



**WORKING IN THE OPERATIONS FLIGHT  
INFRASTRUCTURE SUPPORT**

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This volume in this pamphlet series describes the Air Force Engineer's role in activities required to operate, maintain, repair, and construct installation real property using an in-house military and civilian work force and recurring and nonrecurring service contracts. This volume provides detailed guidance for performing the Infrastructure Support mission. The Infrastructure Support Element provides operation and maintenance of base utilities. These normally include water and waste, heat plant, exterior electric, power production, liquid fuels and alarms. This pamphlet series supports AFI 32-1001, *Operations Management*, as the AFI which implements AFPAMD 32-10, *Installations and Facilities*.

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# Chapter 1 Introduction to the Infrastructure Support Element

## 1.1 Organization and Function

The Operations Flight is responsible for all activities required to operate, maintain, repair, and construct installation real property. The flight is composed of five elements to process requirements in an efficient and timely manner. These elements are Maintenance Engineering, Facility Maintenance, Material Acquisition, Infrastructure Support, and Heavy Repair.

Volume 5, Infrastructure Support is a guide to the mission, objectives, and management of the Infrastructure Support Element of the Operations Flight. With few exceptions, Infrastructure manages and operates all exterior infrastructure systems beyond the five-foot building line and the various utilities and plant operations. The pamphlet offers guidance by suggesting options and tools to successfully perform the mission. Successful alternatives to these suggestions are encouraged and authorized.

## 1.2 Mission Statement

The mission of the Infrastructure Support Element of the Operations Flight, as stated in AFI32-1001, *Operations Manager*, Section C, 11.2, is as follows:

**Infrastructure Support's** mission is to provide the operation and maintenance of base utilities. These normally include water and waste, heat plant, exterior electric, power production, liquid fuels and alarms.

## 1.3 Objectives

The element has four overall objectives:

- (1) perform operations work;
- (2) maintain, repair, and modify real property;
- (3) perform the recurring work program; and
- (4) assist management of the infrastructure program.

The following is a brief review of these objectives. Chapters 2 through 5 are an in-depth look at each, providing guidance and offering tools and suggestions that can be used to meet the objectives, thus fulfilling the mission of the Infrastructure Support Element.

### 1.3.1 *Operations Work*

Performing operations work is one of the objectives of the mission of the Infrastructure Support Element. Operations work includes:

- (1) operating the base utility systems;
- (2) operating the base utility plants;
- (3) activation, deactivation, and post-engagement operations of aircraft arresting systems;
- (4) training base personnel in the operation of aircraft arresting systems;
- (5) operating emergency electrical generators;
- (6) training personnel in the operation of emergency electrical generators;
- (7) operating the base water distribution system including, water sampling, testing, and chemical treatment;
- (8) operating the base wastewater collection system including, the oil separators and pretreatment facilities; and
- (9) operating base heating plants and heat distribution systems.

### 1.3.2 *Real Property Maintenance, Repair, and Alteration*

The Infrastructure work centers are responsible for the general maintenance, repair, and modifications to the various utility systems and plants. Their capability includes maintenance, repair, and modifications to:

- (1) utility plants,
- (2) exterior electrical systems,
- (3) airfield lighting,
- (4) aircraft arresting systems,
- (5) emergency generators,
- (6) liquid fuels,
- (7) grounding and lightning protection,
- (8) alarms,
- (9) sewage,
- (10) water and gas distribution,
- (11) deluge fire protection, and
- (12) cathodic protection systems.

Infrastructure manages the large, multi-craft work orders for all infrastructure activities and systems.

### 1.3.3 *Recurring Work Program*

A major task for the Infrastructure Support Element is the accomplishment of the recurring work program (RWP) for the base utility plants and systems. The recurring work program's unique value is in the savings that can be achieved by periodic, scheduled maintenance of equipment and utility systems. Its major purpose is to maximize the life ex-

pectancy of these systems, minimize failures, and maximize operating effectiveness and reliability. Recurring work is accomplished by the utilities work centers with technical assistance from the Maintenance Engineering Element.

#### *1.3.4 Infrastructure Program Management*

Development of long-range infrastructure programs requires the coordinated effort of the infrastructure program engineers in the Maintenance Engineering Element and the senior craftsmen/supervisor from the Infrastructure work centers. The program engineer(s), in conjunction with the expertise and knowledge available in the various Infrastructure work centers, is large tasked to develop a management program to cover all long-range infrastructure utility and plant systems.

### **1.4 Manpower**

AFMS 44EO, *Manpower Standard Operations Flight*, details the manning for the Operations Flight. Using the detailed formulas and determining the applicable manpower ranges, manpower managers can consult the Standard Manpower Tables provided in AFMS 44EO to identify the manning of the Infrastructure Support Element needs.

While some command and base variations may make manning requirements unique, the Civil Engineer formed the original, typical Objective Squadron, Infrastructure Support Element template to provide overall guidance on the numbers and types of Air Force specialties (AFS) authorized. The chief of the Infrastructure Support Element is a civilian position.

#### *1.4.1 Training*

Manning levels and authorizations are based upon fully qualified personnel. The appropriate training prior to assignment is essential for acceptable work performance.

#### *1.4.2 Enlisted Workforce*

The requirement for having a military workforce is to meet the wartime contingency taskings. Each MAJCOM has a military strength, which is distributed to each installation. There is some flexibility in the overall military-to-civilian mix based on the core AFS requirements (Attachment 2).

Coordination with the MAJCOM and Resources Flight manpower person can assist in determining the right mix and numbers required to meet specific base needs.

#### *1.4.3 Civilian Workforce*

The military forces of the Infrastructure Support Element are augmented by a civilian work force who accomplish

operations, maintenance and repair, recurring work, and modifications to real property. This civilian work force:

- (1) provides a higher level of career field knowledge to supplement the senior enlisted force;
- (2) provides continuity and stability at the installation during contingency exercises and deployments of military personnel;
- (3) has specific duties and responsibilities during base exercises, military deployments, and natural disasters/emergencies; and
- (4) provides training to enlisted and other civilian personnel.

The local Consolidated Personnel Center and Labor Management Agreement can give specific criteria for each of these instances. Most civilians hired are at the Journeyman level; however, in the future, they may be hired as apprentices and intermediate level employees.

#### **1.4.4** *Multi-craft/Multi-skilling Initiative*

The multi-crafting and multi-skilling initiatives were established as part of the DMRD 967. The purpose was to enhance the organization by gaining efficiency and productivity. The intent of multi-crafting was to create teams of skilled craftsmen with the purpose of quickly completing work assignments. Both multi-skilling and multi-crafting included using military and civilian personnel.

### **1.5** **Matrixing**

Productivity gains are achieved through matrixing. Matrixing is the movement of personnel within an element to support an identified shortage in a skill level, AFS, or specialized work task. Inspection of specialized service contracts is one example where craftsmen are used to augment quality assurance evaluators (QAEs) in the Maintenance Engineering Element.

The *Working in the Operations Flight* pamphlet is primarily a source of processes for accomplishment of the flight's mission. This volume lists processes for accomplishment of the Infrastructure Support Element mission; including, how it relates to other flights and other elements.

## Chapter 2 Maintenance and Operation of the Base Infrastructure Systems

The Infrastructure Support Element is possibly the most critical and diversified element in the Civil Engineer Operations Flight. Plants and utility systems are the backbone supporting the Civil Engineers' primary mission; they must operate reliably at all times. Operation and maintenance (O&M) of the aging base utilities and plants is an on-going challenge. In 1995, the average age of all Department of Defense (DoD) facilities was 40 years, with 60 percent over 35 years old. Over half of all facilities and supporting utilities had exceeded their normal design life. The Air Force has been unable to fully fund the proper maintenance of base facilities; infrastructure was often ignored.

### 2.1 Program Development

The program engineers in the Maintenance Engineering Element are focal points and managers of the various infrastructure programs. They have ultimate responsibility for developing, prioritizing, and defending both the near- and long-term infrastructure programs. Craftsmen and technicians work with the program engineers to develop an inventory and condition assessment.

The program engineer then evaluates the infrastructure system by component and types and determines the best management avenue for execution of the work. The requirements identified during the assessments — recurring work programs, work orders, or engineering projects including simplified acquisition of base engineering requirements (SABER), O&M contracts, military construction projects (MCP), and indefinite delivery/indefinite quantity (IDIQ) delivery orders are developed into program activities. The program engineer with inputs from the work centers senior craftsmen considers the work's priority, scope, method of execution, and funding avenues.

**The priority of the work** — Does it need to be done now? What is the impact to the mission if it is delayed? What is the likelihood of system failure?

**The scope of the work** — Who has the expertise to perform the work? How big is the effort?

**The best method to execute** — Can it be consolidated with other like work requirements? Will an expert be used?

**Funding avenues** — When the work requirements have been developed into a program activity, the program engineer should prepare the work request, coordinate a short cost estimate with the work centers, track through the approval process, and coordinate the execution priorities as appropriate.

## 2.2 Condition Assessment

During 1994, AFMC published a complete set of standards for evaluating the condition rating for each Infrastructure Support Element. This pamphlet, the AFMC *Infrastructure Condition Standards* (ICS), divided the systems into components and into subcomponents. The condition evaluation was based on the zero to ten scale. This pamphlet gave a comprehensive definition of the numerical rating expected for each sub-component. Additionally, weighting factors were developed to roll up sub-component ratings into component ratings and component ratings into system ratings and project ratings.

The ratings provide a means of comparison across the infrastructure program and across programs for assigning priorities and funds. The generic format of the standards is shown in Table 1, Condition Standards.



**Table 1. Condition Standards**

<b>Condition</b>	<b>Generic Rating</b>	<b>Standard Evaluation Measurement</b>
10	New Condition	Like new with no defects, system is fully operational, repairs required.
8	Minor Defects	System fully operational at full capacity; only preventative maintenance and minor repairs required; some minor efficiency loss due to defects; in some cases, system could be upgraded.
6	Moderate Defects	System is operational at (95%) capacity and experiences no more than one unscheduled outage a year. No backup system; moderate loss of efficiency; repairs and/or upgrade required on a regular basis.
4	Serious Defects	System is operational, but only at (85%-95%) capacity. System down for unscheduled maintenance and repair no more than three times a year. Efficiency far below standards; extensive repairs required on a regular basis.
2	Excessive Defects	The system is not reliable. System down frequently, no longer efficient; major overhauls or replacements required.
0	Failed	System no longer functions or efficiency so poor, it's not cost effective to operate or do replacement or total overhaul required.

