 INTERVIEW QUESTION NUMBER 4

Problem Area	Frequency
Minor Construction Statutory Limit	9
Work Classifications	8
Regulations and Guidance	6
Computer Support	6
Identifying Requirements	5
Non-CE Personnel Understanding of Regulations	5
Project Approval Authority Levels	4
Lack of Money	4
Lack of Predictive, Long-Range Planning	3
Developing an Executable Program	3
Lack of Base-Level Programming Experience	3
Quality of Programming Documents	3
Complexity of O&M Project Programming	3
Lack of Communication With the User	3

he did not have enough experience with this class of work to form an opinion.

By a substantial majority, the project programmers interviewed do not think that the renovation class of work

has helped improve the project programming process. Of the 51 respondents who answered this question, 44 (86.3%) are of the opinion that this new class of work has not contributed much to the project programming process. The others, though, think that the concept has potential and that its intent was to make the project programmer's job easier, provide more flexibility, and improve our programming efforts.

Numerous reasons were given by the project programmers who think this new class of work has not improved the project programming process. The project programmers complain that you still have to classify the work into minor construction and repair. Since renovation projects are restricted to a total maximum funded cost of \$1,000,000, including a maximum of \$200,000 for minor construction work, it is preferable and just as easy for them to program companion repair and minor construction projects which provide a higher MAJCOM limit for the repair portion of the undertaking, \$3,000,000. A separate renovation policy applicable to companion projects has been kept in AFR 86-1. Also, many programmers found that the restrictions applicable to renovation class projects (renovation class cannot be used for additions to existing facilities, where exterior work will be performed, nor where the facility's

category code will be changed) disqualify many, if not most, of the projects at their bases. Most facility renovation projects involve at least some minor exterior work and a change in category code is a frequent reason for renovating a facility.

Other comments volunteered by these project programmers are that they do not see any additional benefits associated with this class of work; that it is very limited, has too many restrictions and complications, and has not simplified anything; and that it is not well defined and provides a lot of room for error. In addition, one MAJCOM has instituted the policy of not using it while some others have retained approval authority for renovation class projects.

Nonetheless, favorable comments for the renovation class of work were provided by seven project programmers. One advantage is that the minor construction work in a renovation class project does not count towards the MAJCOM's 15 percent limit on minor construction within its total O&M funded contract project program. It has helped one major command improve many facilities that had received no major interior improvements since the 1950s. A few project programmers also think that it allows more latitude and flexibility, streamlines and speeds up the project

programming process, and lessens the paperwork by allowing one project to be programmed instead of two.

Question No. 6. Does your MAJCOM use this new class of work (renovation)? Why?

Almost three-fourths of the respondents to this question answered yes, their MAJCOM does allow them to use the renovation class of work. Yet, several of the MAJCOMs have either not provided their bases with specific guidance on renovation class of work or they recommend breaking renovation projects into companion repair and minor construction projects. Reasons given for using the renovation class of work include that it is a neater way of programming, cuts down on the paperwork, and, theoretically at least, it is easier to manage one project with a single class of work. It also helps the project programmer somewhat by eliminating one document per undertaking.

Only one MAJCOM has established a policy against using renovation class projects. They would rather not use it than confuse the project programmers in the field by presenting a new class of work that provides no benefit. Yet, bases in that command have used it for projects within base-level approval authority. Obviously, the policy applies only to renovation class projects requiring MAJCOM approval.

Question No. 7. Do you think the USAF needs to modify the project programming process in order to avoid negative audit reports? Why?

This question was answered by 49 of the project programmers interviewed, three of them stated that they did not know enough, due to their lack of experience, about the project programming process and negative audit reports to determine if the process needed modifications or not. Of the answers given, only 13 (26.5%) were in favor of modifying the project programming process in order to avoid negative audit reports while 36 (73.5%) did not think modifications were necessary.

Within the group of project programmers who think changes are not necessary, 16 stated that there is nothing wrong with the project programming process and that it is adequate, works well, and is a good arrangement. The opinion of some of these project programmers is that the programming rules and policy are straightforward and that project programmers need to follow them and program properly. Seven project programmers stated that if an audit occurs it usually results from violations of the existing regulations and policy and that modifications should not be made just to avoid audits, since they are a necessary integral part of the checks and balances required to prevent

abuses in the system. They also say that it is important that violators and abusers of the project programming process answer for their actions and that disciplinary rules be better enforced. Others maintain that auditors will never be satisfied no matter how you modify the project programming process and that it is necessary to better train and educate the auditors who will audit facility projects. Still other project programmers expressed the view that the success of the project programming process at a base will depend on the base's senior leadership and management. It is essential that these leaders be cognizant of the capabilities and limitations of the project programming process and at the same time be aware of the consequences involved when the applicable rules and policies are violated. Likewise, it is extremely important that the project programmers themselves be highly competent and completely knowledgeable of current regulations, guidance and policy in order to avoid negative audit reports. Also, O&M program managers need to demand better quality and more complete programming documents.

The thirteen project programmers who think the project programming process should be modified to avoid negative audit reports provided several ideas. These changes include:

1. allow a limited amount of minor construction work in repair projects without having to track this cost separately;
2. require only one programming document for companion repair and minor construction projects;
3. consolidate all regulations that govern the project programming process;
4. provide more specific and clearer guidance to avoid the vagueness that lead to audits;
5. make the DD Form 1391 mandatory for all contract projects when the funding MAJCOM is different from the host MAJCOM;
6. standardize regulation and guidance interpretation and implementation among the MAJCOMs;
7. simplify and streamline the project programming process, presently it is too complicated and cumbersome;
8. educate and train auditors and CE customers more on the project programming process and require new project programmers attend the Air Force Institute of Technology (AFIT) course on Project Programming either before assuming their project programming duties or within three months of having done so;

9. require recording on the programming document why a particular work classification was chosen to avoid ambiguities that lead to audits;
10. raise the statutory minor construction limit;
11. change the attitude of all the participants in the project programming process so that the process is taken seriously; and
12. break out CE into its own command and as a tenant organization at all bases/installations, CE would then charge the base/installation for all services rendered.

Question No. 8. Do you think the USAF needs to modify the project programming process in order to meet current needs and requirements? Why?

This question was answered by 51 of the 52 project programmers interviewed. Twenty nine (56.9%) of those who responded expressed the view that the project programming process should be modified to meet current needs and requirements, 22 (43.1%) thought otherwise. Only one project programmer said that he did not have enough experience in project programming to know if the project programming process required modifications to meet current needs and requirements.

The most frequently mentioned suggestion presented by those in favor of modifying the project programming process

is to raise the statutory limit on minor construction work while at the same time providing for automatic increases of the minor construction statutory limit based on inflation rates and/or area cost factors (ACF). Numerous suggestions were proposed with the purpose of streamlining, simplifying, and speeding up the project programming process as another way of better meeting current needs and requirements. These include improving the PDC software on the WIMS, further automating the project programming process via the WIMS, simplifying the project approval process, delegating project approval authority to the lowest possible level, providing clearer guidance and regulations, eliminating the distinction between the maintenance and repair classifications of work, loosening the restrictions of the renovation class of work, providing the bases more lenient guidelines, revising the work classification definitions, and granting the MAJCOMs and the bases higher NAF project approval authority.

