

CHAPTER 230: ENGINEERING SERVICE

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1 PURPOSE AND SCOPE

This document provides Space Planning Criteria for Engineering Service Chapter 230 as it applies to all medical facilities at the Department of Veterans Affairs (VA).

Engineering Service is responsible for improving, maintaining, and operating the medical center physical plant and equipment, and for construction projects.

2 DEFINITIONS

Accessible: A site, building, facility, or portion thereof that complies with provisions outlined in the Architectural Barriers Act of 1968 (ABA).

Architectural Barriers Act (ABA): A set of standards developed to insure that all buildings financed with federal funds are designed and constructed to be fully accessible to everyone. This law requires all construction, renovation, or leasing of sites, facilities, buildings, and other elements, financed with federal funds, to comply with the Architectural Barriers Act Accessibility Standards (ABAAS). The ABAAS replaces the Uniform Federal Accessibility Standards (UFAS).

Full-Time Equivalent (FTE): A staffing parameter equal to the amount of time assigned to one full time employee. It may be composed of several part-time employees whose total time commitment equals that of a full-time employee. One FTE equals a 40 hours per week.

Functional Area: The grouping of rooms and spaces based on their function within a clinical service. Typical Functional Areas are Reception Areas, Patient Areas, Support Areas, Staff and Administrative Areas, and Residency Program.

Input Data Statements: A set of questions designed to elicit information about the healthcare project in order to create a Program for Design (PFD) based on the criteria parameters set forth in this document. Input Data Statements could be Mission related, based in the project's Concept of Operations; and Workload or Staffing related, based on projections and data provided by the VHA or the VISN about the estimated model of operation for the facility. This information is processed through mathematical and logical operations in VA-SEPS.

Program for Design (PFD): A space program based on criteria set forth in this document and specific information about Concept of Operations, workload projections and staffing levels authorized.

SEPS (VA-SEPS): Acronym for Space and Equipment Planning System, a digital tool developed by the Department of Defense (DoD) and the Department of Veterans Affairs to generate a Program for Design (PFD) and an Equipment List for a VA healthcare project based on specific information entered in response to Input Data Questions. VA-SEPS incorporates the propositions set forth in all VA Space Planning Criteria chapters. VA-SEPS has been designed to aid healthcare planners in creating a space plan based on a standardized set of criteria parameters.

3 OPERATING RATIONALE AND BASIS OF CRITERIA

- A. Workload Projections or planned services / modalities for a specific VA medical center, hospital, or satellite outpatient clinic project are provided by the VA Central Office (VACO) / VISN CARES Capacity Projection Model. The workload projections are generated by methodology based upon the expected veteran population in the respective market/service area. Healthcare planners working on VA medical center, hospital, or satellite outpatient clinic projects will utilize and apply the workload

criteria set forth herein for identified services and modalities to determine room requirements for each facility.

- B. Engineering Service is responsible for construction projects and for improving, maintaining, and the operating the Medical Center's physical plant and equipment. The Department is organized with an Office of the Chief of Engineering Service and Five (5) other sections: maintenance and repair; operations; biomedical engineering; projects (construction); and safety, industrial hygiene and fire protection.
- C. Space planning criteria have been developed on the basis of an understanding of the activities involved in the functional areas of the Engineering Service and its relationship with other services of a medical facility. These criteria are predicated on established and/or anticipated best practice standards, as adapted to provide environments supporting the highest quality health care for Veterans.
- D. These criteria are subject to modification relative to development in the equipment, and subsequent planning and design. The selection of the size and type of Engineering Service equipment is determined by VACO and upon Veterans Health Administration (VHA) anticipated Facility needs.

4 INPUT DATA STATEMENTS

A. Mission Input Data Statements

- 1. Is Engineering authorized to be located in a separate building? (M)
- 2. Is a Biomedical Repair Shop authorized? (M)
 - a. How many Biomedical Research Technician FTE positions are authorized? (S)
- 3. Is a Carpentry Shop authorized? (M)
 - a. How many Technical Carpentry Shop FTE positions are authorized? (S)
- 4. Is an Air Conditioning Shop authorized? (M)
 - a. How many Technical Air Conditioning Shop FTE positions are authorized? (S)
- 5. Is a Plumbing Shop authorized? (M)
 - a. How many Technical Plumbing Shop FTE positions are authorized? (S)
- 6. Is an Electrical Shop authorized? (M)
 - a. How many Technical Electrical Shop FTE positions are authorized? (S)
- 7. Is a Paint Shop authorized? (M)
 - a. Is a Flammable Storage room authorized? (M)
 - b. How many Technical Paint Shop FTE positions are authorized? (S)
- 8. Is a Machine Shop authorized? (M)
 - a. How many Technical Machine Shop FTE positions are authorized? (S)
- 9. Is a Mason Shop authorized? (M)
 - a. How many Technical Mason Shop FTE positions are authorized? (S)
- 10. Is a Grounds Maintenance Shop authorized? (M)
 - a. How many Technical Grounds Maintenance Shop FTE positions are authorized? (S)
- 11. Is a Locksmith Shop authorized? (M)
- 12. Is a Multi Use Shop authorized? (M)