The final version of the condition standards are divided into five general categories:

- (1) Category I, Buildings,
- (2) Category II, Utilities,
- (3) Category III, Roads and Grounds,
- (4) Category IV, Airfields, and
- (5) Category V, Central Plants.

The section buildings contain components normally found in typical building construction: heating, ventilation, and air conditioning (HVAC); interior electric; plumbing; etc. Exterior distribution systems such as steam, water, electric, and liquid fuels can be found in the utility section.

The Infrastructure Support Element's main responsibilities in the inventory and condition assessments of the base infrastructure systems includes parts of all categories except Category III, Roads and Grounds.

Category I, Buildings, includes, in part, the

- (1) HVAC systems,
- (2) primary power supply,
- (3) emergency/backup power supply,

- (4) lightning protection,
- (5) fire detection and alarm systems,
- (6) fire suppression systems, and
- (7) fire protection water storage and distribution system.

Category II, Utilities includes the

- (1) waste water collection system,
- (2) storm water collection and distribution,
- (3) domestic water wells storage and distribution,
- (4) natural gas distribution,
- (5) compressed air distribution,
- (6) liquid fuels storage and distribution,
- (7) steam and hot water distribution,
- (8) chilled water distribution,
- (9) electrical substations,
- (10) primary electrical feeders,
- (11) exterior lighting, and
- (12) fire detection and alarm system.

Category IV, Airfields, covers the

- (1) airfield lighting and air navigation systems and
- (2) aircraft arresting barriers.

Category V, Central Plants, includes

- (1) domestic waste water treatment and disposal,
- (2) industrial waste water treatment,
- (3) potable water plants,
- (4) solid waste disposal systems,
- (5) boiler plants,
- (6) compressed air plants,
- (7) chilled water plants, and
- (8) power plants.

### 2.2.1 *Facility Investment Metric (FIM) Program*

Maintenance Engineering and the programmers in Engineering Flight work together to prioritize infrastructure projects within the total list of facility requirements. Because the Air Force will use the FIM as a means of advocating funds, the intention is for all projects to be prioritized and accomplished consistent with FIM criteria. The FIM measures specific requirements and rates them according to their impact on the installation/tenant mission. It is essential that the condition of infrastructure systems is clearly tied to FIM criteria for mission impact.

### 2.2.2 *Specialized Surveys*

For most infrastructure, commercial specialists can assess the systems; objectively rate the components; and develop a maintenance, repair, and replacement program. In some

cases, these contracts will alleviate manpower-intensive requirements when manning support is unavailable. The contractor can also provide critical technical expertise and/or systems not available at many bases (e.g., infrared roof evaluation systems). Regular assessment contracts should be considered for many programs. For example, the energy program recommends an Energy Conservation Opportunity Analysis to support the program.

### 2.3 Plant Operation

The work centers in the Infrastructure Support Element operate the various utilities and plants assigned to them. The day-to-day operation of plants is accomplished as operations work. The operations category of work allows plant operations to perform this work with minimal record keeping and with the degree of control and oversight desired by the supervisor. Generally, operations work is internally identified, approved, and performed with minimal tracking. Similar to the direct scheduled work order (DSWO), this method or work accomplishment does not require separate computer entries or paperwork for each item of work. Work is directly charged to operations and cost accounting done on a large scale only by utility or plant support.

Operations of utility plants (such as, central heat boiler plants and sewage treatment facilities) require continuous monitoring to ensure compliance with national, state, and local agency environmental laws. State-certified plant operators must maintain currency in their field as prescribed by the appropriate agency or dictated by other regulatory directives. Written operating procedures should be developed for all systems and be prominently displayed for ready reference by the plant operators.

## Chapter 3 Maintenance, Repair, and Alteration to Real Property

### 3.1 Primary Responsibilities

Infrastructure Support is responsible for operation, maintenance, repair, and alteration of real property utility systems, equipment, and plants. The tasks to accomplish these requirements follow.

- (1) Maintain and correct emergency conditions within 24 hours.
- (2) Provide reliable utilities to meet readiness requirements, maintain quality of life, and satisfy installation needs.
- (3) Accomplish work requirements quickly.
- (4) Establish standards to address quality, customer's needs, and mission requirements.
- (5) Establish a system to provide customers with the costs of work performed or services provided.
- (6) Assist in the development and provide annual updates to future plans for major work requirements (roofing, protective coating, electrical distribution).
- (7) Develop work plans to effectively allocate in-service resource; including people, facilities, equipment, and vehicles to meet mission and customer needs.
- (8) Periodically compare actual man-hours used to accomplish the work with estimated man-hours to eliminate or minimize performance problems.
- (9) Establish a process to measure and continuously improve support of base missions and customers.
- (10) Establish and maintain holding areas for ordered material.
- (11) Establish a system to minimize the accumulation and maximize the use of residual material.

#### NOTE

See Volume 3, Facility Maintenance for a more detailed discussion of maintenance, repair, and alteration work; including the work order process.

### 3.2 Work Requirements

Meeting the tasks that fulfill the mission of the Infrastructure Support Element requires time and experience in the field and a good relationship between the base customers, senior craftsmen, work center planners, and engineers as-

signed to the Operations Flight. To develop this field experience and a cooperative, long-term working relationship, the Infrastructure Support managers and senior craftsmen should:

- (1) meet regularly,
- (2) develop documentation,
- (3) classify work,
- (4) strive to develop a good relationship with customers, and
- (5) ensure craftsmen are properly and adequately trained.

### 3.2.1 *Work Type*

Requirements are initiated with necessary documentation used to establish the appropriate type of work order (Direct Scheduled or Planned Work).

#### 3.2.1.1 Direct Scheduled Work

Direct Scheduled Work, previously referred to as job orders, is work that generally does not require detailed planning. These work orders are small and require less than 50 man-hours. Direct scheduled work is immediate or routine and can be maintenance, repair, or minor construction not requiring capitalization.

#### 3.2.1.2 Immediate Work

Immediate work includes emergency and urgent direct scheduled work.

**Emergency work** is work required to correct an emergency condition detrimental to the mission or reducing operational effectiveness. It should be completed within 24 hours of notification. An emergency will always include, but is not limited to, failure of any utility, fire protection, environmental control, or security alarm system.

Work that is not an emergency, but must be responded to and completed within five days after receipt of material is classified as **urgent**. Urgent work is usually done as a direct scheduled work order. Urgent requests might include broken windowpanes, inoperative faucets, missing roof shingles, or inoperative light switches.

#### 3.2.1.3 Routine Work

Routine work is work that does not qualify as emergency or urgent work, but should be done to maintain the standards of an installation. Routine work should be completed within 30 calendar days or during the next scheduled cycle visit to the facility, unless materials are required. When practical, all routine requirements for a facility should be consolidated and grouped into a single work package,

placed on an AF Form 1219, BCE Multi-Craft Job Order, and performed during the next scheduled facility visit.

### 3.2.2 *Work Classification*

Work is classified as maintenance and repair (M&R) or an alteration.

Maintenance and repair is work required to preserve or restore an existing facility. Some examples of M&R are repainting, replacing floor tile or light fixtures, and repairing heating systems. The regularly scheduled facility visits are used to check the condition of the utilities, floors, support structures, or various areas of a building.

#### **NOTE**

Detailed programming information is available from the Engineering Flight based upon guidance in AFI 32-1110, *Planning And Programming Real Property Maintenance Projects Using Appropriated Funds (APF)*.

Minor construction, including alteration, means building a new facility or modifying, adding to, or otherwise altering an existing building. Some examples are installing new walls or lighting, relocating existing walls or real property installed equipment (RPIE), and cutting doorways. These projects are funded from operations and maintenance funds.

Civil engineering will assign one of the following priorities to the work request, consistent with guidance in the Facility Investment Metric:

- (1) **Mission** — Work in direct support of the overall base or tenant unit mission that, if not done, would reduce operational effectiveness.
- (2) **Safeguard Life and Property** — Work needed to give adequate security to areas subject to compromise; eliminate health, fire, or safety hazards; or protect valuable property or equipment. Energy conservation work is also included.
- (3) **Support** — Work that supports the mission or prevents a breakdown of essential operating or house-keeping functions.
- (4) **Necessary** — Not qualifying for higher priority.

Work requiring detailed planning or capitalization of the real property records is categorized as planned work. This type of work is usually submitted on an Air Force Form 332, BCE Work Request.

The Objective Squadron does not identify a separate planning section. Planners are earned and authorized as part of the Journeyman-level crafts position description. Some CE squadrons have a formal planning section located in either the Heavy Repair or Maintenance Engineer Elements with the manning taken from within current authorizations. (Figure 1, Direct Scheduled and Routine Work Requests).

### 3.2.3 *Coordination*

The requester must coordinate with the appropriate agencies on work that requires CE action to eliminate or correct hazards. This coordination is critical to ensure compliance with prescribed building, safety, and environmental policies, regulations, and criteria. Utility outages are often required in order to accomplish repairs on utility systems and plants. It is imperative that these outages be publicized and fully coordinated.

### 3.2.4 *Work Evaluations*

Work orders go to the appropriate work center-of-execution for initial evaluation and rough estimate. The heavy repair force manager is usually the focal point for the Work Request Review Board and manages the work orders. If the work order affects the base infrastructure (and almost all do), Maintenance Engineering and Infrastructure Support should evaluate the work order and recommend action. Following the Maintenance Engineering evaluation, the work order should go to the WRRB for final evaluation and approval or disapproval. The basic evaluation process answers a number of questions:

**Is this work consistent with long range plans?** Is this work going to have a positive or adverse affect on the infrastructure program? Have energy costs, additional HVAC load, roof penetrations, and pavement integrity been considered?

**Is the work redundant?** Is the work duplicating or negating other planned work, especially the work in the long-range plans? Often mission requirements may drive a programmed project to be executed earlier and is advantageous to the program.

