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MILITARY HANDBOOK

ADMINISTRATIVE FACILITIES



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ABSTRACT

Design criteria for use by experienced architects and engineers are presented for facilities covered by Category Class 600. The contents include criteria for Navy and Marine Corps administration buildings and related facilities. This includes architectural, mechanical, and electrical requirements; interior systems requirements; electromagnetic compatibility requirements; areas housing electronic equipment; TEMPEST requirements; and requirements for security and restricted areas, plus designs and types of flagstaffs.

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## FOREWORD

This handbook has been 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 (NAVFACENGCOM), other Government agencies, and the private sector. This handbook was prepared using, to the maximum extent feasible, national professional society, association, and institute standards. Deviations from these criteria, in the planning, engineering, design, and construction of Naval shore facilities, cannot be made without prior approval of NAVFACENGCOM HQ Code 04.

Design cannot remain static any more than the functions it serves or the technologies it uses. Accordingly, recommendations for improvement are encouraged and should be furnished to Commander, Naval Facilities Engineering Command, Western Division, Code 406C, P.O. Box 727, San Bruno, California 94066-0720, telephone commercial (415) 877-7422.

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCE DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

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ADMINISTRATIVE FACILITIES CRITERIA MANUALS

<u>Criteria</u> <u>Manual</u>	<u>Title</u>	<u>PA</u>
MIL-HDBK-1034	Administrative Facilities	WESTDIV

Note: This handbook is issued to provide immediate guidance to the user. However, it may or may not conform to format requirements of MIL-HDBK-1006/3 and will be corrected on the next update.

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Section 1: INTRODUCTION

1.1 Scope. This military handbook provides design criteria for Navy and Marine Corps administration buildings and related facilities at shore activities.

1.2 Related Criteria. All documents referenced in this military handbook are included in the REFERENCES. Publications from which criteria in this handbook were developed but not specifically referenced as well as suggested readings are included in the BIBLIOGRAPHY.

1.3 Cancellation. This handbook, MIL-HDBK-1034, supersedes and cancels NAVFAC DM-34, Administrative Facilities, of March 1981.

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## Section 2: DESIGN/PLANNING CONSIDERATIONS

2.1 Predesign Planning. All administration building requirements and components should be identified and outlined in a comprehensive program.

2.1.1 Square Footage Criteria. Square footage criteria should be established based on the functional requirements of each job category including worksurface, storage, office equipment, and meeting areas. (Refer to NAVFAC P-80, Facility Planning Criteria for Navy and Marine Corps Shore Installations, and MIL-HDBK-1190, Facility Planning and Design Guide, for guidelines.)

2.1.2 Expansion. In administration building design, taking plans for expansion of the Station into consideration is particularly important, since any such expansion may result in a corresponding increase in administrative workload and increased space requirements.

2.1.2.1 Service Core. Where future expansion is contemplated, the service core (that is, reception, circulation, toilet, storage, and mechanical facilities) should be designed to accommodate such expansion.

2.1.2.2 Short-Term Expansion. To maximize flexibility and operating efficiency, short-term expansion (growth within 2 years of occupancy) should be incorporated into the building area and distributed throughout the facility, adjacent to the functional units requiring the additional space.

2.2 Site Planning. The site location must agree with the Base Master Plan and Base Exterior Architecture Plan.

2.2.1 Administration Building. The administration building should be centrally located in relation to the activity or subsidiary group that provides its workload; e.g., public work groups or training groups and supply groups. In addition, the administration building should occupy a prominent position at the activity or the subsidiary group's main approach roads. The site should provide ample area for initial construction, parking, and roadways plus any possible expansion.

2.2.2 Parking. Provide parking facilities at the sides and/or rear of the administration building. Avoid parking in front of and directly adjacent to the building. Parking for the staff and the handicapped should be provided near a building entrance. Consider screening parking areas to make them less conspicuous. Parking areas should be located to prevent cars from backing into oncoming traffic when pulling out of parking spaces. (Refer to the NAVFAC P-272, Definitive Designs for Naval Shore Activities, and DD-1404370, Parking Area Criteria for Vehicles, for additional information.)

2.2.3 Flagstaff. The flagstaff should be the focal point of the Station and located in front of the administration building in a dignified, formal setting, removed from the visual distraction of parked vehicles.

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2.3 Design Character. Architectural treatment should express the administration building's significance as the activity's command and reception center. Building massing (number of stories, heights, and roof pitches) should relate to internal programmatic requirements, and the primary entrance to the facility should be clearly visible. Exterior building materials should be compatible with those of the surrounding buildings.

2.4 Design Factors. Administration buildings must be organized for ready access to public areas and general work areas and for controlled access to more sensitive areas. Although operational requirements can vary, the following areas are common to virtually all administration buildings:

2.4.1 Reception Area. Unless the mission of the administration building requires absolute exclusion of the public, functional arrangements should provide for orderly, pleasant reception and direction of visitors.

2.4.2 Lobby Area. Provide facilities for information, reception, and waiting.

2.4.3 Toilets. Toilets should be convenient to the lobby and be properly identified.

2.4.4 Private Offices. Size and assignment of private offices should be based on rank or function and located to provide proximity to related work areas.

2.4.4.1 Command Suite. Offices of Commanding and Executive Officers should be adjacent to each other and connected to administrative support areas. These executive offices should be isolated from the building's main traffic flow and enclosed by permanent partitions. The Commanding Officer's office must receive the same careful architectural treatment as the lobby, since it, too, serves as a reception area for important visitors. Consideration should also be given to private entrance and exit requirements, private toilet facilities, and overall security of the suite.

2.4.4.2 Other Executive Offices. Other executive offices should be located consistent with organizational relationship and supervisory requirements.

2.4.5 General Offices. It is desirable to provide large, clear areas for general office space, to permit flexibility in reapportionment of spaces. These areas should be designed around a modular scheme for the greatest possible flexibility in arrangement. Where individual offices are required within general office areas, they should be enclosed by lightweight, movable partitions. Select movable partitions to satisfy visual, acoustical, and access requirements of the spaces being enclosed, in accordance with criteria set forth in this handbook. (Refer to Paragraphs 4.1.3, 4.8.4, and 4.8.5 for additional information.)

2.4.6 Communications Areas. Requirements for communications may range from relatively simple installations to complex radio and electronics facilities. (Refer to Paragraph 4.9 for special requirements for areas housing electronic equipment.)

