

AD-A119 533

NAVAL FACILITIES ENGINEERING COMMAND ALEXANDRIA VA
UNACCOMPANIED ENLISTED QUARTERS.(U)

F/G 13/2

AUG 81

UNCLASSIFIED

NAVFAC-DM-36.2

NL

1 OF 1

ADA
19888

END

DATE

FILED

DTIC

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER DM-36.2	2. GOVT ACCESSION NO. AD-A119533	3. RECIPIENT'S CATALOG NUMBER (1)
4. TITLE (and Subtitle) NAVFAC Design Manual DM- 36.2 Unaccompanied Enlisted Quarters		5. TYPE OF REPORT & PERIOD COVERED Design Criteria Final
		6. PERFORMING ORG. REPORT NUMBER DM-36.2
7. AUTHOR(s) Naval Facilities Engineering Command 200 Stovall Street Alexandria, VA 22332 (Code 0461)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Facilities Engineering Command 200 Stovall Street Alexandria, VA 22332		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Engineering and Design
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Facilities Engineering Command (Code: 0432) 200 Stovall Street Alexandria, VA 22332		12. REPORT DATE August 1981
		13. NUMBER OF PAGES 22
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Unclassified/Unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Unclassified/Unlimited NOTED: This document has been approved for public release and wider distribution is unlimited.		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Building program; electrical requirements; HVAC requirements; interior design; new and rehabilitated construction; occupancy considerations; plumbing requirements; special considerations.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Design criteria for Unaccompanied Enlisted Quarters are presented for use by experienced planners, architects, interior designers, and engineers. The contents contain basic program information for Navy and Marine Corps Unaccompanied Enlisted Quarters, including both new and modernization projects.		

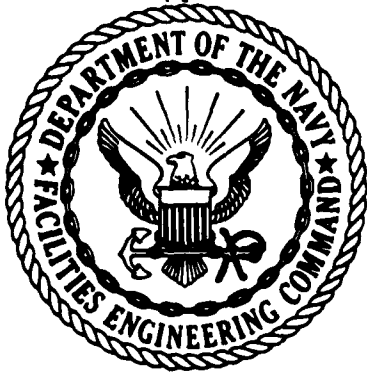
DTIC
SEP 23 1982

AD A119533

DTIC FILE COPY

NAVFAC DM-36.2
AUGUST 1981

ADA119533



UNACCOMPANIED ENLISTED QUARTERS

DESIGN MANUAL 36.2

APPROVED FOR PUBLIC RELEASE

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
200 STOVALL STREET
ALEXANDRIA, VA. 22332

82 00 27 056

DISTRIBUTION: (1 copy each unless otherwise specified)

SNDL
 23A1 (COMNAVFORAZORES only)
 24J1
 27C
 39B
 39C1
 39E
 42A3
 45B
 49
 51A
 51B1
 51B3
 B2A (JCS, NSA, DLA, and DNA only)
 B5 (USCG only)
 C34 (Holy Loch, Souda Bay only)
 C37D (Port Hueneme only)
 E3A
 FA6 (Bermuda, Brunswick, Cecil Field, Key West, Jacksonville, Virginia Beach only)
 FA7 (Guantanamo, Keflavik, Brooklyn, Panama Canal, Mayport, Roosevelt Roads only)
 FA10
 FA18
 FA23 (Antigua, Brawdy, Buxton, Lewes only)
 FA32
 FB6
 FB7 (Alameda, Fallon, Lemoore, Oak Harbor, Miramar, North Island, Moffet Field only)
 FB10 (Adak, Midway only)
 FB21
 FB31 (Guam only)
 FB34 (Kadena, Sasebo only)
 FB36 (Big Sur, Coos Head, Ferndale, and Pacific Beach only)
 FB41
 FB48
 FC3 (London only)
 FC4 (Sigonella only)
 FC5
 FC7
 FC12
 FD2
 FE2
 FE4 (Adak, Edzell, Hanza, Galeta Island, Homestead, Winter Harbor, Sabana Seca, and Sonoma only)
 FF1 (Washington only)
 FF5
 FF6
 FF19 (New Orleans, Seattle only)