Other proposals for modifying the project programming process to meet current needs and requirements are:

1. be proactive instead of reactive in our project programming approach emphasizing long-range planning and base infrastructure;

2. better education and training for the project programmers;
3. revise and update AFR 86-1 and AFM 86-2;
4. give installation commanders more flexibility in accomplishing their projects;
5. eliminate the requirement to classify all category code change related work as minor construction;
6. determine requirements in an objective manner based on the user's real needs and not on what they desire; and
7. provide either stricter or more relaxed rules and guidance, decide one way or the other, and then make sure these policies are followed and obeyed.

Those project programmers who did not favor modifying the project programming process to meet current needs and requirements stated that current project programming guidance and regulations are adequate and possess the necessary answers to the questions project programmers might have, although clarifications are sometimes needed. Nine of these project programmers perceive the process heading in the right direction, structured very well, meeting current requirements, and working just fine in the O&M arena. Delegation of higher approval authority to the bases has already helped, they say. This group of project programmers also maintains that key needs for the process are more

money, more stability, more education of the customers, and improved prior research and planning by the project programmers to determine true requirements and produce quality programming documents. One programmer commented that some bases still do not have WIMS nor computer capability and that acquiring that capability would help them better manage current needs and requirements.

Question No. 9. Do you think current programming guidance and policy lends itself to misunderstandings and misinterpretations? Why?

All of the project programmers interviewed answered this question. A large majority of them, 42 (80.8%), answered yes, they think that current programming guidance and policy does lend itself to misunderstandings and misinterpretations. The other ten (19.2%) project programmers interviewed answered no.

Numerous reasons were given by the project programmers who answered yes to this question. The reason directly mentioned most frequently, by 14 of the 42 positive answers, although it is also implied in some of the other reasons given, is that the regulations governing the project programming process are too vague, ambiguous, unclear, wordy, contain too many "grey" areas, are outdated, and need revision. This, together with frequent and numerous

guidance changes and policy letters, different fund types and work classifications each with their own set of rules, too many special cases and exceptions to the rules, and even conflicting guidance makes it difficult to interpret and easy to misunderstand all the applicable guidance. In the case of occasional users of these guidelines, such as auditors, a few project programmers perceive that the possibility of misinterpretation and misunderstanding is even stronger. Other reasons provided for this situation were:

1. no guidance is provided for preparing DD Form 1391 for O&M funded minor construction projects, AFR 86-1 Chapter 5 provides instructions for P-341 projects and Chapter 6 provides instructions for O&M fund maintenance and repair projects;
2. difficulty in distinguishing between maintenance and repair work;
3. "grey" areas will always exist because regulations cannot possibly cover every situation;
4. conflict between AFR 86-1 and AFR 172-1, USAF Budget, on the classification of certain items as equipment or construction costs;
5. new and inexperienced people involved in the project programming process; and

6. differences in interpretation between the various MAJCOMs and between MAJCOM and base level.

Some programmers maintain that, unfortunately, all of the above sometimes results in people intentionally misinterpreting and bending the rules for their own benefit in order to work around and exploit the system.

On the other hand, the project programmers that do not believe current guidance and policy lends itself to misunderstandings and misinterpretations state that current project programming guidance needs to be read as a whole to understand how everything works together and not just look at isolated points. They think that the policy and rules are clear, well written, and manageable; that they are well laid out for the engineers; and that it is just a matter of becoming familiar with and knowing them. In fact, it was mentioned more than once that the "grey" areas were intentionally left in the regulations to provide flexibility, allow initiative and new ways of doing things, give project programmers some leeway, and allow for unforeseen contingencies and emergencies. Another positive aspect of having "grey" areas is that it allows competent people, who know what they are doing, to interpret the regulation in the best manner possible for their particular situation and circumstances.

Question No. 10. Should the current definitions for work classifications (maintenance, repair, minor construction, and renovation) be modified to reduce misinterpretations? How?

This question was answered by all of the project programmers interviewed. A small majority of the respondents, 29 (55.8%), answered yes, work classification definitions should be modified to reduce misinterpretations. In addition, of the 23 (44.2%) programmers who answered no to this question, nine either proposed changes to the definitions, commented on their shortcomings, or both.

The most frequent comment made by the project programmers who gave positive answers is that work classification definitions need clarification and simplification since they are confusing and vague. Renovation class of work was specifically mentioned as confusing, with nine project programmers suggesting it be modified and three even recommending its elimination. It was also stated that confusion exists between the maintenance and repair classifications of work, with five project programmers suggesting these two work classes be combined or that maintenance be eliminated. Conflicts between recent guidance and AFR 86-1, in addition to inconsistencies between regulations on work class

definitions are also said to exist, thereby adding to the confusion. Seven project programmers also recommended that more and better examples are needed for the different work classes. Others suggested providing a list of work that is considered minor construction no matter what the circumstances or a list of work that is considered confusing. Modification of the definitions of minor construction and repair work classes was also recommended by eight project programmers.

Seven project programmers also suggested reducing the number of classifications to two. One of these would apply only to new construction or additions, the other would apply to all work in existing facilities.

A large portion of the project programmers who answered no to this question expressed the view that the work class definitions are spelled out pretty clearly. Two of the project programmers who said modifications were needed concurred with this view. Seven project programmers stated that some of the definitions are alright while others do need improving. Five other project programmers feel that good examples are provided, that nothing needs to be done to the definitions, that all that is required is the use of common sense, and that stability in the definitions would reduce misunderstandings.

Question No. 11. Should Congress raise its statute limitations on minor construction work? Why and, if so, to what level?

All 52 project programmers interviewed answered this question, although one of them, having mixed feelings, did not give a definite yes or no answer. Forty six (90.2%) of the project programmers who gave a definite answer said that the Congress should raise the statutory limit of \$200,000 on minor construction work.

The main reasons given for this opinion are that \$200,000 does not buy much anymore compared with what it could buy during the early 1980s when the present statutory limit was established. Prices and costs have increased greatly since then and, presently, it is practically impossible to meet the user's requirements with what the project programmers consider an unreasonably low limit.

Several amounts were proposed as the new level for the statutory limit, the most frequently mentioned amount (by 16 programmers) was \$500,000. Also suggested were \$400,000, \$300,000, and \$250,000. Some programmers recommended raising the statutory limit only for alteration work and not for new construction or additions to existing facilities or systems. Others proposed retaining approval authority at the MAJCOM level for any minor construction project over

\$150,000 or \$200,000 in conjunction with the increase in the statutory limit. Also mentioned frequently was the need to correlate raises in the statutory limit to area cost factors or to the inflation rate thereby providing for periodic, automatic raises. Another proposal discussed defining the statutory limit based on scope of work and not on a dollar limit. This would help when programming projects for extremely large facilities.

One of the project programmers who supports keeping the statutory limit at its present level recommends using the MCP for large needs, which was discarded as an option by the opposing group as not responsive enough. Another project programmer indicated that raising the limit does not provide additional dollars in and of itself, while still another programmer mentioned that the main purpose of the O&M funded program is to maintain and repair our existing facilities and raising the statutory limit would just divert more money from maintenance and repair to minor construction work.

Question No. 12. How can Civil Engineering improve its project programming process to better document and justify its selection of a particular work classification for a project?

Every project programmer interviewed answered this question, with 40 (76.9%) proposing improvements to the

project programming process and 12 (23.1%) saying that nothing needed be done or did not know how they would improve the process in this particular aspect.