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2.4.7 Circulation. Stairs, corridors, elevators, and other means of circulation should occupy minimum space consistent with efficiency and safety.

2.4.8 Ancillary Spaces. Provisions for the following areas may be required: utility areas; storage areas, coffee/vending areas, break-rooms, conference areas, reproduction areas, minicomputer areas, word processing, maintenance/janitorial/housekeeping areas, computer rooms, mailrooms, central supply, and telephone switchboard.

2.4.9 Building Design and Materials. The building design and materials shall be in compliance with the standards set forth in the Occupational Safety and Health Act of 1970 (OSHA), Public Law 91-596, and all applicable DOD and Navy safety and health requirements and conformance standards.

2.4.10 Colors. Colors shall be in accordance with NAVFAC P-309, Color for Naval Shore Facilities; DM-1.01, Basic Architectural Requirements and Design Considerations; and established Base color themes.

2.4.10.1 Color Perception. Color as perceived by the human eye is the product of light wavelengths in the visible spectrum being absorbed and reflected from an object. The degree of ray penetration depends on the texture and porosity of the receiving object. Objects themselves have no color. The color of an object is determined by its ability to absorb light rays. Thus, a color surface will reflect the spectrum color it does not absorb. Yet, because objects do not absorb the same quantity of light at each wavelength, various colors are produced. A wall that appears blue to the eye is reflecting blue rays while absorbing all others. White surfaces reflect all color, absorbing none. Black surfaces absorb all wavelengths, reflecting none.

2.4.10.2 Color Properties. Color has three distinct properties: hue, value, and intensity. Hue is the designation or name of a color, such as red. Value is the designation for the brightness of a hue, its degree of lightness or darkness. Intensity is the designation for the saturation of a hue. It is the degree to which a hue is lacking any white pigment.

2.4.10.3 Cool Colors. Cool colors include blue, violet, green, blue-green, and yellow-green and are considered psychologically relaxing and mentally elevating when viewed above eye level. They appear spacious and enlightening when viewed from the side and smooth and hard when viewed from below.

2.4.10.4 Warm Colors. Warm colors include red, red-orange, red-violet, yellow, yellow-orange, and yellow-green and are considered stimulating when they come from above. They produce a warm feeling when they come from the side and have an elevating effect when positioned at eye level or below.

2.4.10.5 Emotional Responses to Color. Emotional responses to color are influenced by viewing conditions, the manner in which color is used on surrounding objects and surfaces, and the size and relationship of these factors.

2.4.10.6 Mental Responses to Color. Color elicits various mental responses that can stimulate the imagination and create, attract, and maintain interest.

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2.4.10.7 Color Application. A conservative approach to color is best for small enclosed spaces, such as interior offices. Too much intense hue will psychologically tire an occupant quickly.

2.4.10.8 Value and Intensity of Hue. Value and intensity of hue play crucial roles in the specification of color. The lighter, more pastel, and neutral values provide better design solutions for background areas of floors, walls, and ceilings. Neutral colors are less inhibitive when used in materials and furnishings. They reflect light better, provide an open expansion to the space, and support the use of deep value accents or patterned materials.

2.4.10.9 Strong Colors. Strong colors, if used too extensively on one side of a room, create a spatial imbalance.

2.4.10.10 Pale Pastel Colors. Pale, pastel colors make walls look light, contributing to a feeling of openness. In a small room, walls can be made to seem to recede by painting them in light values of cool colors such as green or blue. Saturated colors absorb a great deal of light, contributing to a sense of heaviness.

2.4.10.11 Principles of Spatial Manipulation. The following statements are principles of spatial manipulation through the use of color:

- a) Dark ceilings will visually lower the apparent height of a room.
- b) Dark or strong-valued ceilings and floors will jointly unify a space.
- c) Light ceilings will visually increase the apparent height of a room, while light walls will expand a space.
- d) Strong color on an end wall will visually shorten the length of a room. Conversely, cool colors will recede a plane.
- e) Strong color on a wall will call attention to itself.
- f) A brightly colored wall will appear larger than it actually is, because the retina is more actively stimulated than with a greyed hue.
- g) A light wall will emphasize dark objects placed in front of it.
- h) A dark wall will make light colors or tints appear brighter.
- i) Color can direct movement through a space: in furnishings, in graphics, or through the relationship of colors between surrounding and adjoining spaces.
- j) Light objects will appear larger in dimension against a white background.
- k) In order to balance light and dark areas in relation to one another, light areas should be smaller in size than dark areas.



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1) Strong color, coupled with texture, can camouflage undesirable architectural elements.

m) Colors affect and modify one another. Therefore, it is necessary to give careful consideration to the effects of one color on another.

o) Colors of deep value in too great a quantity will make the walls of a room appear heavy; pale colors will impart a feeling of lightness and expansion.

2.4.11 Signage. A sign system shall be provided for direction, identification, and regulation of spaces. Both interior and exterior signs shall be included to orient, direct, and control pedestrian and vehicular traffic (refer to NAVFAC NFGS-10440, Signs).

2.4.12 Vending/Cafeteria Area. The Randolph Sheppard Act requires that an invitation be given to blind vendors to establish a vending or cafeteria area within the building.

2.4.13 Access for the Physically Handicapped. The building shall be designed to ensure accessibility for the physically handicapped in accordance with NAVFAC DM-1 Series, Architecture; MIL-HDBK-1190; American National Standards Institute (ANSI) A117.1, Specifications for Making Buildings and Facilities Accessible By Physically Handicapped People; and the Uniform Federal Accessibility Standards, Federal Register, Vol. 49, No. 153, August 7, 1984.

2.4.14 Security. Identify all areas requiring physical security with the user agency of the specific administration facility; security provisions shall be in compliance with MIL-HDBK-1013/1, Physical Security. Some areas in administration buildings have special requirements for excluding unauthorized personnel and for protecting Government property and classified information. Coordinate with the project sponsor to obtain applicable security requirements. General requirements for physical security are included in OPNAVINST 5530.14A, Physical Security and Loss Prevention Manual, Office of the Chief of Naval Operations, 16 September 1985. OPNAVINST 5510.1G, Information and Personnel Security Program Regulations, Office of the Chief of Naval Operations, shall apply for classified information. All areas requiring security measures should be grouped together to facilitate control. These restricted areas are classified as follows:

2.4.14.1 Exclusion Area. An exclusion area is an area containing classified information of such nature that access to the area constitutes, for all practical purposes, access to classified information.