FF38
 FG2 (Balboa, Harold Holt, Nea Makri, Thurso, Stockton, and Ponce only)
 FG3 (Cheltenham and East Machias only)
 FG6 (Wahiawa and Norfolk only)
 FH3 (Beaufort only)
 FH6 (Bethesda only)
 FH8 (Cairo only)
 FH25 (Philadelphia, Portsmouth VA, Camp Lejeune, Oakland, Newport, Great Lakes, and Long Beach only)
 FJ5
 FKA6A1
 FKA6A2
 FKA6A3A
 FKA6A3B
 FKA6A9
 FKA6A12
 FKA6A15 (Code 521)
 FKA6A16
 FKA9
 FKM8
 FKM9
 FKM12
 FKM13
 FKM15 (Philadelphia only)
 FKN1 (West and Lant only (85 copies each))
 FKN1 (South and North only (50 copies each))
 FKN1 (Pac only, 25 copies each)
 FKN1 (Ches only, 25 copies each)
 FKN1 (Ches, FPO-1 only)
 FKN2
 FKN3 (6 copies each)
 FKN5 (5 copies each)
 FKN8
 FKN10
 FKP1B (less Concord)
 FKP1B (Concord only, 3 copies)
 FKP1E
 FKP1J
 FKP1M
 FKP3A
 FKP7
 FKP8
 FKP11
 FKQ3
 FKR1A
 FKR1B (2 copies)
 FKR2A (Dallas only)
 FKR3A
 FKR3H
 FKR4B
 FKR5
 FKR7E (3 copies)
 FR3
 FR4
 FT1

FT2
 FT6
 FT13 (Less Millington)
 FT18
 FT19 (San Diego only)
 FT22
 FT27 (Idaho Falls only)
 FT28
 FT31
 FT37
 FT55
 FT64
 FT73
 FT74A (MIT and Texas only)
 FT74B (California, Illinois, Rensselaer, Georgia Tech only)
 FT78 (2 copies)
 V2
 V3
 V5
 V8
 V12
 V14
 V15
 V16 (less Camp Smith)
 V17
 V23
 V25

Copy to: (One copy each unless otherwise indicated)

21A
 A2A (ONR only)
 A3
 A4A
 A5
 A6 (Code LFF)
 C7 (Brazil and Chile only)
 FD1
 FE1
 FG1
 FKA1A
 FKA1B (2 copies)
 FKA1C (Code 043 - 50 copies)
 FKA1F
 FKN2 (Port Hueneme (Code 156) only)
 FR1

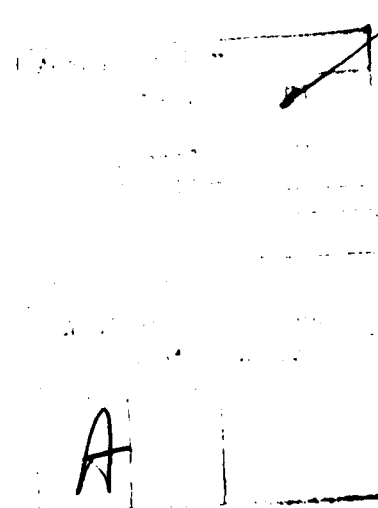
Additional copies are available from:

Commanding Officer
 Naval Publications and
 Forms Center
 5801 Tabor Avenue
 Philadelphia, PA 19120

ABSTRACT

Design criteria for Unaccompanied Enlisted Quarters are presented for use by experienced planners, architects, interior designers, and engineers. The contents contain basic program information for Navy and Marine Corps Unaccompanied Enlisted Quarters, including both new construction and modernization projects.

36.2-111



FOREWORD

This design manual is one of a series developed from an evaluation of facilities in the shore establishment, from surveys of the availability of new materials and construction methods, and from selection of the best design practices of the Naval Facilities Engineering Command, other Government agencies, and the private sector. This manual uses, to the maximum extent feasible, national professional society, association, and institute standards in accordance with NAVFACENGCOM policy. Deviations from these criteria should not be made without prior approval of NAVFACENGCOM Headquarters (Code 04).

Design cannot remain static any more than can the naval functions it serves or the technologies it uses. Accordingly, recommendations for improvement are encouraged from within the Navy and from the private sector and should be furnished to NAVFACENGCOM Headquarters, Code 04. As the design manuals are revised, they are being restructured. A chapter or a combination of chapters will be issued as a separate design manual for ready reference to specific criteria.

This publication is certified as an official publication of the Naval Facilities Engineering Command and has been reviewed and approved in accordance with SECNAVINST 5600.16A.