The improvement most frequently mentioned (by 14 of the 40 who proposed improvements) was the need to produce better quality and more complete programming documents. Project programmers need to realize the importance of these documents and take their development seriously. This could be done by referencing in the programming document the regulation paragraph which supports the work classification selection, for example, or by adding a paragraph on a DD Form 1391c which explains why the work class was selected. One project programmer proposed making the DD Form 1391 mandatory for all contract construction projects once again. Other proposed improvements include more education and training of all persons involved in the project programming process: senior base management, users, auditors, contracting officers, etc., as well as the project programmers themselves. This could take the form of an annual briefing at a FB meeting, offering 1 or 2 day seminars at the bases for non-CE personnel as well as new project programmers, and holding MAJCOM-wide conferences and seminars for project programmers. It is essential that project programmers learn the pertinent regulations well.

Simplifying the regulations and guidance, providing better and clearer definitions and examples for the work classifications, and more specific and distinct guidance from the MAJCOMs to the bases were also recommended.

Other suggestions for improving the documentation and justification of a particular work classification were:

1. develop a checklist, flowchart, or computer program that would guide the project programmer through the process of selecting a work classification;
2. provide more manning in the project programming section;
3. activate WIMS at all the bases;
4. use the comments screen for contract projects in the WIMS;
5. select well-qualified personnel as project programmers;
6. set up a facility data management file that contains an inventory of all equipment items on the base requiring maintenance which could be used to predict maintenance and repair activities; and
7. formalize the work classification selection process through a certification on the programming document.

Among the 12 project programmers who did not suggest improvements to this aspect of the project programming process, four said that we are doing quite well now and no change is necessary while three others said that there is

enough justification already and we do not need any more changes. One of the project programmers indicated that the problem lies with the contracting personnel, whereas another stated that determining work classification has nothing to do with the project programming process. Yet another project programmer said that he was not sure how you would justify the selection of a work classification.

Question No. 13. What is your opinion of higher base level approval authority limits for minor construction projects? Do you think it has helped or hurt the project programming process?

Only 45 of the 52 project programmers interviewed gave a definite yes or no answer to the second part of this question. A large majority of these, 39 (86.7%), think that higher base level approval authority limits for minor construction projects has helped the project programming process. Six project programmers think that these higher approval authority limits have hurt the process and the remaining seven have mixed feelings on the effects of the higher approval authority limits for minor construction projects.

The main reasons given for these higher approval authority limits having helped the project programming process are that they streamline the process, allow the

bases to react more quickly to the user's needs and requirements, and avoid extra paperwork and bureaucracy. These project programmers also indicate that sending programming documents to the MAJCOMs for approval has typically been just a formality and that the effectiveness of having higher minor construction approval authority depends on the base and wing commanders and the BCE. MAJCOM program managers state that it lessens the workload at the MAJCOM level, places responsibility on the base personnel, and gives the bases more flexibility. It also reduces the need for coordination between the bases and their MAJCOM. In addition, some project programmers feel that maximum approval authority delegation should go down to the lowest possible level since the BCE and the base-level project programmer are the people who should know the most about the project and make the right decisions.

The project programmers who feel that higher approval authority limits have hurt the project programming process feel that it puts more pressure on the BCE since he may find it difficult to tell his commanders that a project cannot be accomplished; commanders will do more minor construction work at the expense of maintenance and repair work; the base has more room for errors, to bend the rules, and to abuse the process; the quality of programming documents has

diminished and less of an audit trail exists; and it hurts the process when the programmers at base level are inexperienced, have guidance that is not definitive, and do not dedicate the necessary time to learning the regulations. They also believe that a control balance should exist between the bases and MAJCOM, with the bases having a maximum minor construction approval authority of \$150,000 or \$175,000. Since the MAJCOM programmer's sole concern is programming, this would allow the MAJCOM better scrutiny of the larger minor construction projects, to serve as a "watchdog", and to take some of the pressure off of the BCE since they will have a more objective view of the situation. Four project programmers maintain that approval authority limits are insignificant as long as MAJCOM retains funding approval.

Question No. 14. How does the AF Form 332/DD Form 1391 work to document the logic trail in the decision-making process when determining work class, condition code, rules interpretation, and to prevent audits?

Fifty one of the project programmers interviewed answered this question. Thirty two (62.7%) of these feel that the AF Form 332 and/or the DD form 1391 work well to document the logic trail in the decision-making process

described in this question, whereas 19 (37.3%) believe otherwise.

The general view of the former group of project programmers is that a well written DD Form 1391 clearly presents all the information required. If you describe the work correctly, make sure everything is properly documented, and, if necessary, reference the regulation or guidance used, you should be able to follow the decision-making process for the work classification, rules interpretation, etc. Depending on how well they are written and how the base uses them, both the AF Form 332 and the DD Form 1391 can provide the necessary information and detail. Two project programmers mentioned that the form used does not matter, the important point is to make sure the documentation and information is complete and kept in the project folder.

The opposing view is that the AF Form 332 does not provide the necessary information, is real vague, is useless in documenting the decision-making process, and only approves a concept; that the DD Form 1391 is really only an approval document; and that neither document tells how the decisions were made since there is no direct reference to a regulation or paragraph in them. In other words, these project programmers believe their function is minimal as far

as documenting the decision-making process. One project programmer indicated that his base relies on all the documentation they prepare and need other documents to substantiate the decision-making process. One project programmer said that he just does not explain how he determined the work classification.

Question No. 15. Should we have other required documentation to document this decision-making process?

With all 52 project programmers interviewed answering this question, a large majority of them (35 or 67.3%) stated that there is no need to require any additional document to support this decision-making process. Only 17 (32.7%) feel that additional required documentation is needed.

The general opinion of the project programmers who do not see the need for any additional documentation is that the documents we already have are more than sufficient and that a full-blown, complete DD Form 1391 is more than adequate to document this decision-making process. They also perceive that we have too many documents already and that more documentation would just clog the project programming process more whereas what we really need is to simplify and streamline the process. In other words, more paperwork is not the answer, we need less paperwork. In addition, only a small proportion of the projects deal with

debatable work classification decisions and it seems unnecessary to require additional paperwork for all the projects which really do not need it. Time is better spent on seriously filling out and writing as complete as possible, with all the necessary details, the programming documents we already use. Any documentation, reference, or explanation required can be added as a remark to our programming documents. This is why one of the project programmers maintains that the form does not matter as long as the narrative is sufficient to justify the work classification selection. In addition, each project has a "Remarks" screen in the EPRJ file in the WIMS which can also be used to document the decision-making process. One final point was mentioned by two project programmers, it is essential that we train and educate as best as possible the people who write the programming documents.

The project programmers interviewed who said that other required documentation is necessary also provided possible options. They recommend using memorandums for record (MFR), decision matrices, checklists, or flow charts to document the decision-making process. Four of these project programmers recommend using this additional documentation as needed on a case by case basis. Five of the project programmers did not recommend a specific solution but said

that somehow we need to explain grey area decisions and show how we arrive at a particular work classification. One project programmer took this one step further by proposing a document that records each decision made and provides space for initials or a signature, whereas another project programmer recommends including a list of everyone involved with the project's decision-making process. Other options presented include establishing memorandums of understanding (MOU) between CE and other base organizations, including an economic analysis to support 70% replacement value calculations and "better and cheaper 'fix'" decisions, including a good Real Property Inventory Report, developing a coordinated statement of work with the user, and creating an abbreviated DD Form 1391.

Question No. 16. What recommendations do you propose to improve the project programming process?