2.4.14.2 Limited Area. A limited area is defined as an area containing classified information and in which uncontrolled movement would permit access to the classified information, but within which access may be prevented by escort and other internal restrictions and controls.



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2.4.14.3 Controlled Area. A controlled area is defined as an area within which uncontrolled movement does not permit access to classified information. It is designed for the principal purpose of providing administrative control, safety, or a buffer area of security restriction for limited or exclusion areas.

2.4.14.4 Restricted Area. Controlled areas, limited areas, and exclusion areas shall not be designated in any way that outwardly notes their relative sensitivity. Any such area will be identified as a restricted area.

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## Section 3: BUILDING SYSTEMS REQUIREMENTS

3.1 Structural. Structural design for administration buildings should be in compliance with NAVFAC DM-2 Series, Structural Engineering; NAVFAC P-355, Seismic Design for Buildings; and MIL-HDBK-419, Grounding, Bonding, and Shielding for Electronic Equipment and Facilities.

3.2 Civil. Site work, roadways, parking, and walks for administration buildings shall be designed in compliance with NAVFAC DM-5 Series, Civil Engineering.

3.3 Mechanical. Refer to MIL-HDBK-1190 for overall mechanical engineering criteria.

3.3.1 Plumbing. Provide plumbing in accordance with NAVFAC DM-3.01, Plumbing Systems. Combustible plastic piping should not be used in return air plenums.

3.3.2 Heating, Ventilation, and Air Conditioning. General heating, ventilation, and air conditioning should be provided in accordance with NAVFAC DM-3.03, Heating, Ventilating, Air Conditioning, and Dehumidifying Systems, and DM-3.01. (Refer to Paragraph 4.3.)

3.3.2.1 Special Temperature and Humidity Control. Automated office equipment may require special temperature and humidity control; obtain manufacturer's technical data to establish appropriate design criteria.

3.3.2.2 Smoke Exhaust System. Conference rooms and office areas may require special smoke exhaust systems; establish requirements with the user agency.

3.3.2.3 Combustible Materials. Combustible pneumatic thermostat lines should not be used in return air plenums.

3.3.3 Fire Protection. Fire protection systems should be designed in accordance with NAVFAC MIL-HDBK-1008, Fire Protection for Facilities Engineering, Design and Construction, and National Fire Protection Association (NFPA) 101, Life Safety Code.

3.4 Electrical. Electrical and communication service should be provided in accordance with NAVFAC DM-4 Series, Electrical Engineering, and NFPA-70, National Electric Code.

3.4.1 Communications. Provide telephone service entrance supporting facilities, telephone backboards, conduit runs, and outlet boxes for telephones. Locate telephone outlet boxes in each office as stipulated in the design program. Provide outlets for public telephones as required. Special requirements for areas housing electronic equipment are covered in Paragraph 4.9.

3.4.2 Lighting. Provide lighting in accordance with the design criteria in MIL-HDBK-1190. (Refer to Paragraph 4.5.)

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3.4.3 Power Requirements. Provide power and control equipment in accordance with DM-4.04, Electrical Utilization Systems. (Refer to Paragraph 5.4.) Conference rooms, briefing theaters, and other assembly areas may require additional electrical systems to support rear view, overhead, and video projection capabilities and public address sound systems.

3.5 Energy Conservation. The building shall be energy efficient and its design shall take into consideration siting, orientation, and outdoor design conditions.

3.5.1 Guidelines. Guidelines for indoor design conditions, ventilation and infiltration rates, solar screening, building envelope, and insulation factors are included in NAVFAC DM-3 Series, Mechanical Engineering, and DM-1.01.

3.5.2 Standards. Standards for Energy Monitoring and Control Systems (EMCS) are included in NAVFAC DM-4.09, Energy Monitoring and Control Systems.

3.6 Requirements for Security and Restricted Areas. Provide physical security in accordance with MIL-HDBK-1013/1. General security requirements in administrative facilities are described in paras. 3.6.1 and 3.6.2.

3.6.1 Vaults. When new vaults or strong-rooms are constructed, they shall be built in accordance with the standards specified in the Security Manager's Handbook.

3.6.2 Physical Security. Physical security is that part of an overall security program concerned with the physical measures designed to prevent unauthorized access to facilities, equipment, material, and documents and to safeguard them against espionage, sabotage, damage, theft, vandalism, or other covert acts. These physical measures include, but are not limited to, physical barriers, protective lighting, electronic alarm systems, and functional arrangement of spaces to discourage unauthorized access.

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## Section 4: INTERIOR SYSTEMS REQUIREMENTS

4.1 Space Planning. Careful interior planning and design are necessary for administration facilities in order to ensure the most efficient, productive work environment. Space planning should originate in the conceptual design stage of the project. Furniture and equipment layout sketches should be developed in this early stage and incorporated into all additional submittal stages. Consideration of methods to control natural light and temperature effects should also be incorporated to assure that the solutions are integrated into the total building concept. This process will enable potential problems to be recognized and corrected.

4.1.1 Building Elements. Building elements such as building module, column bay spacing, window-to-building core dimensions, and window spacing should be evaluated as they relate to the sizes of offices, workstations, and equipment outlined in the user program (Figure 1).

4.1.2 Floor Size and Building Configuration. Floor size and overall building configurations should respond to the requirements of the user agency (Figure 2).

4.1.3 Zoning Diagrams. To ensure maximum flexibility, zoning diagrams should be developed to allow the best distribution of open or enclosed spaces to respond to specific program data and management objectives (Figure 3).

4.1.4 Planning Criteria. Specific planning criteria should be developed regarding entry, circulation, office placement, and workstation placement. This criteria will become the basis of the initial space layout and for any future changes. As such, they will maintain spatial clarity and ensure optimum utilization of the facility.

4.2 Space Standards. Configurations and space standards for individual workspaces should be developed for offices and workstations based upon functional requirements, including worksurface, seating, storage, meeting/supervisory activities, equipment, and privacy requirements.