W. M. Tobel
Rear Admiral, CEC, U. S. Navy
Commander
Naval Facilities Engineering Command

UNACCOMPANIED PERSONNEL HOUSING

<u>DM No.</u>	<u>Superseded Chapters in Basic DM-36</u>	<u>Title</u>
36.1	New material	Unaccompanied Personnel Housing
36.2	1	Unaccompanied Enlisted Quarters
36.3	3	Unaccompanied Officer Quarters
36.4	2	Enlisted Personnel Dining Facilities

CONTENTS

UNACCOMPANIED ENLISTED QUARTERS

	Page
Section 1. INTRODUCTION	
1. Purpose	36.2-1
2. Cancellation	36.2-1
3. Related Criteria	36.2-1
Section 2. BUILDING PROGRAM	
1. Schedule of Spaces	36.2-1
a. Sleeping Areas	36.2-2
b. Common Entrance	36.2-4
c. Utility Areas	36.2-4
d. Storage Areas	36.2-5
e. Circulation Areas	36.2-5
f. Mechanical Equipment Areas	36.2-5
g. Administrative Areas	36.2-6
2. Special Program Considerations	36.2-6
a. Enlisted Women's Quarters	36.2-6
b. Special Types of Unaccompanied Enlisted Quarters	36.2-6
c. Marine Unaccompanied Enlisted Quarters	36.2-6
Section 3. HEATING, VENTILATING, AND AIR-CONDITIONING	
1. General	36.2-6
2. Design Guidance	36.2-7
a. Heating and Cooling Load Calculations	36.2-7
b. Design Recommendations	36.2-8
Section 4. PLUMBING	
1. Design Guidance	36.2-9
a. Domestic Water Storage	36.2-9
b. Washers and Dryers	36.2-9
c. Water Spouts	36.2-9
d. Water Hammer Arresters	36.2-9
e. Flow Control in Showers	36.2-9
Section 5. ELECTRICAL	
1. Design Guidance	36.2-10
a. Lighting	36.2-10
b. Outlets	36.2-10
c. Telephones	36.2-10
d. Intercommunications	36.2-10
e. Television	36.2-10
Section 6. INTERIOR DESIGN	
1. General	36.2-10
2. Wardrobes and Chests	36.2-11
a. Wardrobes	36.2-11
b. Chests	36.2-11

CONTENTS

	Page
3. Carpet	36.2-11
a. Occupancy Considerations	36.2-11
b. Usage Considerations	36.2-11
APPENDIX A	A-1
References	Reference-1

TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
1	Basic Criteria for Sleeping Areas and Allowable Gross Building Area	36.2-2

UNACCOMPANIED ENLISTED QUARTERS

Section 1. INTRODUCTION

1. **PURPOSE.** This design manual contains specific program information for the design of Unaccompanied Enlisted Quarters facilities and shall be used in coordination with the general criteria contained in NAVFAC DM-36.1, Unaccompanied Personnel Housing. At the beginning of the design process, the space program shall be analyzed and appropriately diagrammed to illustrate the functional relationships of the various elements. This process shall be carefully coordinated with the using activity in order to ensure that program needs are properly met. Basic quantitative criteria regarding space allowances for specific areas as well as for gross building area shall be followed.

2. **CANCELLATION.** This publication, in conjunction with DM-36.1, 36.3, and 36.4, cancels and supersedes Troop Housing NAVFAC DM-36 of February 1968 in its entirety including change 1, dated May 1968.

3. RELATED CRITERIA.

<u>Subject</u>	<u>Source</u>
Architecture	NAVFAC DM-1
Structural Engineering	NAVFAC DM-2 Series
Mechanical Engineering	NAVFAC DM-3 Series
Electrical Engineering	NAVFAC DM-4 Series
Civil Engineering.	NAVFAC DM-5 Series
Fire Protection Engineering.	NAVFAC DM-8

Section 2. BUILDING PROGRAM

1. **SCHEDULE OF SPACES.** Unaccompanied Enlisted Quarters facilities, depending on size and type, vary in respect to the kind and size of interior spaces that are to be included in the program for a specific project. Space and size requirements as indicated under basic criteria for sleeping areas and allowable gross building areas are, however, common to all Unaccompanied Enlisted Quarters facilities. Definitives or standard designs for Unaccompanied Enlisted Quarters must be adhered to for the basic sleeping areas. However, the core or administrative spaces may vary to meet the design requirements of the specific project. A general outline of space requirements and design considerations for a typical Unaccompanied Enlisted Quarters Project follows:

a. Sleeping Areas.