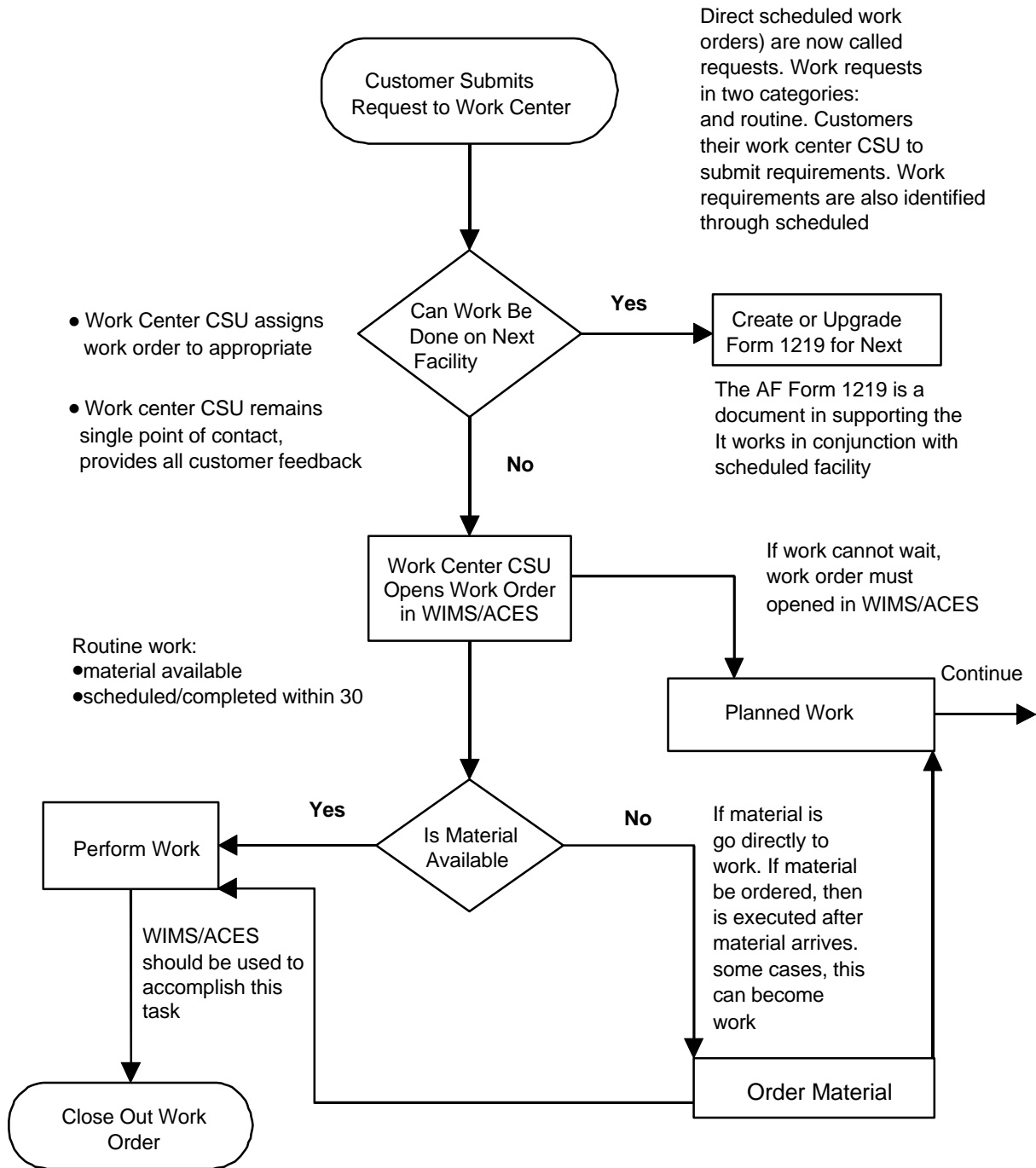
**How should the work be executed?** Is it an in-house work order, a contract project, an IDIQ project, a SABER project, or a small purchase effort? The cost estimate and type of work will impact this evaluation.

**Is the work approved/disapproved?** Is the work valid? The engineer and facility maintenance manager should provide an approval or disapproval recommendation.

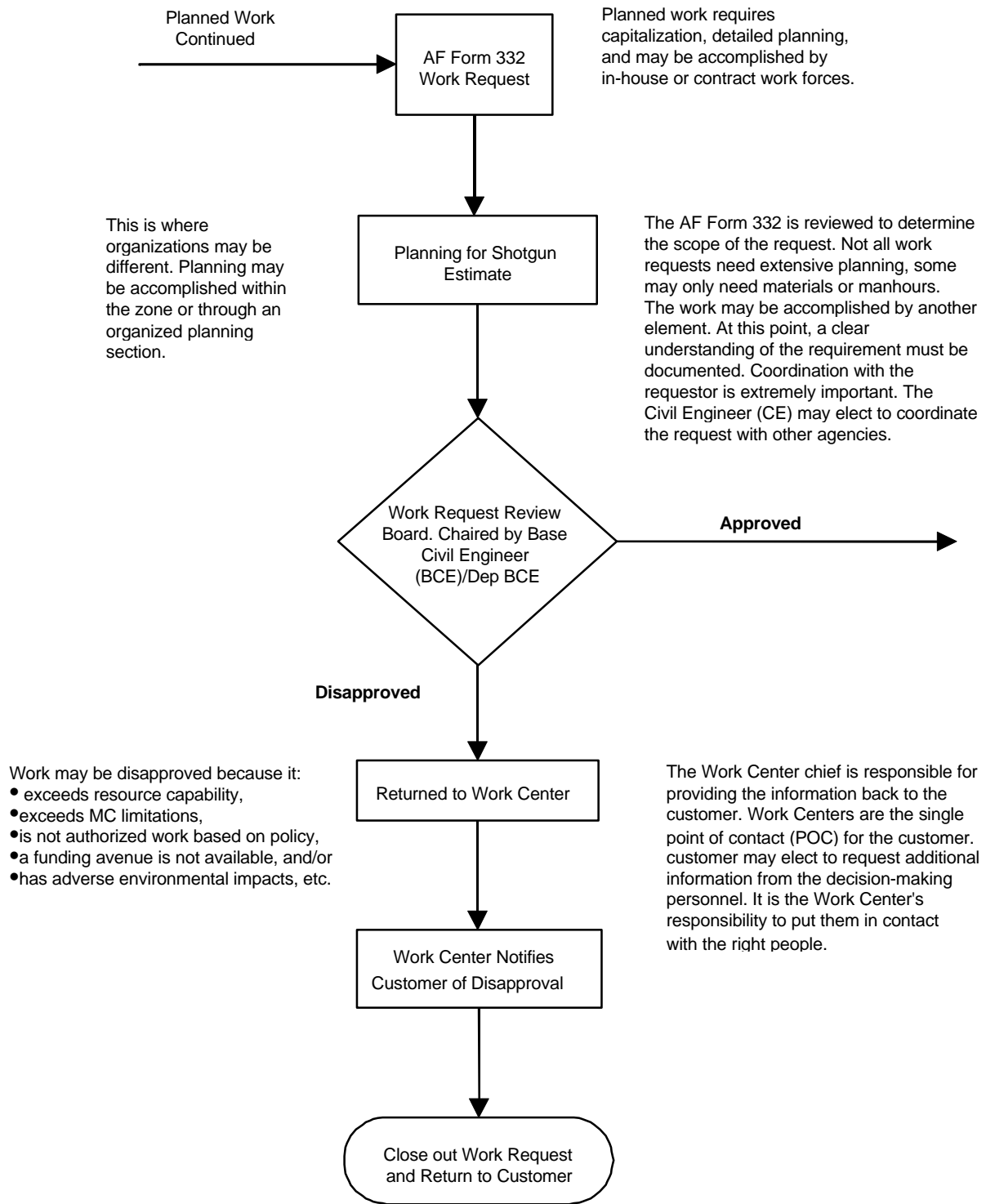
There are many methods of establishing and executing work order programs. These programs were developed and intended to provide equitable support to all base customers, implement and execute dedicated commitment dates, and follow commanders' priorities, and properly manage the workforce. A sound program improves the management of all CE resources.



Figure 1. Direct Scheduled and Routine Work Requests



**Figure 2. Direct Scheduled and Routine Work Requests (continued)**



## Chapter 4 Recurring Work Program Support

### 4.1 Work Program

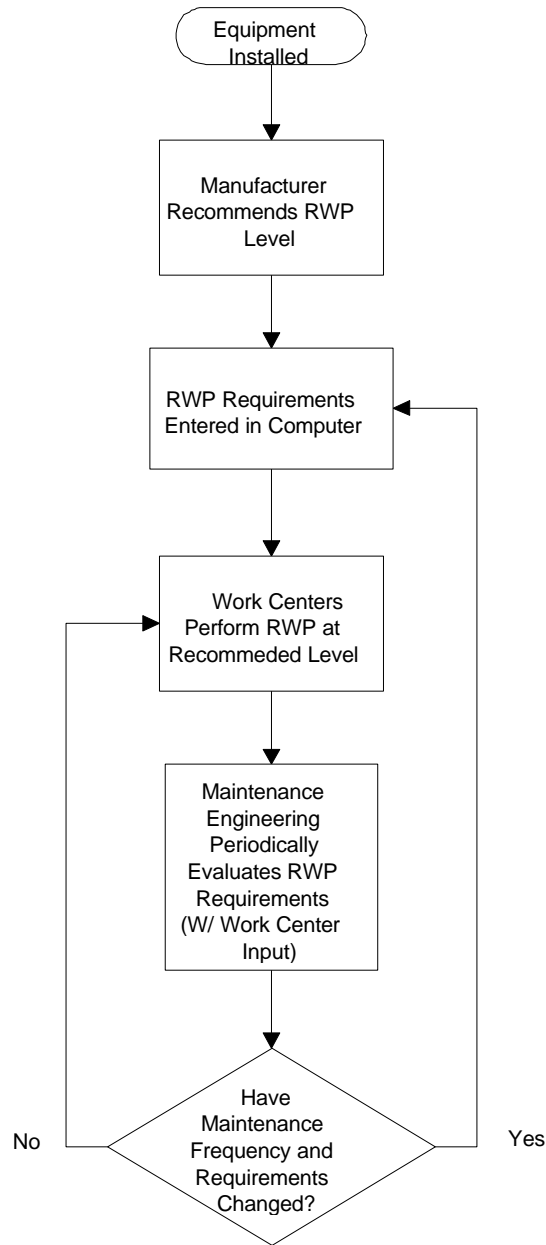
The recurring work program is a mission shared by all sections in the Operations Flight. The Infrastructure Support Element work centers manage and execute the day-to-day program. The Material Acquisition Element maintains the appropriate stock (either in the CE supply store or forward stores/work center stocks) to support the program. The Maintenance Engineering Element oversees the development of the program and assessments of its elements by periodically reviewing the requirements of the recurring work program and making recommendations to improve its effectiveness, efficiency, and manpower requirements. Figure 2, Performing Recurring Equipment Maintenance, illustrates this process for RPIE.