Only two of the 52 project programmers interviewed did not propose improvements to the project programming process. This demonstrates the participants' conscientious interest in improving the project programming process and not just in criticizing it. Improvements suggested by the respondents include:

1. make sure everybody involved takes the project programming process seriously;

2. emphasize the project programming process as a planning process and not just as an approval process;
3. give preference to long-term maintenance, repair and upgrade plans, especially for infrastructure;
4. more training and education for project programmers both at MAJCOM and base level as well as for non-CE personnel involved in the project programming process;
5. have new project programmers attend the AFIT Project Programming course as soon as possible after they assume their duties;
6. after they are trained and qualified, depend on and trust your project programmers, let them do their job;
7. use work feedback systems and regularly schedule programming conferences where the bases can share their lessons learned and the project programmers can attend training sessions;
8. provide a refresher course at AFIT for programmers with more than three years experience in project programming;
9. keep AFIT courses in tune with any modernization in the project programming process;
10. provide better training on the preparation of programming documents and demand better quality programming documents;

11. insert a process flow chart or checklist in AFR 86-1 to help new project programmers learn the process quicker;
12. develop a consolidated programming package, similar to a project booklet;
13. require that project programmers have experience in at least two other positions in CE, preferably in the design or construction management section or in the operations branch, before assuming project programming duties;
14. increase manpower in the project programming arena;
15. develop a system to provide continuity and longevity in the project programming personnel;
16. segregate contract programming from environmental planning as a separate section under the chief engineer;
17. provide very clear definitions in addition to more and better concrete examples of work classifications, especially for repair by replacement work;
18. clarify, for the occasional user of the regulation, the AFR 86-1, paragraph 2-3c statement on "replacement of a failed part with one that represents that state of the art, and is for the current mission or need will be classed as repair" and its reference to AFR 86-1, paragraph 2-3b(4), which addresses minor construction work that provides "a better and cheaper 'fix'" than repair work, as supported by

an engineering analysis, and "can be classified as repair"
(9:9):

19. liberalize the definition of the renovation class of work;
20. reduce the number of work classifications to two, new construction and all other work;
21. reduce excessive backlog of unfunded O&M contract construction projects;
22. on the WIMS, improve the PDC software so that it can be used as a flexible, productive tool at the local level;
23. train base-level project programmers on using the PDC in the WIMS;
24. automate the O&M DD Form 1391 process on the WIMS, similar to the PDC for military construction, to include the electronic transfer of DD Forms 1391 and other programming documents to MAJCOM HQ;
25. activate the WIMS at all bases and sites worldwide;
26. install cost estimating information for O&M programming in the WIMS;
27. expedite updating WIMS to make CECORS real-time reporting;
28. increase MAJCOM funding allotments for O&M contract construction projects;

29. improve the draft Project Programmer's Pamphlet to have a good overview of the regulations in laymen's terms;
30. have all CE officers spend at least two years in the project programming arena;
31. clarify the regulations (AFR 86-1 and AFM 86-2) and keep them current and up-to-date, quickly incorporating the latest guidance;
32. include a list in AFR 86-1 of those elements of work which we have learned from experience are definitely classified as either maintenance, repair, or minor construction under any circumstances;
33. rewrite AFR 86-1, Chapter 5 to split-out O&M minor construction;
34. have several experienced project programmers provide input, when AFR 86-1 and AFM 86-2 are revised;
35. provide definite, clear, solid, and stable guidance;
36. make the base and wing commanders aware of project programming rules and regulations and of the importance of maintaining and repairing our existing facilities;
37. allow less influence from non-CE personnel on the maintenance and repair of facilities and infrastructure;
38. enforce the rules and regulations as they are to avoid abuses in the system;

39. require programming document approval before design starts;
40. use DD Form 1391 as an approval document only when MAJCOM approval is required;
41. require a complete DD Form 1391 whenever the funding MAJCOM is different from the host base MAJCOM;
42. when using an AF Form 332 as an approval document, include any and all information that would have been included in a DD Form 1391;
43. substantiate on the programming document the decision-making process for selecting a particular work classification;
44. streamline and simplify the project programming process;
45. delegate maximum approval authority to the lowest possible level;
46. delegate funding authority to the bases;
47. liberalize the regulations to accomodate reduced funding and our aging physical plant;
48. increase the statute limitation on minor construction work;
49. increase base and MAJCOM project approval authority for NAF projects;

50. give the MAJCOMs waiver of fund source approval authority for NAF projects;
51. standardize the rules for as many funding avenues as possible;
52. minimize the required paperwork;
53. more documentation;
54. develop a procedure to better track all minor construction costs for a facility, including in-house work;
55. eliminate unnecessary Existing Facilities Detailed Deficiency Data Sheets;
56. have downward directed projects sent to the base come complete with validated requirements; and
57. establish separate funding avenues other than O&M for big-scale projects, such as an AF-wide pavements budget or utilities budget, for example.

Question No. 17. Do you have any other comments on the project programming process that you would like to add?

Additional comments were offered by 37 (71.2%) of the project programmers interviewed, indicating that there is interest in topics related to project programming in addition to the ones covered in the questionnaire used for this research. A synopsis of these comments follows:

1. The project programming process is adequate and works well. MAJCOM maintains rapport with the people at base

level to ensure they comprehend what we understand so things run smoothly. The process is at an optimum level in that it takes care of everything.

2. Local regulations and supplements can help reduce misinterpretations and incorporate new policy and guidance from SAF or MAJCOM not included in MAJCOM supplements.

Cross-reference all sources used in developing the local regulation or supplement, be they policy letters, staff assistance visits, etc.

3. MAJCOM should concentrate on command-wide problems, not micromanage programs at the base level, and lead its bases in program areas.

4. Education is the biggest point. Educate everybody involved in the project programming process, down to the user. Many audits result from project programmers not having enough experience or who have not been to the AFIT Project Programming course.

5. Keep the politics out of the project programming process. Many unneeded projects get done just because a high ranking official or a group wants it, or because it is visible, or because bad press results if we do not do it, all bad reasons. Accomplish a project for good, solid reasons: because it is needed, because it will save the AF

money in the long run, etc. Use good, sound engineering judgement.

6. In-house minor construction work can bust the \$200,000 statutory limit for a facility if it is not coordinated with the contract work scheduled for that facility. Establish an account number for each facility, maybe its facility number, to keep track of all minor construction work (in-house, self-help, and contract) done to that facility in a 12-month period and ensure the \$200,000 statutory limit is not exceeded. Combine the project programming and the design sections. Use the "cradle to grave" concept where the same engineer is responsible for programming, designing, and, to some extent, inspecting the construction of the project.

7. Eliminate the 70% of the replacement value rule. It has become meaningless given the cost of making our facilities usable through renovation. The only other alternative is the MCP which is non-responsive due to the long lead time required, the lack of funds, and the low priority given these type of projects compared with new construction.

8. The biggest problem as a project programmer is trying to explain the project programming rules to upper management. A mechanism to better train the senior managers who make project decisions at the bases, on how the programming rules work, what the limitations are that they need to abide,

would eliminate many of the problems faced as a project programmer. Liberalizing the 70% rule on replacement cost would help solve the statutory limit problem, but the ultimate solution is to raise the limit while still retaining some control above base level so commanders do not waste money, ignore the infrastructure, etc. Many cases have occurred where a base has a legitimate need for a project and there was just no programming avenue available even though the money was there to do it. This results in "creative" programming and bending of the rules. Project programmers should not be put in a position where they have to figure out a way to get around the rules. Rules should be an aide and guide to the base, not a restriction. AFR 86-1 is more of a restriction than an aid to a base's capability in meeting its mission. With the limited MCP money available and the long lead time required, flexibility is needed in the O&M minor construction arena to build the facilities we really need.

9. Project programmers do not have their own occupational series. They currently fall under the engineering technician series which does not tell what programming is. There is nothing that really defines what a contract programmer is. None of the series presently used have skill codes that apply to project programmers. There is no real

career progression for contract project programmers. A separate series would really help the project programmers. Another possibility is combining the community planners, real property officers and the project programmers in a multi-level field similar to engineering.