B. Workload Input Data Statements

- 1. How many patient beds in total are projected for this facility? (W)

C. Staffing Input Data Statements

- 1. How many Engineering Clerical FTE positions are authorized? (S)
- 2. How many Industrial Hygienist FTE positions are authorized? (S)
- 3. How many Project Engineer FTE positions are authorized? (S)

4. How many Technical FTE positions are authorized? (S)
5. How many Driver Dispatch FTE positions are authorized? (S)
6. How many Shop Supervisor FTE positions are authorized? (S)
7. How many Trainee FTE positions are authorized? (S)
8. How many Draftsman FTE positions are authorized? (S)
9. How many Engineering Technician FTE positions are authorized? (S)

D. Miscellaneous Input Data Statements

1. How many FTEs will work on peak shift? (Misc)
2. How many FTE positions are not authorized to have an office or work space? (Misc)

5 SPACE CRITERIA

A. FA 1: Reception Area:

1. **Waiting (WTG05).....110 NSF (10.3 NSM)**
Provide one for Engineering Service.

Allocated space accommodates three standard chairs @ 9 NSF each, one bariatric chair @ 14 NSF, one accessible space @ 10 NSF, and circulation; total five people.

2. **Reception (RCP01).....85 NSF (7.9 NSM)**
Provide one for Engineering Service.

Allocated NSF accommodates one Receptionist FTE, patient privacy area, and circulation.

3. **Toilet, Public (TNPG1).....60 NSF (5.6 NSM)**
Provide one for Engineering Service.

Allocated NSF accommodates one accessible toilet @ 25 NSF, one wall-hung lavatory @ 12 NSF, ABA clearances, and circulation.

B. FA 2: Administrative and Operations Area:

1. **Office, Engineering Chief (OFA09)100 NSF (9.3 NSM)**
Provide one for Engineering Service.

2. **Office, Engineering Assistant Chief (OFA09)100 NSF (9.3 NSM)**
Provide one for Engineering Service.

3. **Workstation, Fire and Safety Specialist (OFA07)56 NSF (5.3 NSM)**
Provide one for Engineering Service.

All Engineering and Fire Safety Publications to be maintained in this work space.

4. **Workstation, Industrial Hygienist (OFA07)56 NSF (5.3 NSM)**
Provide one if an Industrial Hygienist FTE position is authorized.

5. **Workstation, Project Engineer (OFA07)56 NSF (5.3 NSM)**
Provide one per each Project Engineer FTE position authorized.

6. **Workstation, Clerical (OFA07).....56 NSF (5.3 NSM)**
Provide one per each Clerical, Technical, Driver Dispatch, Shop Supervisor, and Trainee FTE position authorized.

7. **Conference Room (CFR02)**..... **300 NSF (27.9 NSM)**
Provide one if a separate building for Engineering Service is authorized.

Allocated NSF accommodates ten conference chairs @ 7.5 NSF each, four 5'-0" x 2'-0" tables at 10 NSF each, one credenza @ 8 NSF, and circulation; total ten people.

8. **Hospital Plans and Drafting Room (XXYYC)**..... **200 NSF (18.6 NSM)**
Minimum NSF; provide an additional 85 NSF per each Draftsman and Engineering Technician FTE position authorized.

This room provides space for one Draftsman, plan storage, layout table, Computer workstation and Plotter / Printer.

9. **Interior Design Office / Library / Workroom (XXYYC)** **250 NSF (23.2 NSM)**
Provide one for Engineering Service.

10. **Lounge, Staff (SL001)**..... **80 NSF (7.5 NSM)**
Minimum NSF; provide an additional 15 NSF per each Engineering Service FTE position working on peak shift greater than five; maximum 210 NSF.

11. **Locker Room, Staff (LR001)**..... **80 NSF (7.5 NSM)**
Minimum NSF if total number of Engineering Service FTE positions not authorized to have office or work space is between five and thirteen; provide an additional 6 NSF per each Engineering Service FTE position not authorized to have office or work space is greater than thirteen.