(1) New Construction. In Unaccompanied Personnel Housing projects involving several buildings, no single unit shall have less than 33 bedrooms. In the planning and design of new Unaccompanied Enlisted Quarters facilities, the basic quantitative criteria shown in Table 1 shall be met.

TABLE 1
Basic Criteria for Sleeping Areas and Allowable Gross Building Area

Grade	Allowable net sleeping area	Allowable gross building area
E-1 and Recruits	Open compartment bay with minimum of 72 square feet net living area per person. Maximum of 60 persons per room, central toilets. (Note 1)	The gross building area shall not exceed 125-130 square feet per person.
E-2 thru E-4	Room with net living area of 270 square feet, three persons per room. (Notes 2 and 3)	The gross building area shall not exceed 165 square feet per person for grades E-2 thru E-4.
E-5 thru E-6	Room with net living area of 270 square feet, two persons per room. (Notes 2, 3, and 4)	Where a mix of E-2 thru E-4 and E-5 thru E-9 personnel are housed in the same facility, the gross building area shall not exceed approximately 480 square feet for each sleeping room.
E-7 thru E-9	Room with net living area of 270 square feet, one person per room. (Notes 2, 3, and 4)	

Notes:

1. The net living area is one equal share per person of the sleeping room. The sleeping room is measured to the inside face of the peripheral walls.
2. Each room is provided with a three-fixture toilet including water closet, shower (tub or tub/shower units in women's quarters), and lavatory.
3. The net living area is the clear area in the sleeping room allocated for the individual's bed, wardrobe-closet unit, and interior circulation. It excludes lounges, toilets, and general circulation. To calculate gross area for Unaccompanied Enlisted Quarters (including all supporting spaces), refer to the definition of gross building floor area contained in NAVFAC DM-36.1.

4. Marine staff sergeants in grade E-6 are considered as staff NCO's and, therefore, are provided facilities comparable to grades E-7 thru E-9.

(2) Alterations. An alteration to Unaccompanied Enlisted Quarters is the work required to adjust interior arrangements, on-base location, or other physical characteristics of an existing facility so that it may be more effectively adapted to or utilized. Additions, expansions, and extensions are not alterations. When planning and designing alterations, the following criteria shall be followed.

(a) Accomplish as one project.

(b) Sleeping areas shall be designed in accordance with new construction standards to the extent possible.

(c) If not feasible to provide 3-person rooms for E-2 thru E-4, either two-person rooms or four-person rooms shall be provided. If both are equally feasible, two-person rooms shall be used.

(d) The net living area for E-2 thru E-4 personnel shall not be less than 85 square feet per person.

(e) Where impractical to provide a bathroom for each E-2 thru E-4 room, a central bathroom for not more than 12 persons may be provided. The central bathroom shall be for the exclusive use of E-2 thru E-4 personnel and shall be conveniently located from their rooms.

(f) Where impractical to provide a bathroom for each E-5 thru E-6 room, a central bathroom for not more than 8 persons for exclusive use by these grades is acceptable. The central bathroom shall be conveniently located from their rooms.

(g) A separate bathroom is required for E-7 thru E-9 (and E-6 Marine Corps personnel) regardless of alteration difficulties.

(3) Waivers. Reviews of request for waivers to statutory cost limitations will be evaluated on the basis of providing E-1 quarters at approximately 125-130 gross square feet per person, and E-2 thru E-4 quarters within 165 gross square feet per person, exclusive of mechanical space in both instances. Where a mix of E-2 thru E-4 and E-5 thru E-9 personnel are housed in the same facility, the gross area will be evaluated on the basis of providing approximately 480 gross square feet for each sleeping room (exclusive of mechanical spaces). Waiver reviews will also consider net-to-gross area relationships, architectural treatment, structural framing, and bid results.

b. Common Entrance.

(1) Lobby. The entrance lobby should be an attractive focal point and of a minimum size consistent with good traffic circulation and exit requirements. Public telephones should be accessible from the lobby.

(2) Main Lounge. This lounge should be located near the main lobby and have a livable and attractive residential atmosphere. In some instances, this space may be combined as part of the main lobby or may not be required at all depending on the specific requirements of the local activity. The design of the lounge and location of entrance doors shall discourage use of this space as a walk-through room.

(3) Concession Space. All vending machines shall be located in a separate room or space which can be properly serviced and maintained without undue disturbance to other spaces in the building. This area should be located on the main floor and be within view and controllable from the reception desk. The activity shall be consulted to determine the number of machines to be accommodated.