The recurring work program RWP applies to all routine, redundant, recurring work involving real property, RPIE, or systems and other equipment maintained by CE. By definition, its scope and frequency is well known, locations are well established, materials are available or not required, or it's a recurring service. Work includes operations, service work, and preventative maintenance. The scope and level of effort is known.

### 4.2 Work Analysis

Some RWP will be service- or operations-related. Other work, such as flightline sweeping or snow-removal, is a service provided by the horizontal work center of the Heavy Repair Element and, typically, listed as a work item in the RWP. However, most RWP will be preventative maintenance work, such as periodically replacing belts and filters on HVAC equipment. This type of RWP often requires Maintenance Engineering analysis support and, therefore, a close working relationship among all elements of the Operations Flight is desired. For additional discussion on analysis of the recurring work program see AFPAM 32-1004, *Volume 2 Maintenance Engineering*.

Figure 3. Performing Recurring Equipment Maintenance



## Chapter 5 Long-range Planning

### 5.1 Long-range Infrastructure Programs

The program engineers in Maintenance Engineering are the managers of the various infrastructure long-range programs. To make the programs work, the senior Infrastructure work center craftsmen must be involved in all facets of these programs. The craftsmen must support and be a team member of the facility evaluation group for the proper assessment of all assigned utility system and plants. Craftsmen should meet with the program engineers once or twice a month at a facility in conjunction with a 1219 inspection. The team performs a technical evaluation to include all Infrastructure Support Elements (HVAC, electrical, water/sewage). Deficiencies are identified, tagged, and an appropriate AF Form 332, Base Civil Engineer Work Request, prepared and worked into the multi-year infrastructure plans. The program engineer acts as the focal point for the program for organizing and managing the log and ensuring the requirements are closed out to the plans. The goal is to visit all major facilities in a year. The benefits of this team approach include mutual support and consultation, synergy, team identification, and improved coordination between engineer and work center technicians.

### 5.2 Major Programs

Most bases have a unique set of programs emphasizing regional, state, or command requirements. However, many programs are common throughout the Air Force and some are mandated. These programs cover the major utilities and plant systems and are in place at most bases:

- (1) water and wastewater systems,
- (2) HVAC systems and plants,
- (3) refrigeration management,
- (4) fire protection,
- (5) electrical distribution,
- (6) airfield lighting,
- (7) corrosion control  
cathodic protection and  
protective coatings,
- (8) industrial water treatment, and
- (9) informal programs.

The Infrastructure craftsmen and technicians must work closely with the Maintenance Engineering program managers, focusing on assessments and inputs for the continual improvement and refinement of these long-range infra-

structure plans. Additional information on each program is included in AFPAM 32-1004, *Volume 2 Maintenance Engineering*: program listings provide the type of inventory system and assessment methods used; as well as, a list of available references.

### 5.2.1 *Water and Wastewater Systems*

The water and wastewater systems program ensures this critical utility keeps flowing. The programs are often divided into water supply systems (potable, non-potable, and fire suppression) and wastewater removal systems (sanitary and storm). Systems include the piping/channels, connections, manholes, pumps and lift stations, and treatment plants. As the nation's conservation and environmental concerns grow, management pressures on these systems are expected to increase. Many communities have been pressed to upgrade their systems to reduce infiltration and inflow. A long-range plan for the upgrade of the systems will ensure the program engineer can support the increasing requirements.

### 5.2.2 *HVAC Systems and Plants*

HVAC management is the main mechanical program and includes all environmental systems: air conditioners, heat pumps, furnaces, boiler plants, central air conditioning (A/C) plants, and associated exterior distribution piping systems.

### 5.2.3 *Refrigeration Management*

Refrigeration management is a recent program. Bases use it as a tool to manage their dwindling inventory of critical refrigerants and develop appropriate plans for replacement of the equipment. Implementing an effective refrigeration management program means having or implementing an effective HVAC program.

### 5.2.4 *Fire Protection*

Infrequently, a base will require a fire protection engineer; usually, the mechanical engineer serves this purpose. The mechanical engineer, with system updates from the Infrastructure technicians, manages the base's fire protection systems to include the Aqueous Film Forming Foam (AFFF) systems in hangers, building sprinklers, status of fire extinguishers, emergency lighting and markings, and fire hydrants. The water and wastewater program engineer maintains the information on the hydrant system and the Fire Protection Flight maintains all remaining information to support this critical program.

### 5.2.5 *Electrical Distribution*

The electrical distribution program ensures that power (one of the primary mission utilities) continues to flow. The electrical distribution system involves the base power plants, main feeders, substations, primary circuits, transformers, generators, power lines, and, often, the circuits to the building circuit boxes. Also included are support systems such as oil pump stations. In recent years, polychlorinated biphenyls (PCBs) and energy conservation have placed an increased emphasis on this program.

The environmental impact of PCBs has required an inventory and replacement plan for all transformers using PCBs. PCB transformers must be treated as hazardous waste until purged. This plan should be jointly developed by the electrical systems work center and the program engineer and progress tracked through completion. An energy conservation plan should be developed for employing efficient electrical components and metering the maximum number of users to allow analysis of energy problems.

### 5.2.6 *Airfield Lighting*

The crux of the base mission is the airfield. Supporting airfield lights and other visual air navigation systems is, therefore, a primary concern of CE units. The systems include all substations, circuits, light systems, and vaults associated with lighting. The program engineer should also maintain a base lighting program to support those circuits and systems of both airfields and roads.

### 5.2.7 *Corrosion Control*

The annual corrosion cost in the US is estimated to be about \$150 billion. The cost to the Air Force Civil Engineer is estimated at \$500 million (\$3-4 million at an average base; 1984 dollars). Controlling this corrosion is a primary concern of CE. Corrosion control programs usually consist of two primary components: cathodic protection and protective coatings.

### 5.2.8 *Cathodic Protection*

Underground metal structures, primarily steel, corrode rapidly because they are exposed to many electrochemical environments. Cathodic protection is the system of providing cathodic potential to the structure preventing the electrochemical corrosion. This can be done by sacrificial anode or the impressed current system.

The sacrificial anode is a metal/alloy anode (electrochemically more active than the structure) buried in the same underground environment and connected to the structure. The anode undergoes the corrosion and, at the same time, sends

a current increasing cathodic potential of the structure, preventing corrosion of the structure.

In the impressed current system, an external direct current (DC) power source provides a current to the structure and the surrounding environment. This current increases cathodic potential of the structure, preventing corrosion of the structure.

**NOTE**

The DC power source transmits the current through expendable anodes. They corrode through this process and must be replaced.

### 5.2.9 *Protective Coatings*

The primary purpose of the protective coatings program is to separate the underground metal structure from the electrochemical environment. Along with the necessity to maintain this type of protective coatings program, the program engineer needs to maintain and manage a general protective coatings plan for all base structures.

One other corrosion control method, less common but used throughout the Air Force, is environment alteration. This method alters the electrochemical environment by changing temperature and water levels and adding corrosion inhibitors or chemical catalysts to prevent the corrosion.

### 5.2.10 *Industrial Water Treatment*

The electrochemical effect, opposite of corrosion, on CE systems is scale buildup. This buildup normally occurs in systems using heated water or steam (for example, boilers, heat plants, hot water piping, cooling towers). Scale causes significant energy efficiency losses in the heating systems and can stress and deteriorate the systems in turn. CE prevents this scale by treating the industrial water used with scale inhibitors or chemicals to react with the scaling compounds. When there is a buildup of the scale, it is usually removed with acidic washes or physical chipping. The industrial water treatment program engineer manages the treatment systems and scale removal.

### 5.2.11 *Informal Programs*

Many bases have small, informal programs to support base-specific concerns and initiatives. These programs are rarely regulated, but require some expert management. Most are managed either with a series of folders or a marked-up map. They are, rarely, supported with spreadsheets. Systems included in general programs are the natural gas distribution system, liquid fuels storage and distribution,



grounding and lightning protection, alarm systems, emergency generators, aircraft barrier systems, and backflow prevention.

The program engineer, along with the responsible infrastructure technicians, should know the extent of the inventory, the condition of the systems, and the requirement for replacement. Environmental concerns such as underground and above ground fuel storage tanks; petroleum, oil, and lubrication (POL) delivery systems; and water treatment often require a detailed inventory, condition assessment, and long-range improvement plan. A program engineer or infrastructure technician usually manages these activities.

Aircraft arresting barriers systems are maintained and managed in the power production work center and frequently require an engineer POC to provide liaison with the base Major Command (MAJCOM) and Air Staff leadership and advocate for program funds. The power production section is responsible for performing aircraft arresting system inspection, maintenance, and repair in compliance with the frequency and direction provided by the technical orders (TO) for all systems at the base. AFI 32-1043, *Managing Aircraft Arresting Systems*, and ACCI 32-16, *Operation and Maintenance of Aircraft Arresting Systems* provide detailed guidance for the O&M of installed barriers.