Provide locker space only for those FTEs without assigned office or work space. For less than five FTE combine Locker Room facilities with adjacent department or sum in chapter 410.

12. **Toilet, Staff (TNPG1)**..... **60 NSF (5.6 NSM)**
Minimum one; provide an additional one for every increment of fifteen Engineering Service FTE positions working on peak shift greater than fifteen.

Allocated NSF accommodates one accessible toilet @ 25 NSF, one wall-hung lavatory @ 12 NSF, ABA clearances, and circulation.

C. FA 3: Engineering Control Center:

1. **Engineering Control Center (XXYYC)** **300 NSF (27.9 NSM)**
Provide one for Engineering Service.

This area houses the computer and control system that controls and monitors the HVAC system, emergency generators, and selected systems and equipment. H-08-3, the Department of Veterans Affairs Construction Standard 688-1, "Engineering Control Center" applies. If toilet facilities (Water closet and Lavatory: (50 NSF) are not conveniently available then the toilet facility will be included in the 300 NSF.

D. FA 4: Biomedical Engineering Repair Shop:

1. **Workstation, Biomedical Engineer (OFA07)** **56 NSF (5.3 NSM)**
Provide one if a Biomedical Repair Shop is authorized.

2. **Receiving and Cleaning (BMRA1)**..... **100 NSF (9.3 NSM)**
Provide one if a Biomedical Repair Shop is authorized.

This area provides space where equipment can be broken down and cleaned, and where new medical equipment can be inspected.

- 3. **Repair (BMER1)400 NSF (37.2 NSM)**
Minimum NSF; provide one if a Biomedical Repair Shop is authorized; provide an additional 100 NSF per each Biomedical Technical FTE position authorized greater than one.

This function is divided into a mechanical repair area and an electronic repair area. A large amount of testing equipment is required on work benches.

- 4. **Storage Room (SRE01)100 NSF (9.3 NSM)**
Minimum NSF; provide one if a Biomedical Repair Shop is authorized; provide an additional 25 NSF per each Biomedical Technical FTE position authorized.

This area provides for storage of special spare parts and for equipment awaiting repair.

E. FA 5: Shop Area:

- 1. **Carpentry Shop:
 Floor Mounted Tools and Equipment (PMCW1)500 NSF (46.5 NSM)**
Provide one if four Technical Carpentry Shop FTE positions or greater are authorized.

This area provides space for large size tools and equipment that are normally mounted to the floor.

- 2. **Carpentry Shop: Workbench and Worktable (PMCW1)400 NSF (37.2 NSM)**
Provide one if four Technical Carpentry Shop FTE positions or greater are authorized; provide additional NSF per Table 1.

TABLE 1: WORKBENCH AND WORKTABLE AREA CALCULATION

NUMBER OF FTE POSITIONS AUTHORIZED	AREA
4	400 NSF (37.2 NSM)
5	480 NSF (44.6 NSM)
6	520 NSF (48.4 NSM)
7	540 NSF (50.2 NSM)
8	560 NSF (52.1 NSM)
9	580 NSF (53.9 NSM)
10	590 NSF (54.9 NSM)
Greater than 10	590 NFS (54.9 NSM) plus 10 NSF per FTE position greater than ten.

This area normally contains wall benches, freestanding worktables, bench mounted tools, equipment, and devices necessary for a wide variety of tasks associated with maintenance and repair of the physical plant and grounds.

- 3. **Carpentry Shop: Storage (SRE01)250 NSF (23.3 NSM)**
Provide one if four Technical Carpentry Shop FTE positions or greater are authorized; provide an additional 24 NSF for each Technical Carpentry Shop FTE position authorized greater than four.

This area provides storage of a 30 day supply of equipment, parts, supplies, and tools. Special heavy duty tools, machines, materials for recurring maintenance, and testing equipment must be maintained to minimize "down time".