4.2.1 Automated and Conventional Workstations. Automated workstations (an organization of computer-interfaced equipment and task-supportive furniture distinguished from the conventional workstation by the type and quantity of equipment, the particular requirements of the tasks, and the criteria that govern the design of its furnishings) require 10 to 15 percent more area than conventional workstations (an organization of separate components that support standard tasks and equipment such as typing and dictation).

4.2.1.1 VDT/Keyboard Configuration. VDT keyboard configurations require deeper worksurfaces than conventional typewriters.

4.2.1.2 Conventional Task Space. Space must be provided for conventional tasks in addition to electronic equipment.

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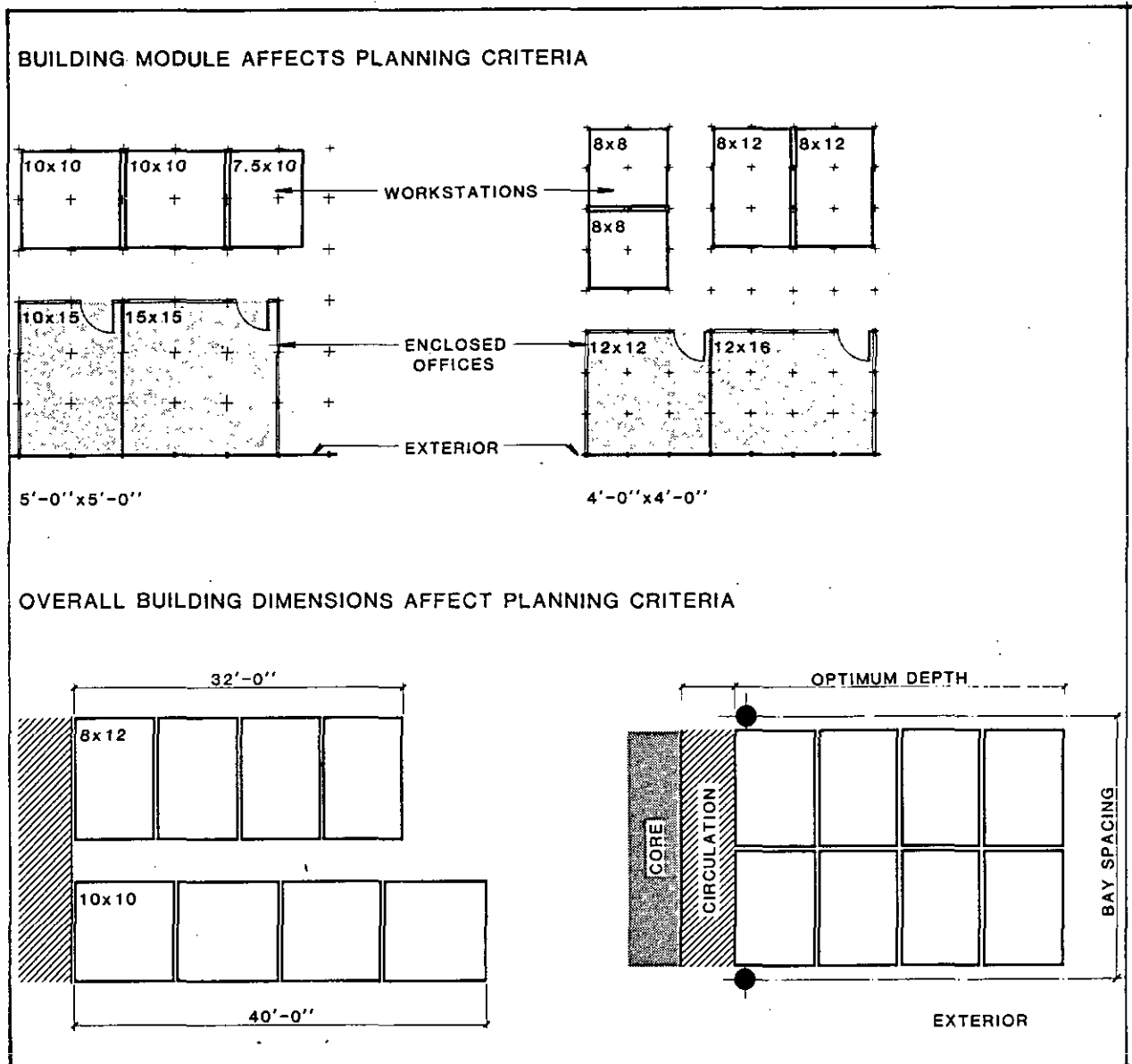
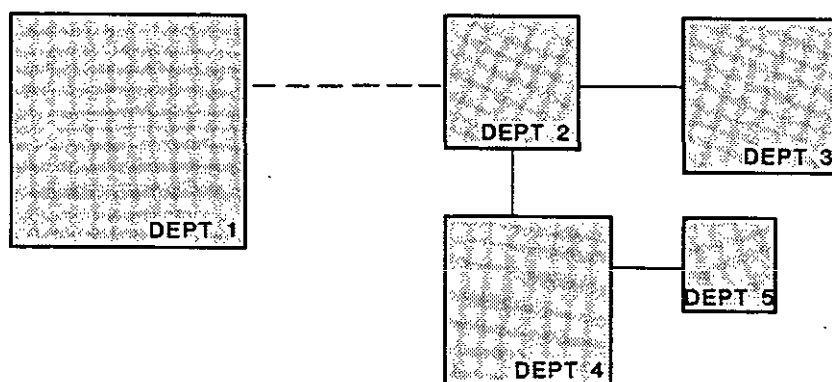


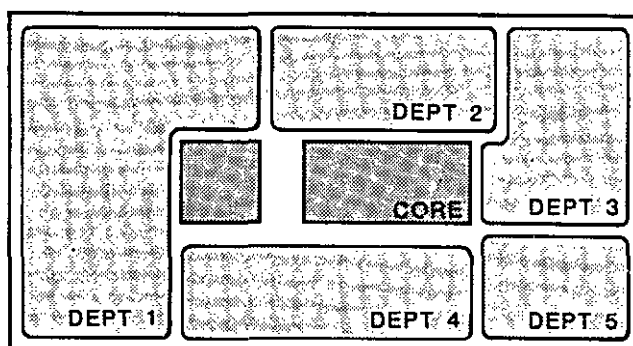
Figure 1  
Building Module and Dimensions Affect Planning Criteria