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## Attachment 1 Glossary of References and Supporting Information

### References

ACCI 32-16, *Operation and Maintenance of Aircraft Arresting Systems*  
 AFI 32-1001, *Operations Management* (replaces AFI 32-1031)  
 AFI 32-1110, *Planning and Programming Real Property Maintenance Projects Using Appropriated Funds* (replaces AFI 32-1032)  
 AFI 32-1043, *Managing Aircraft Arresting Systems*  
 AFMC, *Infrastructure Condition Standards*  
 AFMS 44EO, *Manpower Standards*

### Abbreviations and Acronyms

3E5X1	the engineering AFS
A/C	air conditioning
A-76 Action	Process, under OMB Circular A-76, under which core responsibilities are contracted
AAFES	Army and Air Force Exchange Service
A&E	architect and Engineer - most commonly referring to the contract firms
ABO	air base operability
ACES	Automated Civil Engineer System
ADD	agreed delivery data
AF/CE	Air Force/Civil Engineer
AFCESA	Air Force Civil Engineer Support Agency, Tyndall AFB FL
AFFF	Aqueous film forming foam - the fire-fighting agent often used in hanger systems
AFI	Air Force Instruction
AFIT	Air Force Institute of Technology, Wright Patterson AFB OH
AFMAN	Air Force Manuals
AFMS	Air Force Manpower Standard
AFO	Accounting & Finance Office
AFPAM	Air Force Pamphlets
AFS	Air Force specialty (formally called AFSC - AFS Code)
AKA	also known as
BBE or BEE	Base Bio-Environmental Engineer
BCAS	Base Contracting Acquisition System
BCE	Base Civil Engineer
BCP	Base Comprehensive Plan (replaced by the Base General Plan)
BEAMS	Base Engineer Automated Management System - an older CE database system
BPA	blanket purchase agreement
BTU	British thermal units - a measurement of energy
BUR	built-up roofing system
CA/CRL	custodial account/custody receipt listing
CADD	computer aided design and drafting, a computer-based program that organizes drafting and design functions to produce high-quality facility drawings.
CALT	contracting administrative lead-time
CAS	Condition Assessment Survey, a DoD program to objectively assess and evalu-

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	ate DoD facilities for developing CAS
CATV	cable television
CBA	cost/benefit analysis
CDR	contract deficiency report, a report of substandard contract performance
CDS	career development center
CE	Civil Engineer
CEC	office symbol for the CE Engineering Flight
CEMAS	Civil Engineer Material Acquisition System
CFA	Commanders' Facility Assessment (replaced by Facility Investment Metric)
CFETP	career field education and training plans
CIAPS	Customer Integrated Automated Procurement System
CMSgt	chief master sergeant
COCESS	Contractor Operated Civil Engineer Supply Store
CSL	CEMAS Stock List Number
CSU	customer service unit
CWM	cost work order materials
CWON	Collection Work Order Number
DC	direct current
DDC	direct digital control
DIFM	due in from maintenance
DIN	do it now
DIRK	direct input reject key
DoD	Department of Defense
DOLI	date of last inventory
DOLT	date of last transaction
DPMIAC	Defense Pest Management Information Analysis Center
DRMO	Defense Reutilization Marketing Office
DSWO	Direct Scheduled Work Order
DVEP	Disease Vector Ecology Bulletins
ECIP	Energy Conservation Investment Program
EDD	estimated delivery date
EEIC	Element Of Expense/Investment Code
EMCS	Energy Management Control System
EMIS	Environmental Management Information System
EOD	end of day
EPS	Engineering Performance Standards
ESPC	Energy Savings Performance Contract
FAD	force activity designator
FAR	federal acquisition regulations
FCA	fund cite authorization
FEDLOG	Federal Logistics Data
FEMP	Federal Energy Management Program
FIM	Facility Investment Metric
FOB	found on base
FSC	Federal Supply Class
FSDC	Fire Safety Deficiency Code

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GIS	graphic information system, a linking of database data with CADD drawings
GOCESS	Government Operated Civil Engineer Supply Store
GOQ	general office quarters
GSA	General Services Administration
HM	hazardous material
HMP	Hazardous Material Pharmacy
HVAC	heating, ventilation, and air conditioning
ICS	Infrastructure condition standard
IDIQ	indefinite delivery/indefinite quantity, a type of contract
IEC	Issue Exception Code
IEU	individual equipment unit
IL	identification list
IMPAC	International Merchant Purchase Authorization Card
IPM	integrated pest management
IWT	industrial water treatment
LP	local purchase
M&R	maintenance and repair
MADJ	Adjective File
MADT	Adjective Type File
MAJCOM	Major Command
MC	minor construction
MCP	see MILCON
MCPAM	man-hour ceiling/priority analysis method to prioritize RWP work items
MCRL	master cross reference list
MDF	material documentation folder
MFH	military family housing
MILCON	Military Construction Program (previously known as MCP)
ML-C	management data listing
MNAD	Noun Additional Description File
MNON	Noun File
MRA&C	maintenance, repair, alteration, and condition
MRL	material requirements list
MRTSUD	Rejected Transaction Suspense Program
MSDS	material safety data sheet
MSYN	Noun Synonym File
MTL	master task list
NAF	non-appropriated funds
NIIN	National Item Identification Number
NIST	not-in-stock ticket
NPI	non pre-priced
NPL	non-price listed
NSN	National Stock Number
O&M	operations and maintenance
ODBC	open database connectivity, a structure enabling communications between databases
OPR	office of primary responsibility

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OSD	Office of the Secretary of Defense
PCB	polychlorinated biphenyl, a hazardous additive to some oils used as coolants in transformers
PCN	Product Control Number
PD	pier delivery
PDO	Publishing Distribution Office
PFMR	Project Funds Management Record
PHM	potentially hazardous material
PIIN	Purchase Information Identification Number
PM	preventative maintenance
PMD	property movement document
PO	purchase order
POC	point of contact
POF	Purchase Order File
POL	petroleum, oil and lubricants, AF term for organizations and systems that manage any fuel or oil-based materials
PWS	performance work statement
QAE	quality assurance evaluators, QAEs monitor service contracts.
QASP	quality assurance surveillance plan
QUP	quantity unit pack
RAC	risk assessment criteria
RC	responsibility center/cost center
RCCC	Responsibility Cost Center Code
RDD	required delivery date
RFQ	request for quote
RHA	residue holding area
RIEI	Roofing Industry Educational Institute
RIF	reduction in force
RMS	recurring maintenance schedule
RPIE	real property installed equipment, equipment CE physically installs and maintains as part of a facility
RVP	reverse post
RWP	recurring work program
SABER	simplified acquisition of base engineering requirements, IDIQ contract that performs minor construction and repair.
SBSS	Standard Base Supply System
SFM	specialty function manager
SHC	self-help center
SMART	structural maintenance and repair team
SMSgt	senior master sergeant
SOQ	senior officer quarters
SOW	statement of work
SQL	structured query language, a method for communicating between databases
SSAN	Social Security Account Number
TA	Tables of Allowances
TIB	Technical information bulletins

TIN	turn-in
TLQ	temporary lodging quarter
TO	technical order
UGT	upgrade training
UJC	Urgency Justification Code
UND	urgency of need designator
URMT	utility rates management team, an AFCESA team to support base utility engineers
WIMS	Work Information Management System, the current CE database management system
WO	work order
WRRB	Work Request Review Board (also known as WORB, Work Order Review Board)

## Terms

<b>1219 visit --</b>	The periodic facility visit performed by a work center to identify routine work requirements and schedule a follow-on repair visit by the work center crafts. Known as the 1219 visit due to the use of the AF Form 1219, Base Civil Engineer (BCE) Multi-Craft Job Order.
<b>acquired land --</b>	Land obtained from any private or public source other than land withdrawn from the public domain.
<b>acquisition --</b>	Obtain, use, or control real property or an interest in real property by purchase, condemnation, donation, exchange, leasing, revestment, or recapture.
<b>Air Force proponents --</b>	Air Force major command, installation, other component or other agent designated to act on behalf of the Air Force, responsible for initiating or carrying out the proposed real property acquisition.
<b>annexation --</b>	A procedure by which a municipality; such as a city, town, or village, incorporates Air Force land within the corporate limits of the municipality. Procedures vary depending on state law.
<b>as-builts --</b>	Original facility design drawings (or replacement master drawings or the master computer aided design and drafting (CADD) drawing file). Civil Engineer units use these drawings to document all as-built conditions of a facility and modifications as they occur over the years.
<b>Base Civil Engineer --</b>	Senior-ranking base engineer in the Civil Engineer unit.

<b>blanket purchase agreement (BPA) --</b>	A simplified method of filling anticipated repetitive needs for small quantities of supplies. This agreement is designed to reduce administrative cost in making small purchases by eliminating the need for issuing individual purchase documents. The government is obligated only when a call is placed against it.
<b>blue-line drawings --</b>	Copies of the original as-built or design drawings used for daily work.
<b>BPA call --</b>	An action initiated by a Civil Engineer Material Acquisition System (CEMAS) buyer or an authorized individual to order supplies from firms that have been awarded a blanket purchase agreement.
<b>CEMAS store work order --</b>	A special collection work order (usually work order 00011) with work center code, cost center, cost account code, and EEIC agreed upon to be used to collect the cost of material purchased and maintained in the store.
<b>CEMAS monitor --</b>	The chief of Material Acquisition or designated representative who will interface between Base Contracting, Base Supply, and Accounting and Finance.
<b>CEMAS stocked items --</b>	Items identified or approved by the chief of Material Acquisition to be stocked for recurring demands. Approval is based on demand history, funding availability, and storage limitation.
<b>CEMAS stock list (CSL) --</b>	A unique number assigned to individual items listed in the noun dictionary.
<b>certificate of necessity --</b>	A written statement, signed by Deputy Assistant Secretary of the Air Force for Installation (SAF/MII), which certifies it is necessary (for reasons vital to the national security) for the Air Force to exceed the statutory cost limits established in AFI 32-9001 relative to annual rent or alterations, improvements, and repairs to leased buildings.
<b>cession --</b>	Ceding or yielding by a state of its legislative jurisdiction over government-controlled real property to the federal government.
<b>clearance easement --</b>	The right to remove or prevent obstructions rising into the airspace. Examples are easements over areas beyond the ends of an airfield runway (approach or departure clearance zones). Also, easements adjacent to the sides of the runway (transition zones), clearance for approach lighting sites, communication sites, etc. A clearance easement, specifically, does not include the right of aircraft passage over the land, so the landowner may separately recover for loss of value to his or her land due to low and frequent flights of aircraft.

<b>commercial facilities (industrial-type) --</b>	Air Force-owned and -operated facilities housing a function that could be done by private industry, such as motor repair shops, laundries, bakeries, ice cream manufacturing plants. (Exceptions are base exchanges, commissaries, and other non-appropriated fund activities.)
<b>condemnation --</b>	A judicial proceeding started by the government through the Department of Justice for the purpose of exercising its right of eminent domain. Condemnation results in passage of title and land to the government with or without the consent of the landowner, but with just compensation paid to him or her.
<b>consideration --</b>	Compensation or an equivalent (such as money, material, or services) that is given for something acquired or promised. This may be the appraised fair market value of the real property or may include protection of the real property against loss by fire, water, or other causes, or any mutually agreeable arrangement that does not conflict with governing statutory limitations.
<b>core requirements --</b>	Process oriented descriptions which describe the tasks needed to support Maintenance Engineering.
<b>declaration of taking --</b>	A pleading filed with a federal court of law in a real property condemnation proceeding whereby, on filing the pleading, together with deposit of estimated "just compensation" in the court, the real estate interest is vested in the government.
<b>declaration of excess --</b>	A narrative description of real property that is no longer required for foreseeable Air Force missions. The declaration contains an identification of the land, type of governmental real estate interest, facility inventory information, recommended disposal dates, re-use rights, and services, obligations, and outgrants outstanding (see AFI 32-9004).
<b>direct scheduled work order --</b>	Emergency or essential work generally not requiring detailed planning, also known as job orders.
<b>direct digital control --</b>	Any control system (HVAC, alarms, lighting, or otherwise) using entirely solid-state (digital) components.
<b>District Engineer --</b>	One of the several Division Engineers, US Army Corps of Engineers, who supervise the activities of certain District Engineers and are the intervening management level between the Chief of Engineers and District Engineers (e.g., US Army Engineer Division, North Atlantic, CENAD).