(4) Reading Lounge. Where space permits, a reading room shall be located on each floor and preferably centrally positioned and easily accessible. It shall have a quiet, relaxing atmosphere away from noisy areas.

(5) TV Lounge. Where space permits, this function shall be in a separate enclosed room with suitable lighting and noise control to provide a pleasant relaxing atmosphere.

c. Utility Areas.

(1) Sleeping Area Toilets. Each bathroom shall be provided with three fixtures including water closet, shower (tub or tub/shower in women's quarters) and lavatory. In Marine Corps Unaccompanied Enlisted Housing, two sinks rather than one shall be provided. Where required, two sinks rather than one may also be provided in Navy Unaccompanied Enlisted Housing. Vanities are to be provided in accordance with NAVFAC Guide Specification, TS-12301, Vanities, Prefabricated. Provide three towel bars for each bathroom, and three additional bars in the lavatory area if separate from the bathroom. All bathroom accessories shall be positively secured by through-bolting, toggle bolting, or other method appropriate to the construction. A medicine cabinet or other built-in storage arrangement with suitable mirrors shall be provided for personal items. Central toilets with stalls and shower facilities shall be provided for male recruits in grade E-1. NAVFAC DM-3, Mechanical Engineering, shall be referenced for fixture counts. In Marine Corps Unaccompanied Enlisted Quarters, flush valve toilets shall be used.

(2) Visitors' Toilets. Visitors' toilets shall be accessible from and near the main lobby area and contain a minimum of one water closet in a separate stall with door, a minimum of one lavatory, a mirror, a soap dispenser, and a paper towel cabinet. The men's toilet shall also have at least one urinal.

(3) Janitor's Closet. A Janitor's closet shall be provided on each floor and contain sufficient area for a floor-mounted slop sink and cleaning equipment and supplies.

(4) Laundry. The laundry area shall be located for ease of access and control. The space shall be of sufficient size and properly laid out to accommodate one washing machine (Government-furnished equipment) per 30 persons and one high speed dryer (Government-furnished equipment) per 60 persons. Sufficient space for a sorting table shall also be included.

d. Storage Areas. Predesign programming shall include contact with the activity Unaccompanied Enlisted Quarters management authority for each project to determine actual bag and linen storage requirements.

(1) Bag Storage Room. This area shall provide approximately 1 square foot/person for bulk and bag storage. Provide 18 inches wide by 3 feet deep storage shelving for each person, arranged for ease of accessibility.

(2) Linen Storage Room. This area shall be sized to provide approximately 0.2 square foot/person for linen and blanket storage.

(3) Building Storage. Sufficient area shall be provided for house-keeping and cleaning supplies and equipment. This function should be separate from the janitor's closet.

e. Circulation Areas.

(1) Corridors. Widths shall be based on the number of units of exit required by the National Fire Protection Association (Life Safety Code, NFPA Standard 101); however, the width shall not be less than a minimum of 4 feet 6 inches. Considerations other than life safety may require greater width such as for equipment access, or where circulation points are heavy such as at an elevator core or main stairway. Dead end corridors shall not exceed 20 feet in length.

(2) Stairs. Exit stairs shall be provided in accordance with NFPA 101.

(3) Elevators. Freight elevators shall not be provided in Unaccompanied Enlisted Quarters less than four stories in height and passenger elevators shall not be provided in Unaccompanied Enlisted Quarters with less than five stories.

f. Mechanical Equipment Areas. The space requirements and location of these areas shall be determined based on good engineering practice and the specific requirements of the systems that are designed for the building. These spaces shall be determined at an early stage of the design so that the areas may be properly integrated into the overall plan of the building.

g. Administrative Areas.

(1) Administrative Offices. Offices for administrative, master-at-arms, and similar activities shall be convenient to the main entrance.

(2) Control or Reception Desk. This space shall be adjacent to the administrative office and be open to the lobby area for control. It shall consist of a reception desk with counter and sufficient space for under counter files, lockable storage, and intercom system. Where possible, it is desirable to arrange the building layout so as to maintain visual control of as many exits as possible from the reception desk for maximum security. Where funds permit, an intercom system for Unaccompanied Enlisted Quarters may be provided with a way to call from the room or corridor to the control or reception desk to accommodate emergencies such as accidents or sickness of personnel. Such systems shall be provided as described in TS-16761, Intercommunication System.