4. **Air Conditioning Shop:
Floor Mounted Tools and Equipment (PMCW1) 300 NSF (27.9 NSM)**
Provide one if four Technical Air Conditioning Shop FTE positions or greater are authorized.
5. **Air Conditioning Shop:
Workbench and Worktable (PMCW1)..... 400 NSF (37.2 NSM)**
Provide one if four Technical Air Conditioning Shop FTE positions or greater are authorized; provide additional NSF per Table 1.
6. **Air Conditioning Shop: Storage (SRE01) 250 NSF (23.3 NSM)**
Provide one if four Technical Air Conditioning Shop FTE positions or greater are authorized; provide an additional 24 NSF per each Technical Air Conditioning Shop FTE position authorized greater than four.
7. **Plumbing Shop:
Floor Mounted Tools and Equipment (PMCW1) 200 NSF (18.6 NSM)**
Provide one if four Technical Plumbing Shop FTE positions or greater are authorized.
8. **Plumbing Shop: Workbench and Worktable (PMCW1) 400 NSF (37.2 NSM)**
Provide one if four Technical Plumbing Shop FTE positions or greater are authorized; provide additional NSF per Table 1.
9. **Plumbing Shop: Storage (SRE01) 200 NSF (18.6 NSM)**
Provide one if four Technical Plumbing Shop FTE positions or greater are authorized; provide an additional 24 NSF for each Technical Plumbing Shop FTE position authorized greater than four.
10. **Electrical Shop:
Floor Mounted Tools and Equipment (PMCW1) 150 NSF (14.0 NSM)**
Provide one if four Technical Electrical Shop FTE positions or greater are authorized.
11. **Electrical Shop: Workbench and Worktable (PMCW1)..... 400 NSF (37.2 NSM)**
Provide one if four Technical Electrical Shop FTE positions or greater are authorized; provide additional NSF per Table 1.
12. **Electrical Shop: Storage (SRE01) 250 NSF (23.3 NSM)**
Provide one if four Technical Electrical Shop FTE positions or greater are authorized; provide an additional 24 NSF for each Technical Electrical Shop FTE position authorized greater than four.
13. **Paint Shop:
Floor Mounted Tools and Equipment (PMCW1) 80 NSF (7.5 NSM)**
Provide one if four Technical Paint Shop FTE positions or greater are authorized.
14. **Paint Shop: Workbench and Worktable, (PMCW1)..... 400 NSF (37.2 NSM)**
Provide one if four Technical Paint Shop FTE positions or greater are authorized; provide additional NSF per Table 1.

15. **Paint Shop: Storage, Flammable (SRHM1)100 NSF (9.3 NSM)**
Minimum NSF; provide one if four Technical Paint Shop FTE positions or greater are authorized and a Flammable Storage is authorized; provide an additional 24 NSF for each Technical Paint Shop FTE position authorized greater than four.
16. **Paint Shop: Paint Area (XXYYC).....500 NSF (46.5NSM)**
Provide one if four Technical Paint Shop FTE positions or greater are authorized.

This area provides a control and isolated area for paint work.
17. **Machine Shop:**
Floor Mounted Tools / Equipment (PMCW1)300 NSF (27.9 NSM)
Provide one if four Technical Machine Shop FTE positions or greater are authorized.
18. **Machine Shop: Workbench and Worktable (PMCW1).....400 NSF (37.2 NSM)**
Provide one if four Technical Machine Shop FTE positions or greater are authorized; provide additional NSF per Table 1.
19. **Machine Shop: Storage (SRE01).....100 NSF (9.3 NSM)**
Minimum NSF; provide one if four Technical Machine Shop FTE positions or greater are authorized; provide an additional 24 NSF for each Technical Machine Shop FTE position authorized greater than four.
20. **Mason Shop:**
Floor Mounted Tools and Equipment (PMCW1)100 NSF (9.3 NSM)
Provide one if four Technical Mason Shop FTE positions or greater are authorized.
21. **Mason Shop: Workbench and Worktable (PMCW1).....400 NSF (37.2 NSM)**
Provide one if four Technical Mason Shop FTE positions or greater are authorized. Provide additional NSF per Table 1.
22. **Mason Shop: Storage, Mason Shop (SRE01)100 NSF (9.3 NSM)**
Minimum NSF; provide one if four Technical Mason Shop FTE positions or greater are authorized; provide an additional 24 NSF for each Technical Mason Shop FTE positions authorized greater than four.
23. **Grounds Maintenance Shop:**
Workbench / Worktable (PMCW1).....400 NSF (37.2 NSM)
Provide one if four Technical Grounds Maintenance Shop FTE positions or greater are authorized; provide additional NSF per Table 1.
24. **Grounds Maintenance Shop: Storage (SRE01)100 NSF (9.3 NSM)**
Provide one if four Technical Grounds Maintenance Shop FTE positions or greater are authorized; provide an additional 24 NSF per each Technical Grounds Maintenance Shop FTE position authorized greater than four.
25. **Grounds Maintenance Shop:**
Storage, Covered Outside (XXYYC).....400 NSF (37.2 NSM)
Provide one if less than four Technical Grounds Maintenance Shop FTE positions are authorized.