<b>easement --</b>	The right to use the land of another for a specified purpose. Usually, the owners of the land continue in possession and may use it as long as such use does not interfere with the purpose for which the easement was granted. An easement may be acquired for a specific term or in perpetuity. An easement differs from a license because: the privilege granted usually cannot be withdrawn during its term and it is considered to be a permanent interest in the property if the term exceeds one year.
<b>emergency work --</b>	Work that must be accomplished immediately.
<b>eminent domain --</b>	The right of the government to take private property for public use upon payment of just compensation.
<b>Energy Conservation Investment Program (ECIP) --</b>	A Military Construction (MILCON)-funded program primarily intended for accomplishing energy conservation retrofits of existing buildings. It includes construction of new, high-efficiency energy systems and modernization of existing systems. ECIP is an OSD centrally-managed program.
<b>Energy Savings Performance Contract (ESPC) --</b>	Contracting with a private sector company for completion of energy audits and installation of energy conservation projects. This provides a method to acquire energy conservation projects with no AF resources and without payment if savings do not result.
<b>Energy Management Control System (EMCS) --</b>	The civil engineer energy control system that historically manages heating, ventilation, and air conditioning (HVAC) systems. It differs from direct digital control in that it includes both solid state systems and the older pneumatic systems.
<b>engineers --</b>	Any engineer in Civil Engineer units to include the Base Civil Engineer, the Maintenance Engineer, program engineers, and project engineers.
<b>environmental assessment --</b>	A document, occurring early in the planning process, for evaluating the potential environmental impact of a proposed action. An assessment covers the same topical areas as an environmental impact statement (EIS), but with less detail. An assessment results in a decision that an EIS is necessary, or that the proposed action will have no significant effect, therefore, a finding of no significant impact (FONSI) can be made (AFI 32-7004).

<b>environmental impact statement --</b>	A detailed full-disclosure report which, pursuant to the National Environmental Policy Act (NEPA) of 1969, (42 U.S.C. 4321-4347), identifies and analyzes the anticipated environmental impact of a proposed Air Force action and discusses how the adverse effects of the proposal will be mitigated. It is prepared in two stages: a draft statement which is filed with the Environmental Protection Agency (EPA) and made available to the public for comment and a final statement which is revised to reflect comments made on the draft EIS (AFI 32-7004).
<b>essential work --</b>	Work that cannot wait for the next 1219 visit.
<b>expanded clear zone easement --</b>	The right to prohibit all uses of land, within 3,000 feet of the runway threshold and extending 1,000 to 1,500 feet on each side of the runway center line extended, that are incompatible with or could impede, aircraft operations. For additional guidance see AFI 32-7003.
<b>facility investment metric (FIM) --</b>	An Air Force facilities requirements identification program to assess facilities based on mission priority; used to develop funding priorities.
<b>Federal Energy Management Program (FEMP) --</b>	An OSD, centrally-managed program for projects less than \$300K. Projects accomplish energy conservation retrofits of existing buildings or new construction plus energy audits, designs and metering programs. It includes construction of new, high-efficiency energy systems and modernization of existing systems.
<b>fee ownership --</b>	Title to real property belonging to a person or the government where full and unconditional ownership exists. Such ownership does not necessarily include mineral rights.
<b>floodplain --</b>	The 100-year floodplain is the lowland area adjoining inland and coastal waters, including flood prone areas of offshore islands that would be inundated by the base flood. The critical actions (or 500-year) floodplain is the area that would be inundated by a 500-year flood. (See AFI 32-7003.)
<b>functional squadron --</b>	Pre-1992 squadron structure, functionally oriented, it collocated like-functions and distribution portions of the missions and objectives to these functional shops.

<b>general purpose space --</b>	Space in buildings and associated land under the assignment authority of the General Services Administration (GSA) which GSA has found to be suitable for use by federal agencies, generally. The following categories of space are excluded: space in any building in a foreign country; space in any building on the grounds of a military or Coast Guard installation; space in airports; and special purpose space, as defined in GSA Federal Property Management Regulations (41 CFR 101, subpart 101-18.104-1).
<b>grantee --</b>	One to whom a grant is made.
<b>grantor --</b>	The person by whom a grant is made; a transferor of property.
<b>GSA reimbursables --</b>	These are special services, beyond the standard levels of service normally provided by GSA, for which the Air Force must reimburse GSA.
<b>GSA rent --</b>	Formerly called "standard level user charge (SLUC)," a rate charged by GSA for assigned space in government-owned or -leased property for which GSA has the assignment responsibility. The user charge approximates commercial charges for comparable space and services.
<b>GSA space --</b>	Space in buildings owned or leased by GSA and assigned to an Air Force or other federal government activity. This space includes land incidental to the use of the space.
<b>hazardous substance --</b>	This term is defined in CERCLA, 42 U.S.C. 9601 (14). For the purposes of this handbook it includes petroleum, petroleum products, oil, and lubricants (POL).
<b>holding area --</b>	A storage area for work order materials awaiting scheduling.
<b>industrial facility --</b>	Any Air Force -owned, -leased, or -controlled real property facility which is used by a contractor for the purpose of fulfilling government research, development, test, evaluation, production, maintenance, or modification contracts or for the storage of production machinery and equipment in support of such activity.
<b>infiltration and inflow (I/I) --</b>	Amount of water that seeps into a sanitary or storm sewer system, increasing the load on the fixed capacity pipes and treatment systems downstream.

<b>ingrants --</b>	Documents such as licenses, leases, permits, temporary easements, foreign base rights agreements, and treaties, under which the Department of the Air Force acquires an interest in, or control of, real property in less than fee ownership.
<b>jurisdiction --</b>	See legislative jurisdiction.
<b>lease --</b>	A conveyance of exclusive possessory interest in real property for a specified term in return for payment of rent or other consideration to the owner.
<b>legislative jurisdiction--</b>	This term, as used in this instruction in connection with a land area, means the power and authority of the federal government to legislate and to exercise executive and judicial powers within the area.
<b>lessee --</b>	One who possesses the right to occupy real property under a lease.
<b>lessor --</b>	One who holds title to, and conveys the right to use and occupy, a property under a lease.
<b>license --</b>	A privilege that can be withdrawn at will, to use or pass over a licensor's real property for a specific purpose (e.g., right-of-entry for survey and exploration, right-of-entry for construction, tree topping). Licenses merely confer a privilege to occupy real property at the sufferance of the owner. Licenses granted to other federal agencies are called permits.
<b>life-cycle cost --</b>	Primary criteria to be used for design (mandated by the Department of Defense); criteria of analyzing the cost over the life span of a component or system to ensure all costs are used (purchase prices, construction costs, maintainability, efficiency, reliability, etc.).
<b>long-range plan --</b>	Multi-year plan for projects to support a specific infrastructure element, originally termed "5-year Plan," many bases and commands have converted to "6-year Plans" to match the two-year programming cycle.
<b>maintainability --</b>	Characteristic of a system describing the ease or frequency of maintenance, highly maintainable systems cost less to maintain.
<b>maintenance engineer --</b>	Chief of Maintenance Engineering.
<b>MicroPaver --</b>	Automated system used to inventory and analyze pavements.
<b>mobilization --</b>	The process by which the Armed Forces or part of them are brought to a state of readiness for war or other national emergency. This includes activating all or part of the Reserve Components as well as assembling and organizing personnel, supplies, and material.

<b>National Capital Region (NCR) --</b>	For purposes of this instruction only, a region encompassing the District of Columbia; Montgomery and Prince George's Counties in Maryland; Arlington and Fairfax, counties in Virginia; and the cities of Alexandria, Fairfax, and Falls Church in Virginia.
<b>nonindustrial facility --</b>	A unit of real property (other than DoD real property), including improvements. Nonindustrial facilities include hotels, motels, resort facilities, educational institutions, hospitals, office buildings, and other real property that can be used for military purposes. These type of facilities are not used or suitable for production or maintenance of materials, munitions, equipment, supplies, goods, and other products for military or civilian use ocean terminals.
<b>non-MRL items --</b>	Items not included in an established material requirements list (MRL). Most Contractor Operated Civil Engineer Supply Store (COCESS) contracts require the item be added to the MRL before the contractor provides the item.
<b>non-pre-priced items (NPI) --</b>	An item obtained for Air Force use by a COCESS contractor for which there was no prior solicited and agreed costs.
<b>noun dictionary --</b>	An item record list which includes item description, pricing history, demand data, and inventory data for each item loaded in CEMAS.
<b>offer of gift (donation) --</b>	Voluntary offer to transfer or convey to the government an interest in real property without payment or consideration of any kind by the government (AFI 51-601).
<b>objective squadron --</b>	Post-1992 squadron structure, objective-oriented, it purposes to collocate all functions necessary to support a mission or objective.
<b>operations specialists --</b>	The Air Force specialty created to support the scheduling and controlling of the Civil Engineer work forces; also known as work force manager, controller, triple-nickel, production controller, and scheduler.
<b>option to purchase --</b>	A contract whereby the owner of the real property gives the government the right to acquire an interest in the property at a stated price during a specified period of time. An offer to sell property, unsupported by any consideration, is not considered an option, and it may be withdrawn at anytime (10 U.S.C. 2677).