2. SPECIAL PROGRAM CONSIDERATIONS.

a. Enlisted Women's Quarters. These facilities contain the same general features and spaces as enlisted men's quarters except where space allowance permits they may include a sewing room, an informal lounge with small kitchen in the sleeping area, and space for ironing in the laundry or where feasible.

b. Special Types of Unaccompanied Enlisted Quarters. In programming and designing Unaccompanied Enlisted Quarters facilities, there may be many variations from the preceding outline of spaces. Such building types as Unaccompanied Enlisted Quarters, with attached dining facilities, or Unaccompanied Enlisted Quarters with activity administrative offices, represent special cases and shall be programmed and designed to meet the specific needs of the activity.

c. Marine Unaccompanied Enlisted Quarters. There may be exceptions in the design of Marine Unaccompanied Enlisted Quarters as they relate to special operational requirements. As an example, Marine Corps Unaccompanied Enlisted Quarters may be modified to provide locker room and shower facilities to satisfy requirements for on-the-job cleanup, classrooms, and storage of gear. It should be noted that this type of locker room space is also required for Marines who do not occupy Unaccompanied Enlisted Quarters and have no other place to change clothing and shower after unit physical training or command recreational functions such as field meets. In addition, these personnel require space to store raincoats, jackets, boots, combat training equipment (packs and cartridge belts, for example), and various items required in the daily training schedule.

Section 3. HEATING, VENTILATING, AND AIR-CONDITIONING

1. GENERAL. Heating, ventilating, and cooling (natural ventilation, mechanical ventilation, evaporative cooling, or air-conditioning) shall be provided in accordance with the basic criteria and references contained in NAVFAC DM-36.1 and the guidance contained in this section.

2. DESIGN GUIDANCE.

a. Heating and Cooling Load Calculations. The following shall be used when calculating heating and cooling loads.

(1) Ventilation.

(a) The rate of ventilation for the sleeping rooms shall not exceed 10 cfm per room.

(b) Ventilation for living rooms and lounges shall not exceed 20 cfm per occupant.

(c) Ventilation for the lobby shall not exceed 10 cfm per occupant. The number of occupants used in calculations shall equal the total lobby area divided by 80 square feet per occupant.

(d) Air exhausted from bathrooms will be replaced through infiltration and shall not be included in heating and cooling load calculations.

(e) Ventilation for the laundry area shall be based on dryer exhaust air requirements.

(f) Ventilation for the vending area shall not exceed 20 cfm per occupant. The number of occupants used in calculations shall equal the total vending area divided by 20 square feet per occupant.

(2) Lighting.

(a) The heat of lights in sleeping rooms shall not be calculated in cooling loads.

(b) The heat of lights in living rooms, lounges, and the lobby shall be included in cooling loads. A 75 percent use factor shall be used.

(3) Other. When calculating cooling loads, the factor for light-colored venetian blinds or drapes shall be used for all windows.

(4) Central Plant Capacity. When sizing cooling equipment for a central plant, the following factors shall be used in determining the cooling loads.

(a) Refrigeration equipment shall be sized on the basis of 30 percent occupancy and zero percent lighting load. If an installation has quarters specifically designated for personnel who sleep during the daylight hours, the refrigeration equipment for these quarters only may be sized on the basis of 75 percent occupancy and zero percent lighting load. No more than 25 percent of the quarters shall be so designed.

(b) Personnel count for living rooms and/or lounges shall equal zero.

(5) Terminal Unit Capacity. When sizing terminal equipment, the following requirements shall apply:

(a) All the foregoing factors shall also be used in sizing terminal equipment.

(b) Full occupancy shall be used in sizing terminal equipment for sleeping rooms facing NNE and SSE. For all other orientations, use 50 percent occupancy.

(c) When sizing terminal equipment for living rooms or lounges, personnel count shall equal the total area divided by 40 square feet per occupant.

(d) When sizing terminal equipment for the lobby, a 100 percent use factor shall be applied to lighting.

b. Design Recommendations.

(1) When fan-coil units are installed in areas where the winter temperature is less than 15 degrees F (97-1/2 percent basis), they should be installed on the exterior wall.

(2) When fan-coil units are installed on exterior walls and outside ventilation air is provided, a separate ducted system shall be considered in lieu of direct outside air connection to the fan-coil unit. Advantages of a separate ducted system are:

- (a) Eliminates fan-coil unit freeze problems;
- (b) Eliminates multiple wall penetrations;
- (c) Reduces fan-coil unit filter maintenance;
- (d) Can provide for winter humidification where required;
- (e) Will reduce fan-coil unit capacity and reduce piping sizes

and cost.