10. How will the O&M approval and documentation process be affected by reductions in manpower? We estimate 20-25% reduction at the MAJCOM level. This will probably result in more authority being delegated to lower levels. With fewer people left to do the same work, this might lead to emphasis on the larger, higher dollar projects which could come back to hurt us if we overlook the small dollar projects even though they are also needed. The people who remain will need clearer work class definitions and documentation to make it easier to stay in compliance.

11. Require project programmers to attend the AFIT Project Programming course before they do any programming, or at least early in their project programming career. It is a big help. Engineers from design or other sections have come into base-level project programming without ever having prepared a programming document. Also, increase the offerings of the AFIT course or take it out to the field/theaters.

12. In the 1980s, we tried to introduce flexibility in an inflexible area: project programming. In the 1990s, we need to accept we are not going to drastically change the way we do business. Congress and the comptroller folks are not going to change. Different colors of money will remain. Policy cannot be liberalized nor lines of responsibility and authority jumped. As the budget shrinks, oversight will increase. Know what the rules are and live within those rules. We need to publish good guidance and procedures that support the policies of the Congress and SAF.

13. We have a real good system with definite regulations. The personalities that get involved are the ones that bend, fold, and mutilate the rules leading to the audit reports. If we follow the rules and good engineering practice, we have a great system.

14. The current project programming process is good and fine. Personalities are involved, though, and sometimes you just cannot satisfy somebody. Our MAJCOM had a contract programmers' conference which really helped out. It cleared the air on what the MAJCOM really wants and why it maintains a certain position.

15. A mini-course, two weeks long, that exposes project programmers to heating, ventilation, air conditioning (HVAC), roofing, and electrical systems; road pavements.

etc.; that is, the technical aspects of projects they program would be useful and result in more effective project programmers.

16. Conflicts with the contracting office are frustrating. Everybody has their own ideas on what to do with the limited resources available. Funding in the O&M arena has not been good for about five years.

17. Project programming is a very interesting process and certainly a challenge. The need for good programming becomes more critical all the time as resources keep shrinking and we have to make tougher decisions. The days of doing something just because someone wants it are numbered.

18. Need software in the WIMS that permits the electronic transmission of DD Form 1391 data for O&M and other funding avenues to speed up the project programming process, similar to the PDC for the MCP arena.

19. Advise wing commanders and BCEs of the low probability of getting a P-341 project funded. In 10 years, have not seen a base-initiated P-341 project make it, although several MAJCOM supported P-341 projects have been built. Bases need more control over their projects in the PDC, presently we have no control at all. Changes made to them at MAJCOM affect base-level reports diminishing their

reliability. This just converts the bases into word processors for the MAJCOMs.

20. Minor construction and space increases should be approved at MAJCOM, they are outside the local area politics and should provide better use of our funds. Involve CE's industrial engineer in validating user requests for more space.

21. Make sure scoping is done properly. More approval authority at base and MAJCOM level is needed and would allow the project programmers to do a lot of good for the AF.

22. Too many DD Forms 1391 are being accomplished by A-E's. To write a good DD Form 1391, you need to get out and talk with the users and having a contractor from downtown instead of an AF representative might send the wrong message. Project programmers need to get involved more with the real property officer and the facility managers.

23. Maximize approval authority at base level, even if it hurts, where the information really is. MAJCOM sometimes makes decisions affecting projects they have no idea about. The information is really at the base. They have the details. Most of those decisions need to be made by the people who go out and talk to the user and/or sees the facility. Most of the time, they are more informed. All MAJCOM ends up doing is "rubber stamping" a lot of papers.

This does not add much value to the project programming process. What have we gained?

24. If you take politics and promotions out of the system, it would be more stable. Stop trying to reinvent the wheel.

25. Celebrate programming conferences more often, where project programmers from various bases can get together to review changes in the regulations and guidance, sit down and answer questions, and learn what others are doing.

26. We need more efficient computer systems to help the project programmers, make sure we are getting quality programming documents, have a better handle on how the projects are categorized, and establish better communication between MAJCOM and the bases.

27. Many inherent problems exist in the project programming process: many different people wanting to have a say in the way things are done, projects being prioritized and reprioritized all the time, frequent scope changes, and other day-to-day problems that are frustrating.

28. Develop a computer program that would prompt the project programmer to ask the right questions, to answer with the right regulation statements and take some of the guesswork out of the process. Keep the process as simple and straightforward as possible. No sense in making it difficult. We have to trust the people who are doing the

programming at base level. Overall, it works pretty well, just takes some getting used to. Not sure if anybody other than project programmers understand it.

29. The project programming process seems to be short sighted due to commander emphasis. The project programming process needs to emphasize a long-range perspective and provide basically for the maintenance and repair, with some minor construction, of the base. Facilities Boards need to take their job seriously and examine the space they have in order to use it to the best of their ability.

30. For decentralization (the tendency of the past few years) to work, the project programmers need real hard core guidance. Have the bases and commanders contribute to it. Project programmers need real clear guidance, a tool they can depend on and use.

31. Many people in project programming do not have in-depth construction knowledge. This may hamper them from doing a good programming job because if you do not know what questions to ask the customer, you are not going to receive a good scope description from the customer. Automate the whole project programming process via computers to eliminate most of the tedious paperwork and focus on the real objective of project programming, better facilities for mission accomplishment.

32. Programming guidance and policy is quite adequate. The problem is the people who run the process. A lot of programmers do not have the competence to perform their work. Others ignore the regulation to satisfy their superior's wishes. Instead of giving clear guidance to their bosses, they become creative and do not give advise according to the applicable guidance and policy. Project programmers should be made accountable for the proper use of resources.

Data Analysis

Through the years, many engineering improvements have been developed, yet our regulations and guidance inhibit incorporating those improvements into our facilities in an efficient, economical, and timely manner. With Congress' insistence on retaining control of construction funding, through an unreasonably low statutory limit that makes it practically impossible to upgrade large facilities and with an MCP that is not time-responsive to small MCP-scope projects, we are forced into using less efficient, more expensive methods; for example, the highly expensive conversion of warehouses to administrative spaces. Life-cycle cost analyses would surely prove that long-term costs for the conversion, including the maintenance and expensive energy costs for an antiquated, old facility, are much more

than the cost for providing a similar facility specifically designed for administrative use. Statements such as.

If a renovation project cannot be accomplished under this guidance, and cannot successfully compete for either MILCON or nonappropriated funding, as applicable, it cannot be done. (9:12)

in AFR 86-1 paragraph 2-3j(4) give the impression that our main objective is following the regulations and not providing the functional, efficient facilities needed for mission accomplishment. The regulations should aid, not impede, in meeting valid requirements.

In addition to providing clearer guidance, we must either liberalize the rules or make them stricter. AFR 86-1 paragraph 1-8 says,

This regulation is not intended to be liberally construed. When it says an act is not permitted, it means "no", and ingenious formulations to evade this result will not be sanctioned. (9:7)

Yet many "grey" areas are intentionally left in the regulation to allow the programmers and engineers flexibility and leeway in fulfilling facility requirements. Auditors, probably due to their limited training and experience in engineering matters, frequently focus on paragraph 1-8 and fail to see the complete picture which provides for the best engineering and economical solution.