<b>outgrants --</b>	Documents such as leases, licenses, easements, joint-use agreements, and other agreements (including use agreements) under which the government's interest in, or control of, real property, as exercised through the Department of the Air Force, is modified by conferring rights therein to another government agency, nonfederal entity (such as a state or local government), or a private party (for such use as grazing livestock). (See AFI 32-9003.)
<b>overhires --</b>	Non-permanent employees hired to fulfill a specific purpose who does not fill an authorized position on the unit manning document, but is paid from civilian pay accounts and counts against the unit work-year ceiling
<b>palace acquires--</b>	Apprentice engineers hired by Air Force Personnel Center and managed on a central manning document; Major Commands and bases commit to a three-year training program and final job placement within the command
<b>permit --</b>	A nonpossessory right of exclusive or nonexclusive use of real property. When granted to a party other than a federal agency, it generally covers a one-time use and is called a "license." However, the term also is used to describe an authorization to use property under the jurisdiction of one government agency by another for a definite period. These two uses of the term must not be confused.
<b>pre-priced items --</b>	These are commonly used items where prices have been previously determined. This is basically what the COCESS contracts have been awarded on. The contractor agrees to provide particular items at a specified price.
<b>pre-priced blanket purchase agreement --</b>	Pre-negotiated BPAs established with vendors that identify specific items to be purchased at specific prices for a specific period of time. These are primarily used to reduce administrative cost and buyer time for purchasing high usage items such as CEMAS store stock.
<b>preventative maintenance --</b>	Recurring work performed to safeguard and/or extend the efficient and effective lifespan of real property, RPIE, or other equipment items.
<b>program engineers --</b>	Engineers of Maintenance Engineering, so termed because they manage infrastructure programs.
<b>project engineers --</b>	Engineers of the Engineering Flight, so termed because they manage projects (design and construction).

<b>project --</b>	As related to real estate acquisition activities, a project is a real property acquisition action, or related actions, at an Air Force installation to fulfill a known requirement. Related real property actions that constitute a complete project are processed simultaneously. (For example: The acquisition of land for an ammunition storage project usually involves the acquisition of fee ownership for the land area used to construct storage facilities and restrictive easements over an adjacent safety area.)
<b>public domain --</b>	Land originally acquired by the United States from foreign governments and which has never left United States ownership. It is administered by the Department of the Interior.
<b>public lands --</b>	Any land and interest in land owned by the United States within the states and administered by the Secretary of the Interior through the Bureau of Land Management without regard as to how the United States acquired ownership. The term excludes lands located on the outer Continental Shelf and lands held for the benefit of Indians, Aleuts, and Eskimos (43 U.S.C. 1702 (e) (see withdrawn land).
<b>purchase request abstract --</b>	CEMAS-generated LP requisition document used to request purchase of BCE items by the buyers.
<b>purchase order --</b>	A document authorizing a vendor to deliver BCE materials.
<b>real property --</b>	Lands, buildings, structures, utilities systems, improvements and appurtenances thereto. Includes equipment attached to and made part of buildings and structures (such as heating systems), but not movable equipment (such as plant equipment).
<b>real estate directive --</b>	A request to another federal agency (e.g., Office of the Chief of Engineers, US Army Corps of Engineers, Department of the Army or Naval Facilities Engineering Command, Department of the Navy or Bureau of Land Management, US Department of the Interior) to act on a real estate matter on behalf of the Air Force.
<b>real estate --</b>	See real property.
<b>recurring work --</b>	Routine, redundant, recurring work involving real property, real property installed equipment (RPIE), or systems and other equipment maintained by CE; scope and frequency is well known, locations are well established, materials are available or not required.

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<b>red-line drawings --</b>	Marked-up drawings (typically blue-lines) indicating changes to facilities and as-built conditions, used to update as-built drawings.
<b>release --</b>	See CERCLA, 42 U.S.C. 9601 (22).
<b>reliability --</b>	Characteristic of a system that describes its anticipated lifespan and performance.
<b>rent, nominal --</b>	A rental consideration of a token amount in money or services. Generally, it involves a rental payment of \$1.00 per year. Nominal rental also means a consideration completely unrelated to the actual or fair market value of the leased property.
<b>request and authority to cite funds --</b>	Base Contracting is provided a quarterly dollar target against which Base Civil Engineer local purchase items are obligated. The availability is certified by Accounting and Finance and the target amount is administered by Base Contracting. The Civil Engineer Funds Management Section should provide a complete AF Form 616, Fund Cite Authorization, to Base Contracting no later than the first working day of the quarter.
<b>residue holding account --</b>	An account for maintaining accountability of excess material after completing a work order.
<b>restrictive safety easement --</b>	The right to restrict the erection of habitable buildings, the congregation of people, or other activities within a specified safety clearance distance of munitions storage areas, armed aircraft and explosives-related facilities (see AFI 91-409).
<b>retrocession --</b>	The act of giving back to a state all or part of the federal legislative jurisdiction formerly enjoyed by the government.
<b>right-of-way easement --</b>	The right to pass over the land of another for a specific purpose. Such use could be for constructing a road, installing pipelines, pole lines, or telephone cables, etc.
<b>right of entry --</b>	The temporary right to enter on real property for a specified purpose without acquiring any estate or interest in it.
<b>service contract --</b>	A contract for nonpersonal services, executed under the Armed Services Procurement Act of 1947, where the contracting party agrees to perform some service for the Air Force and the Air Force agrees to pay for such service. In performing the service, the contractor may use real property in which he or she has an interest, even to the extent of permitting the Air Force to go on the property in a nonexclusive manner.
<b>SLUC --</b>	Standard Level Users Charge (see GSA rent).



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<b>stay-in-schools --</b>	Temporarily hired employees who work a portion of the work week and attend school the rest of the week; are overhires and do not count against a manning document, pay comes from paid civilian pay and hours count against the unit work-year ceiling
<b>space, special purpose --</b>	Space in buildings not under assignment responsibility of the General Services Administration, including land incidental to the use thereof, that is fully or predominantly used for the special purposes of an agency having custody of such space and generally not suitable for use by other agencies. Examples of such space include computer centers, hospitals, laboratories, mints, penal institutions.
<b>space, general purpose --</b>	Space in buildings under assignment responsibility of the General Services Administration, including land incidental to the use thereof, that the GSA has determined to be suitable for use by federal agencies generally, <b>except:</b> space in buildings on installations of the Department of Defense or the Department of Transportation (US Coast Guard facilities) and any space designated by the GSA as special purpose space in 41 CFR 101, subchapter D, subpart 101-18.104-1.
<b>stock record account number (SRAN) --</b>	An accountable stock record account established for the Civil Engineer Material Acquisition Systems (CEMAS).
<b>storage --</b>	The holding of hazardous substances for a temporary period prior to the hazardous substances being either used, treated, transported, or disposed.
<b>subordination agreement --</b>	An agreement whereby the owner of a real estate interest (including subsurface oil, gas and mineral rights) agrees to suspend or limit the exercise of all or part of his or her ownership rights under specified terms and conditions (usually to avoid interference with governmental use of the surface or operations).
<b>suspension agreement --</b>	Suspension by lease of an individual's grazing or mineral rights in public land or state-owned lands.
<b>urban centers --</b>	These are the cities and standard metropolitan statistical areas (SMSA). General Services Administration is the sole leasing authority for obtaining general purpose space in these areas.

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<b>value (current, fair, and estimated) --</b>	As used in this regulation, these terms mean current fair market value or current fair market rental value, as appropriate. Fair market value is the amount in cash, or on terms reasonably equivalent to cash, for which the property would be sold by an owner, willing but not obliged to sell, to a purchaser who desires, but is not obliged, to buy. Fair market rental value of a property is the amount that, in a competitive market, a well-informed and willing lessee would pay and that a well-informed lessor would accept for the use and occupancy of the property for a particular term.
<b>vault --</b>	Storage location of base as-built and Base Comprehensive Plan drawings, so termed because many bases originally stored these drawings in a vault for physical security.
<b>wetlands --</b>	Areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally-saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas such as mud flats, natural ponds, potholes, river overflows, sloughs, and wet meadows. Wetlands may be, but are not necessarily, located in floodplains (AFI 32-7005).
<b>withdrawn land --</b>	Public land that has been set aside or designated for a specific public purpose, such as a national park, wildlife refuge, or national defense use. Withdrawal of public lands generally has the effect of segregating such land from lease, sale, settlement, or other dispositions under the public land laws.
<b>work center(s) --</b>	Civil Engineering Operations maintenance teams organized to maintain and repair base facilities and infrastructure systems. Depending on the installation, these Centers can be classified as either shops, zones or a combination of both..
<b>work orders --</b>	Work requiring detailed planning or capitalization of the real property records.

## Attachment 2 Core Requirements

### PROCESS ORIENTED DESCRIPTION INFRASTRUCTURE SUPPORT

#### **A1E.1. RECEIVES TRAINING:**

A1E.1.1. RECEIVES CONTINGENCY TRAINING:

A1E.1.1.1. RECEIVES CATEGORY 1, CLASSROOM TRAINING.

A1E.1.1.2. RECEIVES CATEGORY 2, HANDS-ON TRAINING.

A1E.1.2. RECEIVES CERTIFICATION TRAINING.

#### **A1E.2. PROVIDES LOGISTIC SUPPORT:**

A1E.2.1. DETERMINES REQUIREMENT AND REQUESTS MATERIAL.

A1E.2.2. MAINTAINS WORK CENTER STOCK.

A1E.2.3. MANAGES WORK CENTER EQUIPMENT.

#### **A1E.3. PERFORMS SYSTEM OPERATION:**

A1E.3.1. OPERATES AIRCRAFT ARRESTING SYSTEM:

A1E.3.1.1. PERFORMS MA-1A POST-ENGAGEMENT OPERATION.

A1E.3.1.2. PERFORMS MA-1A ACTIVATION OR DEACTIVATION.

A1E.3.1.3. PERFORMS BAK-12 POST-ENGAGEMENT OPERATION.

A1E.3.1.4. PERFORMS BAK-12 ACTIVATION OR DEACTIVATION.

A1E.3.1.5. PROVIDES OPERATOR TRAINING.

A1E.3.2. OPERATES DIESEL OR GAS GENERATOR:

A1E.3.2.1. OPERATES EMERGENCY GENERATOR.

A1E.3.2.2. TRAINS BASE PERSONNEL ON GENERATOR.

A1E.3.2.3. REFUELS EMERGENCY GENERATOR.

A1E.3.3. OPERATES WATER DISTRIBUTION SYSTEM:

A1E.3.3.1. TAKES SAMPLE AND TESTS WATER.

A1E.3.3.2. PERFORMS CHEMICAL TREATMENT ON WATER SUPPLY.

A1E.3.3.3. OPERATES FIRE HYDRANT.

A1E.3.4. OPERATES WASTEWATER COLLECTION SYSTEM:

A1E.3.4.1. OPERATES OIL SEPARATOR VALVE.