(3) Outside ventilation air shall not be provided except where it is determined that normal infiltration from windows and doors will not satisfy the ventilation and exhaust air requirements.

(4) In order to achieve greater energy savings, consideration shall be given to the use of variable air volume (VAV) systems with the economizer cycle where effective. Multiple VAV systems shall be considered where overhead space is limited, to reduce the size of ducts required.

(5) Room fan-coil units shall not be used in those areas having 3,000 hours of 67 degree F wet bulb or 1,500 hours of 73 degree F wet bulb in combina-

tion with an outside relative humidity (Rh) of design conditions of 50 percent (Rh) or higher. For these areas, the air-conditioning system shall be designed as follows.

(a) All spaces except mechanical rooms and laundry rooms shall be air-conditioned.

(b) The air-conditioning system shall be the central air type.

(c) The central air system shall provide for control of relative humidity of all conditions of load. Design latent load shall include vapor transfer through exterior walls. The 1 percent wet bulb and 2-1/2 percent dry bulb temperatures shall be used when determining the vapor pressure differential.

(d) The supply air quantity shall be selected to satisfy the sensible or latent loads, whichever is larger.

(e) If a constant volume reheat type system is used, the heat shall be provided by heat recovery using heat recovery chillers, runaround coils, hot gas, etc.

(f) Makeup air for bathroom exhaust shall be continuously conditioned. Quantity of makeup air shall exceed exhaust air quantity by 20 percent.

(g) The cooling capacity for chilled water systems shall be divided between two chillers. The combined capacity of the two chillers shall not exceed the total requirements, including diversity. Selection of chiller capacities should be based on an analysis of the part load operating hours so that neither unit will operate for extended periods at low load conditions.

Section 4. PLUMBING

1. DESIGN GUIDANCE.

a. Domestic Water Storage. Domestic water storage heaters shall be sized in accordance with Figure 1 in NAVFAC DM-36.1.

b. Washers and Dryers. Washers and dryers shall be Government furnished equipment. The contractor shall provide services for hookup.

c. Water Spouts. A water diverter spout for filling cleaning buckets in showers shall be provided as part of the shower supply fitting in each bathroom when cleaning gear rooms are not provided.

d. Water Hammer Arresters. Water hammer arresters shall be provided in water supplies to clothes washing machines only.

e. Flow Control in Showers. Showers shall be equipped with flow-control devices to limit the water flow to 3 gallons per minute.

Section 5. ELECTRICAL

1. DESIGN GUIDANCE.

a. Lighting.

(1) Fluorescent lighting fixtures shall be used for illumination in bathrooms, linen storage areas, laundry rooms, mechanical equipment rooms, sleeping rooms, corridors, and lounges.

(2) Wall- or ceiling-mounted fluorescent light fixtures shall be appropriately located so as to provide general lighting in sleeping rooms. A low level night light may be wall-mounted.

b. Outlets.

(1) Duplex convenience outlets shall be provided in accordance with the National Electrical Code (NEC). In sleeping rooms, outlets shall be provided for each bed and for each desk, and an adequate number of outlets shall also be provided to allow for different furniture arrangements.

(2) Exterior receptacles shall be provided at convenient locations for maintenance tools, lawn equipment, and other like exterior power needs.

(3) Ground fault circuit interrupters shall be provided on bathroom and exterior receptacles.

(4) Clock outlets shall be provided only if electric clocks are to be provided as collateral equipment.

(5) Circuits supplying vending machine outlets shall be sized for expected loads with spare capacity to allow for flexibility.

c. Telephones. One telephone outlet shall be provided for each desk in offices. Consult with the activity to determine number of public telephones to be provided. An empty conduit system shall be installed with provisions for one outlet in each sleeping room.

d. Intercommunications. An intercommunications system shall be provided. See TS-16761 for additional information.

e. Television. A master TV antenna system shall be provided when adequate reception of television stations cannot be obtained on indoor antennas. See TS-16782, Master Television Antenna System, for additional information.