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## PROPORTIONAL DIAGRAM



## PLAN OPTIONS



OR

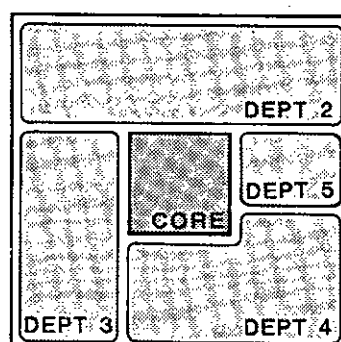
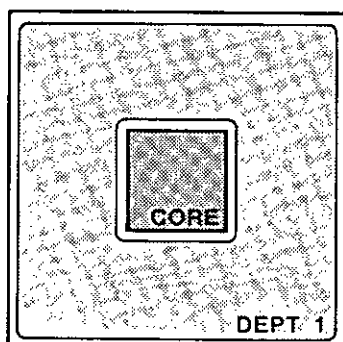
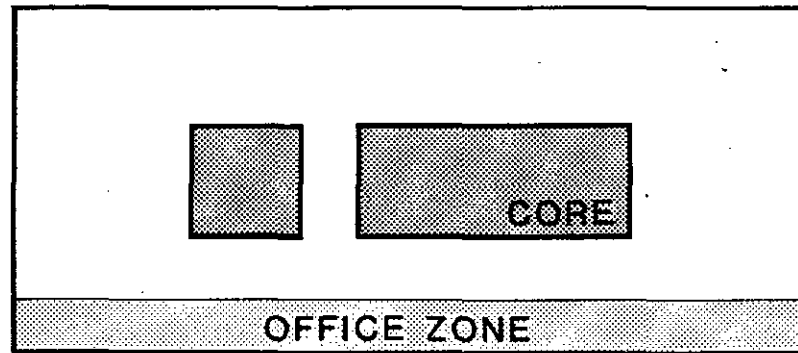


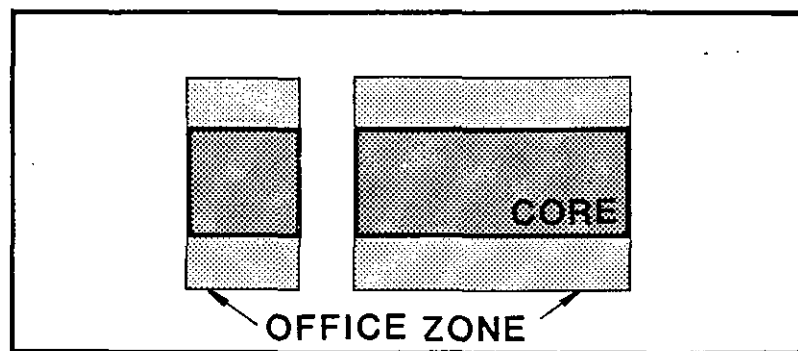
Figure 2  
Block Diagrams

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## CIRCULATION/ENCLOSURE ZONING



OR



OR

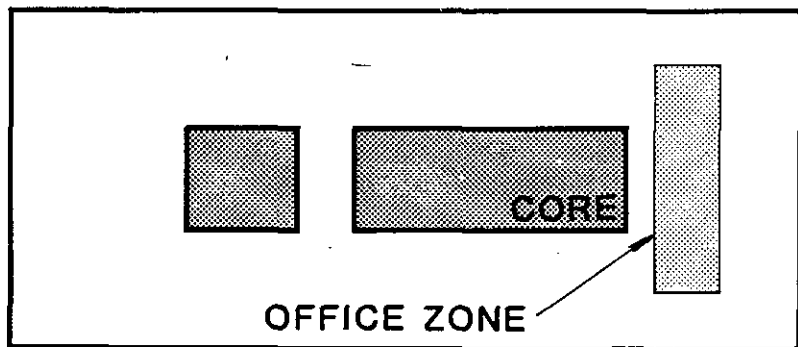


Figure 3  
Zoning Diagrams

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4.2.1.3 Additional Equipment. Additional peripheral equipment such as disk drives, printers, and media storage may be required.

4.2.1.4 Special Equipment Requirements. Special requirements of specific equipment for access, ventilation, or acoustical separation may require additional space.

4.2.2 Shared Equipment. Shared equipment may require the development of specially configured work areas containing terminals, controllers, printers, viewers, etc., for general use of the work unit as a whole. Specific requirements should be determined with the user agency.

4.3 Human Comfort. The increased usage of electronic equipment in administration facilities has generated the need to ensure productive comfort levels and proper equipment operations by considering the following factors in developing the HVAC systems design:

4.3.1 Temperature. The ambient temperature of office space is affected by the cumulative heat generated by electronic equipment.

4.3.1.1 Equipment. The user agency should specify low heat generating equipment.

4.3.1.2 Equipment Distribution. Distribute equipment uniformly throughout the space or provide special consideration for equipment-intensive areas. (Refer to Paragraph 4.9 and NAVFAC DM-12.01, Electronic Facilities Engineering.)

4.3.1.3 Heat Emission. Direct heat emission away from the operator and neighboring individuals.

4.3.2 Humidity/Static Control. HVAC systems design should maintain relative humidity levels within the human comfort range and proper operating levels for electronic equipment. Design for a relative humidity range between 40 percent and 60 percent in office areas. Specify antistatic carpet and fabrics. Maintain relative humidity above 30 percent.

4.3.3 Fresh Air. Provide fresh air flow requirements in accordance with NAVFAC DM-3 Series.

4.4 Power, Telephone, Data Distribution. With the advances in electronic equipment, the introduction of computers into the office environment, and the proliferation of telecommunications, the concealed routing of cable to the end user point requires careful planning.

4.4.1 Power. Provide power outlets for offices and workstations as identified in the design program. In addition, provide duplex convenience outlets approximately every 30 feet in corridors and other areas to allow use of janitorial equipment and other portable appliances. The following alternatives are currently available for wiring distribution systems:



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4.4.1.1 Poke-Through System. Conduit or flexible wiring is brought through a hole or sleeve in the floor slab from the ceiling plenum below. This system offers low initial cost but provides less capacity and flexibility than other systems.

4.4.1.2 Power Pole System. Wiring is brought through a pole from the ceiling above. This system offers better flexibility but contributes to the visual clutter of the space.

4.4.1.3 Conventional Walls and Columns. Wiring is brought from the ceiling through walls and columns to desired locations. This system does not always allow the wires to be located where they are needed, especially in open plan areas.