A1E.3.4.2. PRETREATS WASTEWATER.

#### **A1E.4. PERFORMS REAL PROPERTY MAINTENANCE:**

A1E.4.1. PERFORMS MAINTENANCE ON EXTERIOR ELECTRICAL SYSTEM:

A1E.4.1.1. MAINTAINS OVERHEAD DISTRIBUTION SYSTEM.

A1E.4.1.2. MAINTAINS UNDERGROUND DISTRIBUTION SYSTEM.

A1E.4.1.3. MAINTAINS SUBSTATION.

A1E.4.1.4. MAINTAINS SWITCHING STATION.

A1E.4.1.5. MAINTAINS ELECTRICAL VAULT.

A1E.4.1.6. MAINTAINS CRITICAL EXTERIOR LIGHT.

A1E.4.1.7. MAINTAINS NON-CRITICAL EXTERIOR LIGHT.

A1E.4.1.8. MAINTAINS TRAFFIC LIGHT.

A1E.4.1.9. MAINTAINS ROTATING BEACON.

- A1E.4.1.10. MAINTAINS OTHER EXTERNAL ELECTRICAL SYSTEMS.
- A1E.4.2. PERFORMS MAINTENANCE ON AIRFIELD LIGHTING SYSTEM.
- A1E.4.3. PERFORMS MAINTENANCE ON AIRCRAFT ARRESTING SYSTEM:
  - A1E.4.3.1. MAINTAINS MA-1A.
  - A1E.4.3.2. MAINTAINS BAK-12.
- A1E.4.4. MAINTAINS GENERATOR:
  - A1E.4.4.1. MAINTAINS DIESEL GENERATOR.
  - A1E.4.4.2. MAINTAINS GAS GENERATOR.
  - A1E.4.4.3. MAINTAINS AUTOMATIC TRANSFER PANEL.
- A1E.4.5. PERFORMS MAINTENANCE ON LIQUID FUEL SYSTEM:
  - A1E.4.5.1. MAINTAINS TANK.
  - A1E.4.5.2. MAINTAINS VALVE.
  - A1E.4.5.3. MAINTAINS PUMP.
  - A1E.4.5.4. MAINTAINS PIPELINE.
  - A1E.4.5.5. MAINTAINS OTHER COMPONENT.
- A1E.4.6. PERFORMS MAINTENANCE ON GROUNDING AND LIGHTNING PROTECTION SYSTEM.
- A1E.4.7. PERFORMS MAINTENANCE ON ALARM SYSTEM:
  - A1E.4.7.1. MAINTAINS FIRE ALARM AND DETECTION SYSTEM.
  - A1E.4.7.2. MAINTAINS INTRUSION ALARM SYSTEM.
  - A1E.4.7.3. MAINTAINS ENVIRONMENTAL ALARM SYSTEM.
- A1E.4.8. PERFORMS MAINTENANCE ON SEWAGE SYSTEM:
  - A1E.4.8.1. CHECKS LIFT STATION AND MAIN CONNECTION.
  - A1E.4.8.2. LUBRICATES EQUIPMENT IN LIFT STATION.
- A1E.4.9. PERFORMS MAINTENANCE ON WATER DISTRIBUTION SYSTEM:
  - A1E.4.9.1. PERFORMS RECURRING WORK PROGRAM (RWP) FOR PUMP STATION.
  - A1E.4.9.2. PERFORMS RWP FOR WATER TREATMENT EQUIPMENT.
  - A1E.4.9.3. PERFORMS RWP FOR WATER STORAGE.
  - A1E.4.9.4. PERFORMS RWP FOR SWIMMING POOL.
- A1E.4.10. PERFORMS MAINTENANCE ON DELUGE SYSTEM:
  - A1E.4.10.1. CHECKS AND STARTS ENGINE.
  - A1E.4.10.2. CHANGES OIL AND LUBRICATES.
- A1E.4.11. PERFORMS MAINTENANCE ON CATHODIC PROTECTION SYSTEM.
- A1E.4.12. MAINTAINS FUEL GAS DISTRIBUTION SYSTEM:
  - A1E.4.12.1. PERFORMS RWP FOR NATURAL GAS SYSTEM.
  - A1E.4.12.2. PERFORMS RWP ON LIQUID PETROLEUM SYSTEM.

**A1E.5. PERFORMS REAL PROPERTY REPAIR:**

- A1E.5.1. REPAIRS EXTERIOR ELECTRICAL SYSTEM:
  - A1E.5.1.1. REPAIRS OVERHEAD DISTRIBUTION SYSTEM.
  - A1E.5.1.2. REPAIRS UNDERGROUND DISTRIBUTION SYSTEM.
  - A1E.5.1.3. REPAIRS SUBSTATION.
  - A1E.5.1.4. REPAIRS SWITCHING STATION.
  - A1E.5.1.5. REPAIRS ELECTRICAL VAULT.
  - A1E.5.1.6. REPAIRS CRITICAL EXTERIOR LIGHT.
  - A1E.5.1.7. REPAIRS NON-CRITICAL EXTERIOR LIGHT.

- A1E.5.1.8. REPAIRS TRAFFIC LIGHT.
- A1E.5.1.9. REPAIRS ROTATING BEACON.
- A1E.5.2. REPAIRS AIRFIELD LIGHTING SYSTEM.
- A1E.5.3. REPAIRS AIRCRAFT ARRESTING SYSTEM:
  - A1E.5.3.1. REPAIRS MA-1A.
  - A1E.5.3.2. REPAIRS BAK-12.
- A1E.5.4. REPAIRS GENERATOR:
  - A1E.5.4.1. REPAIRS DIESEL GENERATOR.
  - A1E.5.4.2. REPAIRS GAS GENERATOR.
  - A1E.5.4.3. REPAIRS AUTOMATIC TRANSFER PANEL.
- A1E.5.5. REPAIRS FUEL GAS DISTRIBUTION SYSTEM:
  - A1E.5.5.1. REPAIRS NATURAL GAS SYSTEM.
  - A1E.5.5.2. REPAIRS LP GAS SYSTEM.
- A1E.5.6. REPAIRS LIQUID FUEL SYSTEM:
  - A1E.5.6.1. REPAIRS TANK.
  - A1E.5.6.2. REPAIRS VALVE.
  - A1E.5.6.3. REPAIRS PUMP.
  - A1E.5.6.4. REPAIRS PIPELINE.
  - A1E.5.6.5. REPAIRS OTHER COMPONENT.
- A1E.5.7. REPAIRS ALARM SYSTEM:
  - A1E.5.7.1. REPAIRS FIRE ALARM AND DETECTION SYSTEM.
  - A1E.5.7.2. REPAIRS INTRUSION ALARM SYSTEM.
  - A1E.5.7.3. REPAIRS ENVIRONMENTAL ALARM SYSTEM.
- A1E.5.8. REPAIRS SEWAGE COLLECTION SYSTEM:
  - A1E.5.8.1. REPAIRS LIFT STATION.
  - A1E.5.8.2. REPAIRS SEWAGE LINE.
  - A1E.5.8.3. REPAIRS OIL SEPARATOR.
  - A1E.5.8.4. REPAIRS PRETREATMENT EQUIPMENT.
- A1E.5.9. REPAIRS WATER DISTRIBUTION SYSTEM:
  - A1E.5.9.1. REPAIRS PUMP STATION.
  - A1E.5.9.2. REPAIRS WATER TREATMENT EQUIPMENT.
  - A1E.5.9.3. REPAIRS WATER STORAGE.
  - A1E.5.9.4. REPAIRS INSTALLATION WATER LINE.
  - A1E.5.9.5. REPAIRS WATER VALVES.
  - A1E.5.9.6. REPAIRS SWIMMING POOL.
  - A1E.5.9.7. PERFORMS LIMITED ASBESTOS REMOVAL AND CONTAINMENT WORK.

**A1E.6. PERFORMS REAL PROPERTY MODIFICATION:**

- A1E.6.1. MODIFIES ALARM SYSTEM:
  - A1E.6.1.1. MODIFIES FIRE ALARM AND DETECTION SYSTEM.
  - A1E.6.1.2. MODIFIES INTRUSION ALARM SYSTEM.
  - A1E.6.1.3. MODIFIES ENVIRONMENTAL ALARM SYSTEM.
- A1E.6.2. MODIFIES EXTERIOR ELECTRICAL SYSTEM:
  - A1E.6.2.1. MODIFIES OVERHEAD DISTRIBUTION SYSTEM.
  - A1E.6.2.2. MODIFIES UNDERGROUND DISTRIBUTION SYSTEM.
  - A1E.6.2.3. MODIFIES SUBSTATION.

- A1E.6.2.4. MODIFIES SWITCHING STATION.
- A1E.6.2.5. MODIFIES ELECTRICAL VAULT.
- A1E.6.2.6. MODIFIES EXTERIOR AREA LIGHT.
- A1E.6.2.7. MODIFIES TRAFFIC LIGHT.
- A1E.6.2.8. MODIFIES ROTATING BEACON.
- A1E.6.3. MODIFIES GENERATOR:
  - A1E.6.3.1. MODIFIES DIESEL GENERATOR.
  - A1E.6.3.2. MODIFIES GAS GENERATOR.
  - A1E.6.3.3. MODIFIES AUTOMATIC TRANSFER PANEL.
- A1E.6.4. MODIFIES SEWAGE COLLECTION SYSTEM.
- A1E.6.5. MODIFIES WATER DISTRIBUTION SYSTEM.
- A1E.6.6. MODIFIES LIQUID FUELS SYSTEM:
  - A1E.6.6.1. MODIFIES TANK.
  - A1E.6.6.2. MODIFIES VALVE.
  - A1E.6.6.3. MODIFIES PUMP.
  - A1E.6.6.4. MODIFIES PIPELINE.
  - A1E.6.6.5. MODIFIES OTHER COMPONENT.
- A1E.6.7. MODIFIES GROUNDING AND LIGHTNING PROTECTION SYSTEM.
- A1E.6.8. MODIFIES CATHODIC PROTECTION SYSTEM.
- A1E.6.9. MODIFIES/INSTALLS GAS FUEL DISTRIBUTION SYSTEM:
  - A1E.6.9.1. MODIFIES/INSTALLS NATURAL GAS DISTRIBUTION SYSTEM.
  - A1E.6.9.2. MODIFIES/INSTALLS LP SYSTEM.