Before, management demanded good, thorough programming documents because they would be reviewed at MAJCOM HQ. Now,

the general unofficial policy is to just put something on the document for signing and filing because no one will look at it. This situation is another contributing factor to the project programming process not taken seriously and regarded as just a project approval process and not a long-range planning process. Instead of just being paper pushers, we need to be out in the field identifying accurate requirements, developing project scopes, and producing quality programming documents.

Although several project programmers mentioned that the bases lose updating rights to PDC projects, the latest WIMS release allows the bases to manage these projects through the contract projects EPRJ file. This situation will be resolved as soon as their MAJCOM's computer systems administrator sends out the release to the bases.

The many regulations affecting the project programming process complicate the project programmer's task. Consolidating all the regulations that govern and affect the project programming process into one document would be an impractical undertaking, yet AFR 86-1 can be improved by providing more specific paragraph references to the source regulations that establish criteria in AFR 86-1.

The numerous work classifications, each one with its peculiarities, are main contributors to the complexity and

confusion of the project programming process. Clarifying and simplifying the work classification definitions would greatly contribute to streamlining the project programming process. Two work classifications, new construction and work on existing facilities, are all that is needed.

The minor construction statutory limit provided one of the largest concurring responses with 90.2% of the project programmers agreeing that it is currently too low. The main reason is that it is almost impossible to build a reasonable facility that meets all the safety, fire protection and environmental standards plus architectural compatibility with the rest of the base while at the same time satisfying the functional requirements of the user for less than \$200,000.

Higher base-level approval authority can be a double-edged sword for the base. While it provides greater flexibility and responsiveness to the base it also reduces the need for coordination with the MAJCOM which has resulted in lower quality programming documents. This is just the opposite of what base leadership should be demanding since they are now the ones directly responsible for the actions that document authorizes. At the same time, base leadership must avoid bending the rules and abusing the project programming process.

Although DD Form 1391 and AF Form 332 do not provide a specific block for documenting the decision-making process when selecting the work classification for a project, sufficient space is available for referencing the regulation or explaining a peculiar situation in order to clarify the selection made. In addition, space is available in the "Remarks" screen for each contract project in the EPRJ file in the WIMS. A project programmer should not hesitate to take advantage of this potential use of the programming documents and the WIMS whenever there may be any doubt as to the work classification selected.

A follow-on AFIT course to expose project programmers to the technical aspects of projects, such as HVAC, roofing, and electrical systems, is already offered, the Facility Systems Design course. This is an excellent course for new project programmers who have already attended the Project Programming course and for experienced project programmers.

Summary

A total of 52 project programmers actively involved in O&M project programming, at both the base and major command level and representing all MAJCOMs, were contacted.

Throughout the interviews, the respondents identified numerous problems with the project programming process. Most frequently mentioned were problems with the regulations and

guidance, work classifications, minor construction statutory limit, WIMS computer support, complexity of O&M project programming, identifying requirements, overall communication, lack of money, quality of programming documents, and not taking the project programming process seriously. Similarly, the project programmers proposed many ideas for improving the project programming process.

V. Conclusions and Recommendations

Chapter Overview

This chapter presents the conclusions that can be inferred from the results and data analysis of the interview questions. From these conclusions, the author will then make recommendations for improving the O&M project programming process.

Conclusions

Conclusion No. 1. The interviews accomplished during this study resulted in the identification of several problem areas in the project programming process, based on the number of project programmers who mentioned these areas throughout the interviews when that area was not the topic of discussion. Most of the problem areas mentioned are shown in Table 2, together with their frequency of mention.

Conclusion No. 2. Although many problems exist in the project programming process, it is a process that functions. It should not be modified just to avoid audits but some improvements should be made to achieve a simpler, more responsive and straightforward process.

Conclusion No. 3. AFR 86-1 is a complex regulation. It regulates many different construction programs, each with its own special definitions and rules on work

TABLE 2
 PRIMARY PROBLEM AREAS BY FREQUENCY OF MENTION
 THROUGHOUT THE INTERVIEWS

Problem Area	Frequency
Regulations and Guidance	32
Work Classifications	26
Minor Construction Statutory Limit	17
Computer Support	16
Complexity of O&M Project Programming	15
Identifying Requirements	12
Overall Communication	12
Lack of Money	10
Quality of Programming Documents	10
Project Programming Process Not Taken Seriously ..	10
Non-CE Personnel Understanding of Regulations	8
Project Approval Authority Levels	8
Lack of Base-Level Programming Experience	7
Lack of Predictive, Long-Range Planning	6
Too Many Non-CE People Involved in the Process ...	6
Amount of Paperwork	6
Lack of Formal, Standard Procedures	6
Tracking Total MC Expenses on a Facility	4

classification, funding limits, approval authority levels and amounts, funded and unfunded costs. Project programmers face a continuous challenge to familiarize themselves with it and understand how it works as a whole by continually reading, studying, and discussing the many different clauses, definitions, and limitations that it contains.

Conclusion No. 4. The statutory limit of \$200,000 for minor construction work is inadequate to meet present day needs and requirements. Project programmers are forced to liberally interpret the rules in order to meet the user's requirements by using maintenance and repair classifications of work. It is almost impossible to build or upgrade a facility for less than \$200,000 that meets all the life-safety and environmental standards, satisfies the user's functional requirements with his high-tech needs, and also looks nice and is architecturally compatible with its surroundings. The result is inadequate facilities where low-visibility but important items, such as an oil-water separator or insulation, are sacrificed in order to meet the minor construction statutory limit. Additionally, bases in high cost areas are penalized because they are stifled even further by higher construction costs.

Conclusion No. 5. Information and lessons learned in the project programming arena are not flowing efficiently

between the various units. Directly opposite comments, such as the regulations are too strict or they are too liberal, the regulations and guidance are clear or they are vague, the project programming process works well and is responsive to the customer's needs or it is cumbersome and inefficient, suggest that successes in applying current regulations and guidance to uncommon circumstances are not being communicated to other bases and MAJCOMs. Many programmers are unaware of audit reports and regulation and guidance interpretations at other bases which could be useful in helping them learn their job, avoid programming errors, and solve a difficult situation they face. Some MAJCOMs have yet to provide their bases guidance on the use of renovation class of work within their command. Many of the problems identified in this study could be minimized by more and better communication between the bases, between the bases and their MAJCOM, and between the MAJCOMs.

Conclusion No. 6. Frequent changes in project programming guidance and interpretations affect stability, and add to confusion, misinterpretations, and misunderstandings.

Conclusion No. 7. The quality and completeness of programming documents has decreased as more and more projects are approved at base level, leaving less of an

audit trail for those who will have to endure an audit two or three years from now. The quality and thoroughness of programming documents depends on what MAJCOM and base management demand and on the education, training, and attitude of the project programmer. A key element will be how much effort the project programmer is willing to expend to learn and become familiar with the regulations and guidance, talk with the users and MAJCOM, and develop a good base program and programming documents.

Conclusion No. 8. DD Form 1391 and AF Form 332 can be used to document and justify the selection of a particular work classification for a project. Space is available in the "Remarks" block or an attached DD Form 1391c to reference the regulation paragraph or guidance which supports the work classification selection or explain the circumstances that substantiate the selection. The key is a complete, high quality programming document.

Conclusion No. 9. Current work classification definitions require clarification and simplification. Presently, these definitions are too open to interpretations, contain too many exceptions, and provide examples that are seldom used. Although the renovation class of work's intent was to make the project programmer's job easier, provide more flexibility, and improve our

programming efforts; it has contributed little to the project programming process. It still has potential and eliminating some of the restrictions for performing renovation class work would allow it to meet its original purpose.