4.4.1.4 Wired Slabs. Wiring is brought through floor duct systems or through cellular raceways in the structural pan. These systems require an integrated design approach that incorporates the design of workstations and their spacing with the location of predetermined outlet inserts.

4.4.1.5 Flat Conductor Cable. This system requires junction boxes at the base of columns or core walls from which flat cable can be run wherever required. It must be used in conjunction with carpet tile.

4.4.1.6 Raised Floor Systems. These consist of a substructure that holds a floor panel system 3 to 18 inches above the subfloor. This system has the greatest flexibility and capacity but has high initial cost.

4.4.2 Communications. Provide telephone service entrances, telephone cabinets, wire distribution system, and outlet boxes for telephones.

4.4.2.1 Telephone Outlet Boxes. Locate telephone outlet boxes as stipulated in the design program and provide outlet boxes for public telephones as required.

4.4.2.2 Installation of Communications Systems. There are two methods of installing communication systems: obtain telephone service (interior cable and end user instruments) via competitive procurement or obtain basic service from the local franchised common-carrier company and have cable and equipment installation provided by the general contractor.

4.4.2.3 Interior Telephone Service. Interior telephone service (and the upgrade of existing cable distribution systems) should be coordinated with the local franchised common carrier, COMNAVTELCOM, or other Navy/DOD entity responsible for telephone service.

4.4.3 Data. The location of electronic equipment in the office environment may require connecting cables from the central processing unit (CPU) to specific terminals and/or printers or connecting several computers together in a Local Area Network (LAN).

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4.4.3.1 Distribution of Data Cable. Distribution of data cable may be accomplished by any of the methods listed in Paragraph 4.4.1, with the exception that some equipment manufacturers may not endorse flat cable.

4.4.3.2 Installation of Local Area Network (LAN). There are two methods of installing LAN: general contractor provides the wire distribution system only (the actual data cable is provided by the equipment installer) or the general contractor provides the complete LAN including distribution system and wiring.

4.5 Lighting. Provide energy efficient lighting in accordance with the design criteria in MIL-HDBK-1190 and NAVFAC DM-4.04.

4.5.1 Lighting Design Application. In administrative facilities, the emphasis should be placed on the design application. Consider the quality of the light as well as the quantity of light. Avoid excessive amounts of illumination and glare.

4.5.1.1 Vidio Display Terminal (VDT) Area. Avoid high lighting contrasts in VDT use areas. The brightness ratios between the keyboard, the screen of the video display terminal, and surrounding surfaces should be 1:3:10, respectively.

4.5.1.2 Reflectance Values. Select materials with reflectance values as follows: walls 40-80 percent, furniture/vertical surfaces 40-70 percent, worksurface 30 percent maximum, ceilings 80-90 percent, floors 20-40 percent.

4.5.1.3 Location of VDT Terminals. When placing VDT terminals in the office environment, locate the VDT screen perpendicular to the window plane; locate light fixtures to reduce reflections in the screen (Figure 4).

4.5.1.4 Lamps. Select energy-efficient, long-life lamps with color temperature in the 4,000 degree Kelvin range.

4.5.1.5 Maintenance. Consider ease of accessibility for bulb replacement and maintenance.

4.5.2 General (Ambient) Lighting. General (ambient) lighting can be provided by fixtures that direct light directly into the space (direct lighting) or by reflecting the light off of a surface such as the ceiling plane (indirect lighting).

4.5.2.1 Recessed Ceiling Fixtures (Direct). Use energy efficient fixtures with low brightness lenses or parabolic baffles to reduce glare (Figure 5).

4.5.2.2 Baffled Ceiling Fixtures (Direct). Locate fixtures in the ceiling above a reflective baffle system; this system can also conceal mechanical systems and provide additional acoustical control (Figure 6).

4.5.2.3 Pendant Ceiling Fixtures (Indirect or Direct). Fixtures suspended below the ceiling can provide excellent indirect light quality. Correct spacing between fixtures and distance from the ceiling plane will ensure even distribution and minimize hot spots. Direct down light components provide selected accent lighting (Figure 7).

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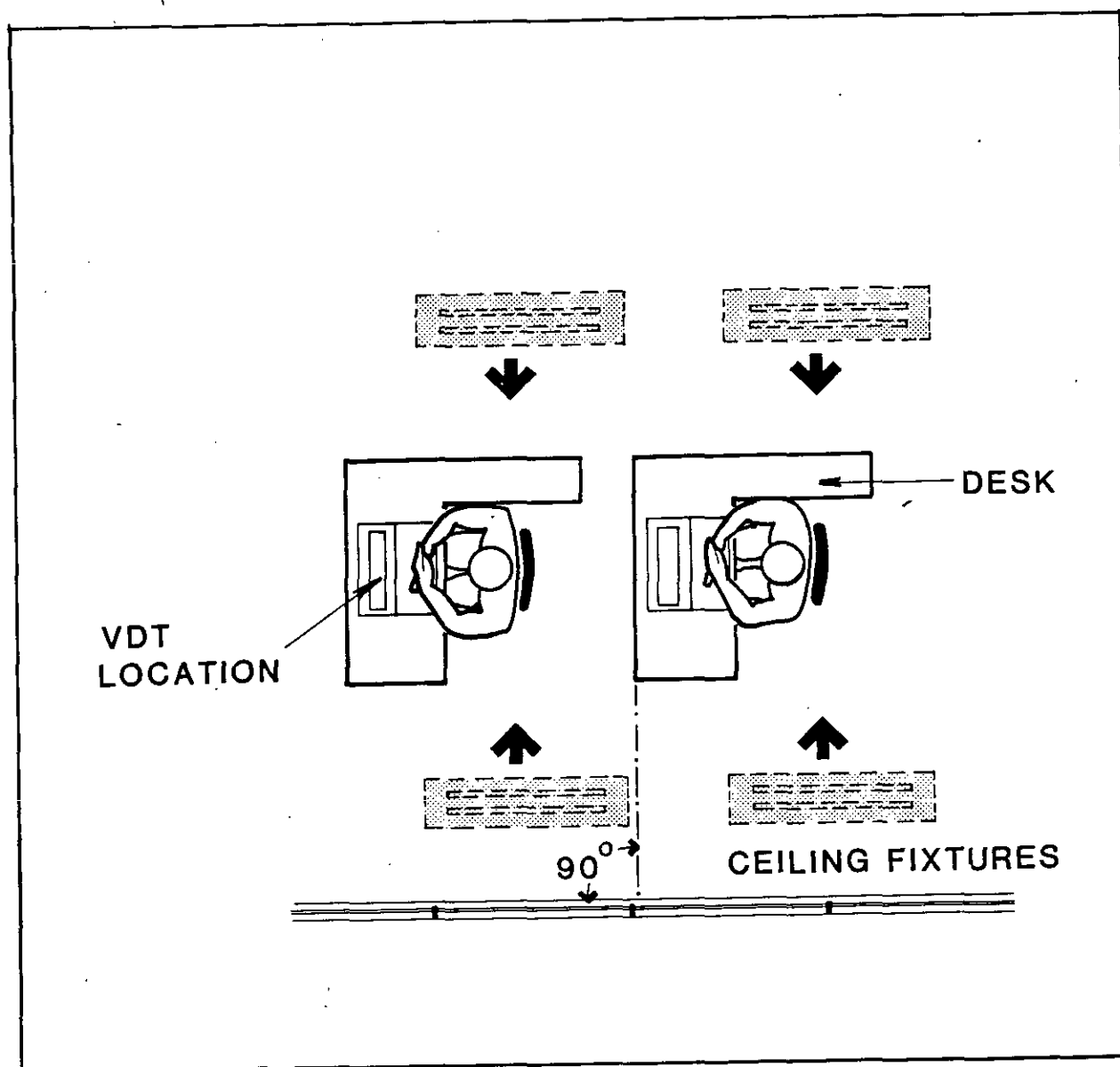