This space provides for storage of grounds maintenance equipment, flammable liquids, sand, gravel, seasonal bulk supplies, etc. The requirement for this space is determined on an individual project basis. The amount of space may vary depending on the location of the medical center and the size of the campus.

26. **Locksmith Shop:**
Workbench and Worktable (PMCW1)..... 120 NSF (11.2 NSM)
Minimum NSF; provide one if the total number of projected patient beds are between 10 and 350; provide an additional 40 NSF if the total number of patient beds is greater than 350.
27. **Locksmith Shop: Storage (SRE01) 80 NSF (7.5 NSM)**
Provide one for the Locksmith Shop.
28. **Multi Use Shop:**
Floor Mounted Tools and Equipment (PMCW1) 350 NSF (32.6 NSM)
Provide one if less than four Shop Areas Technical FTE positions in total are authorized for Engineering Service.
29. **Multi Use Shop: Workbench and Worktable, (PMCW1) 450 NSF (41.8 NSM)**
Provide one if less than four Shop Areas Technical FTE positions in total are authorized for Engineering Service.
30. **Multi Use Shop: Storage (SRE01) 250 NSF (23.3 NSM)**
Provide one if less than four Shop Areas Technical FTE positions in total are authorized for Engineering Service.
31. **Multi Use Shop: Flammable Storage (SRHM1) 100 NSF (9.3 NSM)**
Provide one if less than four Shop Areas Technical FTE positions in total are authorized for Engineering Service.
32. **Housekeeping Aids Closet (HAC) (JANC1) 60 NSF (5.6 NSM)**
Minimum one; provide an additional one for every increment of two Engineering Shops authorized greater than two.

6 PLANNING AND DESIGN CONSIDERATIONS

- A. Departmental Net-to-Gross factor (DNTG) for Engineering Service is **1.30**. This number when multiplied by the programmed Net Square Foot (NSF) area determines the Departmental Gross Square Feet (DGSF).
- B. Administrative offices / work spaces should be located in proximity to the main hospital administration complex. (Different floors are acceptable).
- C. Shop areas should be located adjacent to the loading dock and accessible to interior transport system. If not adjacent to the dock then a double exterior opening door should be considered. Access is needed to move lengths of pipe and large sheets plywood and sheetrock.
- D. The engineering control room (ECC) shall be totally enclosed, air conditioned, and designed acoustically to provide an ambient noise level of not more than 50 Decibels. The control room shall be located so that visual surveillance of both the water chilling equipment and boiler plant equipment can be maintained. If this is not feasible, then the control room shall be located to provide visual surveillance of the water chilling equipment (or as recommended by the Engineering Officer).
- E. A vacuum system is required for the equipment utilized in carpentry work. A fume hood is required where welding is accomplished.
- F. Individual shops may be combined to form larger shops or all shops may be combined into one large shop area. Shop storage areas may be combined.

- G. AMES / MERS is the abbreviation for Automated Engineering Management System / Medical Equipment Reporting System. This may be a web based system. PC of Wyse based or terminal is needed.
- H. The work space for the Biomedical Engineer may be located either with the biomedical Engineering shop or in the administrative office area.
- I. If an automatic transport system (ATS) is planned for the medical center, then an ATS repair shop is required. The ATS shop should consist of a test track, workbench area, and a battery recharging area. Space must be determined on a project by project basis.
- J. Refer to the latest edition of the Guidelines for the Design and Construction of Health Care Facilities (FGI).

7 FUNCTIONAL RELATIONSHIPS

Relationship of Engineering Service to services listed below:

TABLE 2: FUNCTIONAL RELATIONSHIP MATRIX

RELATIONSHIP OF ENGINEERING SERVICE	ADMIN.	SHOPS	ENG. CTRL.	BIOMED REPAIR
Audiology and Speech Pathology		X	X	
Building Management -Administration	3			
Cardiology Laboratory				3
Dietetic Service - Food Proceeding		3		
Dialysis Center				3
Director's Suite	3			
Laboratory				3
Laboratory - E.M. Suite		X	X	
Nursing Units – CCU				3
Nursing Unit – MICU				3
Nursing Unit – SICU				3
Pulmonary Medicine				3
Radiology - Main Suite				3
Supply Service – Administration	3			
Supply Service - S.P.D. Central				3
Supply Service – Warehouse		3		
Surgical Service - Operating Suite	X			3

Legend:

Relationship:

- 1. Adjacent
- 2. Close / Same Floor
- 3. Close / Different Floor Acceptable
- 4. Limited Traffic
- 5. Separation Desirable

8 FUNCTIONAL DIAGRAM