Section 6. INTERIOR DESIGN

1. GENERAL. Refer to NAVFAC DM 36.1 for basic interior design criteria and reference.

2. WARDROBES AND CHESTS.

a. Wardrobes. Three wardrobes shall be provided in each sleeping area regardless of the number of personnel actually programmed to occupy the room. Wardrobes shall be in accordance with TS-12322, Wardrobes; Type I or Type II as required; Condition 1 Size B; Class A (for Navy Unaccompanied Enlisted Quarters) or Class B (for Marine Corps multi-use Unaccompanied Enlisted Quarters).

b. Chests. A removable, three-drawer chest shall be installed in each wardrobe as part of the construction contract. Chests shall be in accordance with TS-12321, Wardrobe Storage Cabinet Three Drawer. Funding for chests shall be from other than MCON.

3. CARPET. Wall-to-wall carpet may be provided where possible within statutory cost limits and where desired by the activity.

a. Occupancy Considerations.

(1) Navy chief's quarters and all Navy Unaccompanied Enlisted Quarters that are to be occupied by female personnel - no restrictions.

(2) Navy Unaccompanied Enlisted Quarters intended for permanent party occupancy, carpet only after consultation with activities to determine the desirability of carpet, and the adequacy of their management and maintenance potential to insure that carpet is feasible.

(3) Navy Unaccompanied Enlisted Quarters intended for occupancy by male personnel in transient status - carpet not permitted.

(4) Marine Corps Unaccompanied Enlisted Quarters - carpet lounges only.

b. Usage Considerations.

(1) Carpet may be provided in all living and sleeping areas except bathroom/lavatory facilities.

(2) Carpet may be provided, where appropriate and feasible, in common-use and circulation spaces such as lobbies, lounges, corridors, and offices. The degree of practicality of carpet for these spaces, however, can vary significantly with different designs, space adjacencies, traffic patterns, and climatic factors. Each facility shall be considered individually, and other floor coverings specified or combined with carpet where carpet is inappropriate or would not provide an adequate life in use. Confined, heavy traffic patterns; building entrances without vestibules and walk-off areas to protect carpet; areas with concentrated, pivoting type wear; and areas directly outside cleaning gear rooms are examples of potential problem areas which should be evaluated and treated individually as required.

(3) Carpet shall not be provided in toilets, laundry rooms, storage and cleaning gear rooms, mechanical equipment spaces, or at vending machine areas.

(4) Carpet quality shall conform to TS-09682, Carpet.

APPENDIX A

Metric Equivalence Chart

Conversions are approximate

72 Square Feet	-	6.70 m ²
125 Square Feet	-	11.63 m ²
130 Square Feet	-	12.09 m ²
270 Square Feet	-	25.11 m ²
165 Square Feet	-	15.35 m ²
480 Square Feet	-	44.64 m ²
85 Square Feet	-	7.91 m ²
18 Inches	-	450 mm
3 Feet	-	900 mm
0.2 Square Feet	-	.018 m ²
4 Feet 6 Inches	-	1 317 mm
20 Feet	-	6 100 mm
10 Cubic Feet Per Minute	-	0.28 m ³ per minute
20 Cubic Feet Per Minute	-	0.56 m ³ per minute
80 Square Feet	-	7.40 m ²
20 Square Feet	-	1.86 m ²
40 Square Feet	-	3.72 m ²
15 Degrees F	-	-9 Degrees C
67 Degrees F	-	19 Degrees C
73 Degrees F	-	23 Degrees C
3 Gallons	-	11 l

REFERENCES

National Electrical Code, (NEC), National Fire Protection Association, Boston, MA 02210.

National Fire Protection Association, (NFFA) Standard Code 101, National Fire Protection Association, Boston, MA 02210.

NAVFACENGCOM Design Manuals and P-Publications

DM-1	Architecture
DM-2 Series	Structural Engineering
DM-3 Series	Mechanical Engineering
DM-4 Series	Electrical Engineering
DM-5 Series	Civil Engineering
DM-8	Fire Protection Engineering
DM-36 Series	Unaccompanied Personnel Housing

Government agencies may obtain Design Manuals and P-Publications from the U.S. Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120. TWX: 710-670-1685, AUTOVON: 442-3321. The stock number is necessary for ordering these documents and should be requested from the NAVFACENGCOM Engineering Field Division in your area.

Non-Government organizations may obtain Design Manuals and P-Publications from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

NAVFACENGCOM Type Specifications

TS-09682	Carpet
TS-12301	Vanities, Prefabricated
TS-12321	Wardrobe Storage Cabinet Three Drawer
TS-12322	Wardrobes
TS-16761	Intercommunication System
TS-16782	Master Television Antenna System

Type Specifications are available, free of charge, from the U.S. Naval Publications and Forms Center, Philadelphia, PA 19120.

Reference-1