Conclusion No. 10. Higher base-level approval authority limits for minor construction work has helped streamline the project programming process. Bases are able to react more quickly to user's needs and requirements, avoiding extra paperwork and bureaucracy. At the same time, with less oversight from MAJCOM, the quality of programming documents has decreased and less of an audit trail exists in many project folders. Additionally, more responsibility and pressure rests on the BCE since he has authority to approve larger minor construction projects and there is more potential for the base to bend the rules and abuse the process. Ultimate authority still rests at most MAJCOMs, though, since only a few of them have delegated funding approval authority to their bases.

Conclusion No. 11. With reduced funding in the O&M budget, the project programming process must be taken seriously by all involved with emphasis on long-term planning and efficient use of the limited resources available. Effective, long-term maintenance, repair, and

upgrade plans must be given high priority if our physical plant and infrastructure is to last and serve its purpose. Project programming is the key step in getting projects started and providing the necessary facilities for mission accomplishment.

Conclusion No. 12. New programmers at base level do not have a well-defined, established procedure for learning the project programming process. They learn it mostly through trial-and-error and experience in a haphazard manner.

Conclusion No. 13. Project programming should not be an entry-level position in CE. New project programmers should have experience in at least two other positions in the CES, preferably in design, construction management or operations with a minimum of one year experience in each position. Also, all CE officers should spend at least one year in the project programming arena. Project programming provides the experience to learn where money comes from, how CE gets it, and what CE has to do to get it.

Conclusion No. 14. Computer support is essential to the success of a base's project programming efforts. The latest WIMS release should solve most of the criticism expressed by the project programmers on the PDC's usefulness to the bases. This release allows the bases to manage PDC

projects through the EPRJ file in the WIMS. The bases still require added capabilities, though, such as electronic transfer of programming documents other than DD Forms 1391 between the base and their MAJCOM (forms such as site plans and D³ sheets cannot be sent yet) and software similar to the PDC but applicable to other funding avenues.

Conclusion No. 15. Project programmers need to spend more time talking to the users, visiting facilities, and performing in-depth research of the situation to determine accurate, actual mission requirements and provide the customer with adequate, functional facilities.

Recommendations

The results of this research show that improvements can be made in several areas of the project programming process. The following recommendations are proposed as possible solutions to some of the problems identified and as topics for future research.

Regulations and Guidance. The first step required in this area is publishing a revised, updated AFR 86-1 as soon as possible. This will help alleviate the present confusing situation where guidance is spread out amongst the regulation and numerous guidance and policy letters and messages. The process in AFR 86-1 must be better defined.

Emphasize stability, with changes incorporated to improve, define, and clarify the process, not just as a reaction to events. Avoid and correct confusing, and apparently contradicting, instructions such as AFR 86-1 paragraph 2-3b(2) which says that, in order to be classified as repair, restoration or replacement of utility systems in a facility must be in its original location. If an engineering analysis, as suggested in AFR 86-1 paragraph 2-3b(4), shows that a "better and cheaper 'fix'" is achieved through a different system configuration, and it represents state of the art for that type system (since we are most probably replacing or repairing a system that was installed 20 - 30 years ago), allow it to be classified as repair if it is for current mission needs as provided in AFR 86-1 paragraph 2-3c. Also clarify confusion, and apparent conflict, between AFR 86-1 paragraph 2-3e (renovation as a class of work) and paragraph 2-3j (interior renovation).

Reference other regulations, including paragraphs, that give origin to requirements and statements in AFR 86-1 and AFM 86-2 so project programmers can better understand the whole process. Indicate which regulation governs in case of conflict.

Add guidance for preparation of DD Form 1391 for O&M funded minor construction and renovation work to AFR 86-1.

Chapter 6 and rename this chapter, O&M Projects. Presently, these projects are grouped together with P-341 projects in Chapter 5, Unspecified Minor Construction (MC), and the instructions are not applicable to O&M funded minor construction projects. Documentation of renovation projects is not addressed at all.

Streamline the project programming process. Eliminate levels of review and delegate as much authority and responsibility as possible to the bases, due to less manpower, but strictly enforce disciplinary rules when this authority is abused through gross violations of programming regulations and guidance.

Update AFM 86-2 to reflect latest changes and requirements.

Bases can develop local regulation supplements which incorporate latest policy and guidance not included in MAJCOM supplements in order to reduce misinterpretations. Reference all sources when developing these local supplements (policy letters, staff assistance visits, etc.).

Address and provide guidance in AFR 86-1 and AFM 86-2 on systems furniture, direct equipment support (expense EEIC 592, work for others), tempest requirements, and asbestos removal.

Provide better, more applicable and practical, specific examples for each work classification, including better explanation of equipment cost.

Allow some minor exterior work, such as windows and doors, on renovation class projects so that this class of work can meet its objective of providing more programming flexibility.

Develop an index for AFR 86-1 and AFM 86-2.

Work Classifications. Reduce the number of work classifications. Two principal work classifications are sufficient. One would apply to new construction where you build a new facility or add square footage to an existing facility. The other work classification would include all work in existing facilities. This could take the form of repairing and maintaining components or renovating the complete facility to provide a better, more functional, efficient, and useable facility. Consider even, by performing a life cycle cost analysis, if tearing down the facility and rebuilding it in place would provide a "better and cheaper 'fix'" than continuing to pour money into an old facility. Streamlining this aspect of project programming would greatly decrease confusion, misinterpretations, and misunderstandings. The bottom line should be how we can best use our money.

Minor Construction Statutory Limit. Raise the minor construction statutory limit based upon the inflation rate increase since the current level, \$200,000, was implemented. In addition, adjust each base's minor construction statutory limit by the applicable ACF and provide for automatic increases based on the annual inflation rate, cost of living index, or other suitable factor. To preclude the existence of an odd approval limit, such as \$237,300, raise the statutory limit only when the inflation rate causes an increase in excess of a predetermined amount (every \$50,000, for example).

Upon increasing the minor construction statutory limit and to prevent an increase in minor construction spending at the expense of maintenance and repair projects, recommend that MAJCOM retain project approval authority for all minor construction projects with funded cost over \$200,000 and strictly enforce keeping the total minor construction work done at an installation within 15% of the total O&M funded contract project program.

Computer Support. Provide capability for the electronic transfer of programming documents other than DD Form 1391 by WIMS to the MAJCOM.

Have MAJCOM computer system administrators distribute to the bases the latest WIMS releases as soon as feasible.

Activate WIMS at all bases and sites to improve overall efficiency and information flow.

Provide training on how to use the WIMS and PDC at base level.

Complexity of O&M Project Programming. Reconcile the differences in work classification definitions between AFR 86-1 and budgeting and procurement directives and definitions.

Identifying Requirements. Establish clear, effective, and sincere communication channels with our customers, the users and facility managers. Project programmers need to go out to the project site with the customer to identify and document the requestor's real requirements. The requestor also has to be told what information the project programmer needs to accurately complete the programming documents. When additional space is requested, involve the CE industrial engineer and the real property officer.

Automate AFM 86-2. Each base could establish its own database for input into the software program in order to simplify requirements validation.

Develop a questionnaire or checklist the facility manager can follow to help him/her realize what his requirements are.

The end result will be better requirements identification, fewer mistakes, and better facilities for mission accomplishment.

Overall Communication. Have MAJCOM computer system administrators send the latest WIMS updates out to the bases as quickly as possible. Some bases still do not have latest update which has been out since April 1990.