Figure 4  
Video Display Terminal Location

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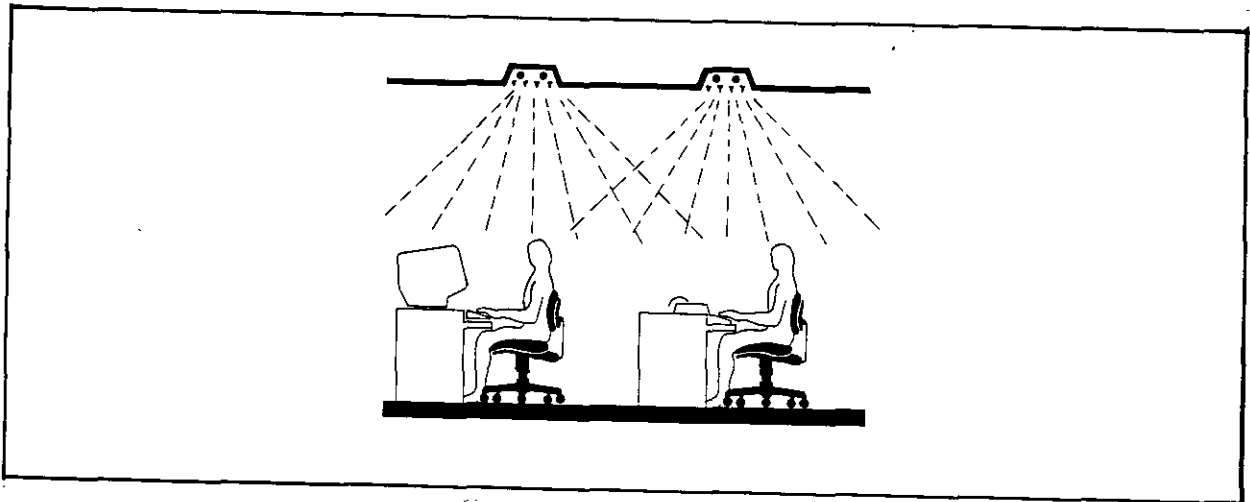