Use WIMS to quickly distribute to the bases information on latest interpretations made at MAJCOM, HQ USAF, and resulting from audits. Likewise, bases should use the WIMS to let other bases know of a success or problem in solving a peculiar programming situation. For example, if a base is using renovation and getting benefits from its use, get some examples out to the field so other bases can also benefit from that experience. A bulletin board could be set up in the WIMS just for these purposes.

Celebrate programming conferences and seminars regularly, by MAJCOM or AF-wide, where programmers from various bases can get together to review recent changes in the regulations and guidance or in their interpretations, ask and answer programming questions, and learn what others in the project programming arena are doing. Although TDY funds are scarce, savings will result from better trained

project programmers, fewer audits, and better planned facilities.

Have MAJCOM provide better, clearer guidance on how they expect their bases to fill out the programming documents and what exactly it is they want documented. This would eliminate much of the rewriting.

Coordinate CE, auditor, procurement, and accounting and finance regulations to make the project programming process work smoother. Presently, it appears these different regulations are not coordinated with respect to their combined effect on the project programming process. Definitions and concepts appear to be totally different in these arenas.

Lack of Money. Use the money that is available more effectively by pursuing only those projects truly necessary.

With limited funding for the foreseeable future, spend money wisely and avoid spending thousands of dollars in changing building colors, architectural themes, and other minor items every time a new commander is assigned. Also avoid accomplishing a project just because a high ranking official or group wants it or because it is highly visible. Perform projects that are needed using good, sound engineering judgement. This will save us many, many dollars in the long run.

Quality of Programming Documents. For maintenance and repair projects, specifically reference on the programming document, and the project's remarks section in the WIMS, the regulation paragraph or guidance that supports the work classification selection or explain with a reasonable rationale the particular situation that led to that selection.

Provide an economic analysis to support 70% replacement value calculations and to back up "cheaper and better 'fix'" decisions.

Have management insist on better written documents. With increased base approval authority, base commanders should prefer to have better information in a concise, thorough, standard format. Responsibility rests at base level and they do not have higher HQ to fall back on.

Non-CE Personnel Understanding of Regulations. Train and educate commanders, auditors, accounting & finance personnel, procurement personnel, users, building managers, and any others involved with the project programming process, such as Facilities Board members, on how the whole project programming process works, what its capabilities and limitations are, and the consequences, not only of violating rules and policies, but also of ignoring the maintenance and repair of our facilities and infrastructure.

Brief commanders during their commander's orientation.

Project programmers can develop a mini-seminar to train auditors, users, and other involved personnel at their bases. This mini-seminar can also be used to brief the Facilities Board once a year on the project programming process.

Auditors, especially, need to learn and understand how engineers use and interpret AFR 86-1, including the use of engineering analyses to support "better and cheaper 'fix'" determinations, what is considered state of the art, and the reason for flexibility and leeway in programming regulations.

Project Approval Authority Levels. Delegate approval authority to the lowest possible level allowed by the regulations, to those with knowledge of the detailed project information. Decentralization streamlines the process.

Have installation commander sign in a block at the bottom of the DD Form 1391 to show his knowledge and support of the proposed work.

Lack of Base-Level Programming Experience. Assign to project programming positions only those engineers with at least two years experience in other CE positions, such as in the design or construction management sections, or the

operations branch. Require a minimum one year experience in each position.

Management should emphasize sending new project programmers to the AFIT Project Programming course within the first few months of assuming their project programming duties.

As part of their continuing education, send experienced project programmers to other AFIT courses, such as Construction Cost Estimating, Mechanical Systems for Managers, Electrical Systems for Managers, Facility Systems Design, and Architectural Planning.

Management should also emphasize the need for project programmers to read and re-read AFR 86-1 and the latest guidance closely until they become familiar with all aspects to avoid misinterpretations and misunderstandings. Base contract programming sections should regularly schedule sessions to analyze and discuss AFR 86-1 and recent guidance.

Finalize the draft Programmer's Pamphlet so it provides a good overview of programming regulations in laymen's terms.

Insufficient Predictive, Long-Range Planning. Establish a new funding program, an AF-wide infrastructure program with separate budgets for pavements, electrical systems.

mechanical systems, water systems, and other basewide recurring work. The bases identify their requirements, develop a good long-term infrastructure plan, and then work it based on yearly allotments from MAJCOM. With the remainder of the MAJCOM allocation, the bases can take care of those projects supported by the base leadership.

Establish a facilities data management file in the WIMS that provides an inventory of all equipment items for preventive maintenance purposes and records all maintenance, repair, and minor construction work done by shops or by contract. This information can then be used to forecast maintenance and repair activities and, more importantly plan the replacement of facility infrastructure items in advance. Better planning allows you to build an executable program year-by-year and not have to worry so much about changes and inserts.

Incorporate into our facilities operations and maintenance process private industry's latest, most efficient, sound engineering practices and methods.

Lack of Formal, Standard Procedures. Develop a computer program, checklist, or flowchart that prompts the project programmer with questions, guides him/her to the appropriate regulation paragraph, and takes some of the guesswork out of the project programming process. This will

assure the contract programmer of considering all aspects of the project in developing the programming documents.

Tracking of Total MC Expenses on a Facility. Develop a report in the WIMS that tracks all minor construction work on a facility (contract, in-house, and self-help) to assure staying within the \$200,000 minor construction statutory limit. This could be done by assigning an account number to each facility and charging all work done on that facility during the previous 12 months to its account number.

Train operations branch personnel to classify in-house and self-help work based on the work classification definitions in AFR 86-1.

Other. Separate project programming from environmental planning. With the current emphasis on environmental matters and the complex nature of project programming, the section chief needs to concentrate all his energies and knowledge on only one area. Anything less will hurt the quality of project programming, environmental compliance, and, ultimately, the installation. CE management must ensure that good, complete, accurate project folders are kept and all documents relating to the project are included.

Future Research. Further project programming research could use the problem areas identified in this study to

determine, using a formal survey technique, how pervasive these problems exist throughout the USAF.

An in-depth study can also address why the project programming regulations and guidance are so complex and confusing with the purpose of simplifying and clarifying them.

In addition, a similar effort to this one could be performed for the MFH project programming process.

Finally, the regulation revision process can be studied. Why does it take so long? Can it be improved? How?

Summary

From the primary problems areas identified during the interviews, several conclusions were deduced and recommendations for improving some of these problem areas, and ultimately the project programming process, were formulated.

Contract programming plays a key role in the acquisition and maintenance of U.S. Air Force facilities and, therefore, in mission accomplishment. It is essential that future research determine how pervasive these problems exist throughout the Air Force and that steps be taken to improve the process for the benefit of mission accomplishment and the efficient use of scarce resources.

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13. ABSTRACT (Maximum 200 words) This thesis identified problem areas in the O&M project programming process by interviewing contract programmers actively involved in the O&M arena at the base and MAJCOM level. The study resulted in identifying 18 primary problem areas based upon their unsolicited frequency of mention throughout the interviews. The five most frequently mentioned problem areas are: the regulations and guidance, work classifications, the minor construction statutory limit, computer support, and the complexity of O&M project programming. The main conclusions inferred are: the \$200,000 minor construction statutory limit is inadequate to meet present day needs and requirements, project programming information and lessons learned are not flowing efficiently between the various units, frequent changes in project programming guidance add to the confusion and misunderstanding, the quality and completeness of programming documents has decreased as more projects are approved at base level. Recommendations include: publish a revised AFR 86-1 and AFM 86-2 as soon as possible, reduce the number of work classifications, raise the minor construction statutory limit, improve computer support at the bases, celebrate programming conferences regularly, demand better written programming documents, and improve training. <i>Keywords:</i>			
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