Figure 5  
Recessed Ceiling Fixtures

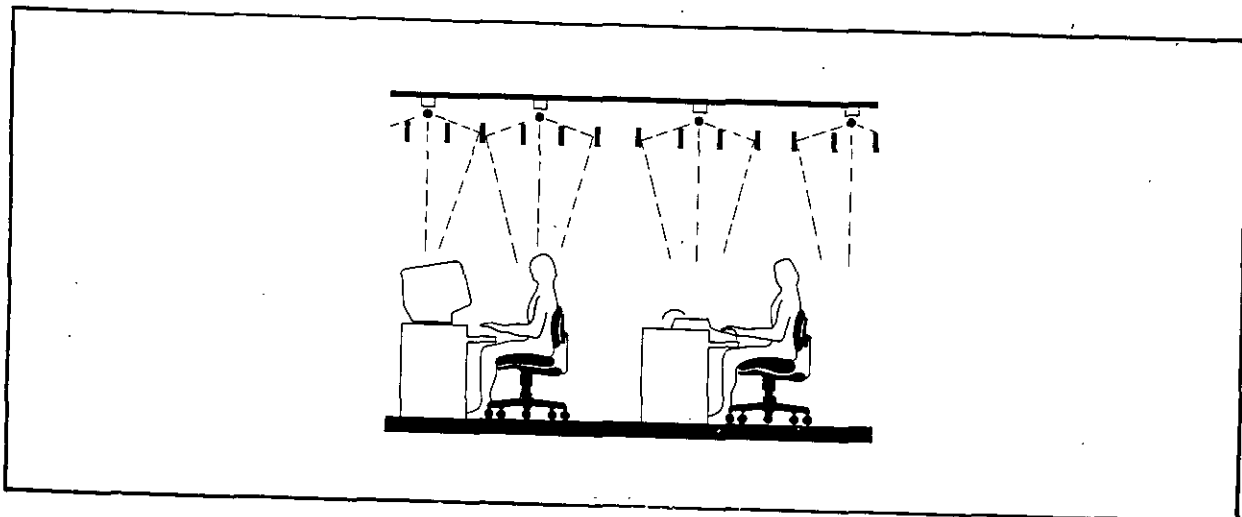


Figure 6  
Baffled Ceiling Fixtures

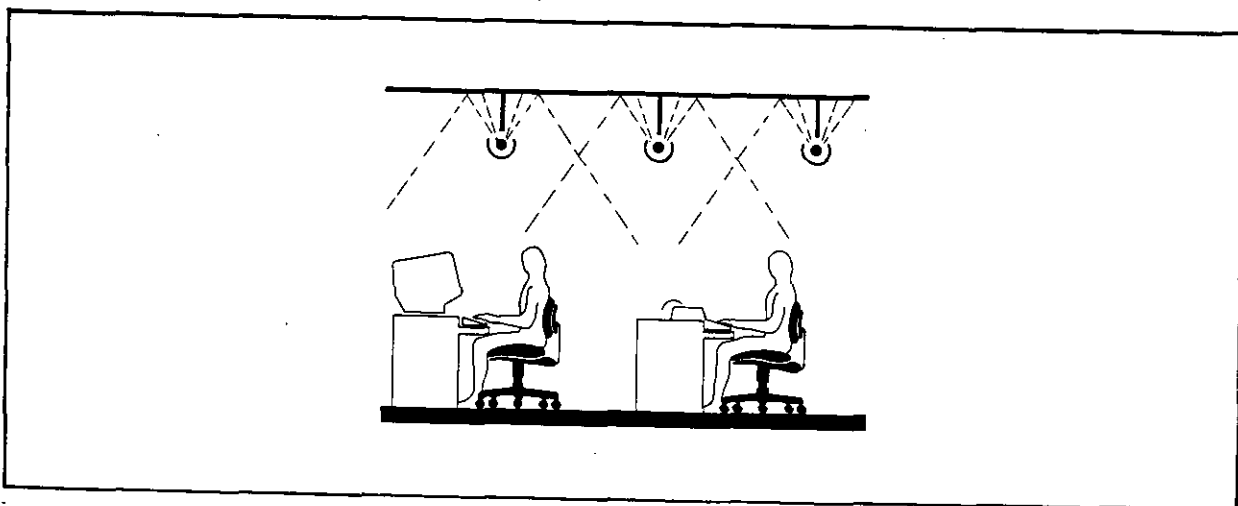


Figure 7  
Pendant Ceiling Fixtures

4.5.2.4 Floor- or Furniture-Mounted Fixtures. Floor-supported pedestals or furniture-mounted fixtures (indirect) eliminate fixtures from the ceiling plane. Lighting design may be disrupted by relocation of furniture as changes occur (Figure 8).

4.5.3 Task Lighting. Task lighting or lighting for use on a particular task or work area supplements general ambient lighting. Placement and design of the fixture and lens should prevent glare and veiling reflections (Figure 9).

4.5.4 Accent Lighting. Provide selected accent lighting on vertical surfaces to add shape and focus to the space.

4.5.5 General Maintained Light Levels. This information is further defined to provide the following general maintained light levels: general ambient (overall light level in corridors and non-task-related areas) - 30 footcandles, (consider that screening panels will cast shadows and reduce effective light levels), worksurfaces - 50 footcandles, and conference or meeting areas - 30 footcandles.

4.6 Acoustics. Provide acoustical control in compliance with NAVFAC DM-1.03, Architectural Acoustics. In the administration facility, consider provisions to provide normal speech privacy (defined as the ability to hear conversations in adjacent workspace without understanding the overall meaning and content) in open plan and office areas; provide control for airborne and structure-borne noise from equipment.

4.6.1 Noise Transfer. Plan offices and locate workstations with adequate distance and entry orientation to minimize noise transfer.

4.6.2 Acoustically Absorbent Ceilings. In open areas, provide acoustically absorbent ceilings and select light fixtures that will minimize the reflection of sound.

4.6.3 Sound Masking. Consider masking sound for open plan areas. (Refer to DM-1.03.)

4.6.4 Acoustical Hoods and Isolation Pads. Provide acoustical hoods or isolation pads for printers and equipment generating impact noise.

4.7 Materials and Finishes. Specifications for interior materials and finishes shall comply with NAVFAC DM-1 Series.

4.8 Furnishings. Furniture selections should be made to best support the activities being performed in the office or workstation. These activities will vary depending on the job responsibilities. Some typical functional job categories are management, professional, technical, data entry, clerical, etc.

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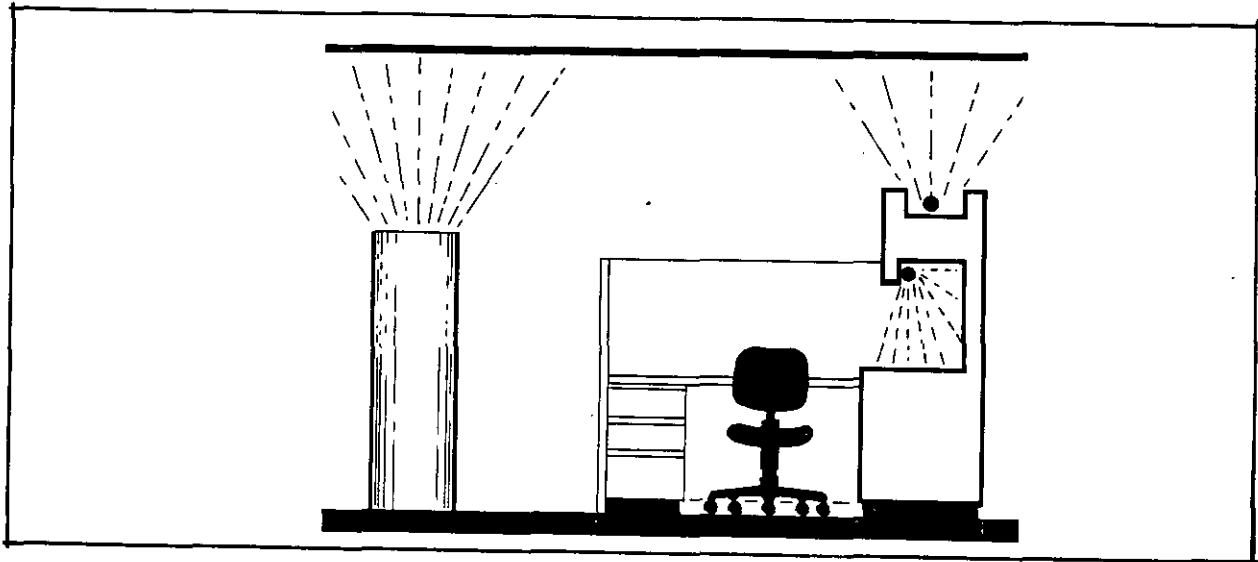


Figure 8  
Floor-/Furniture-Mounted Fixtures

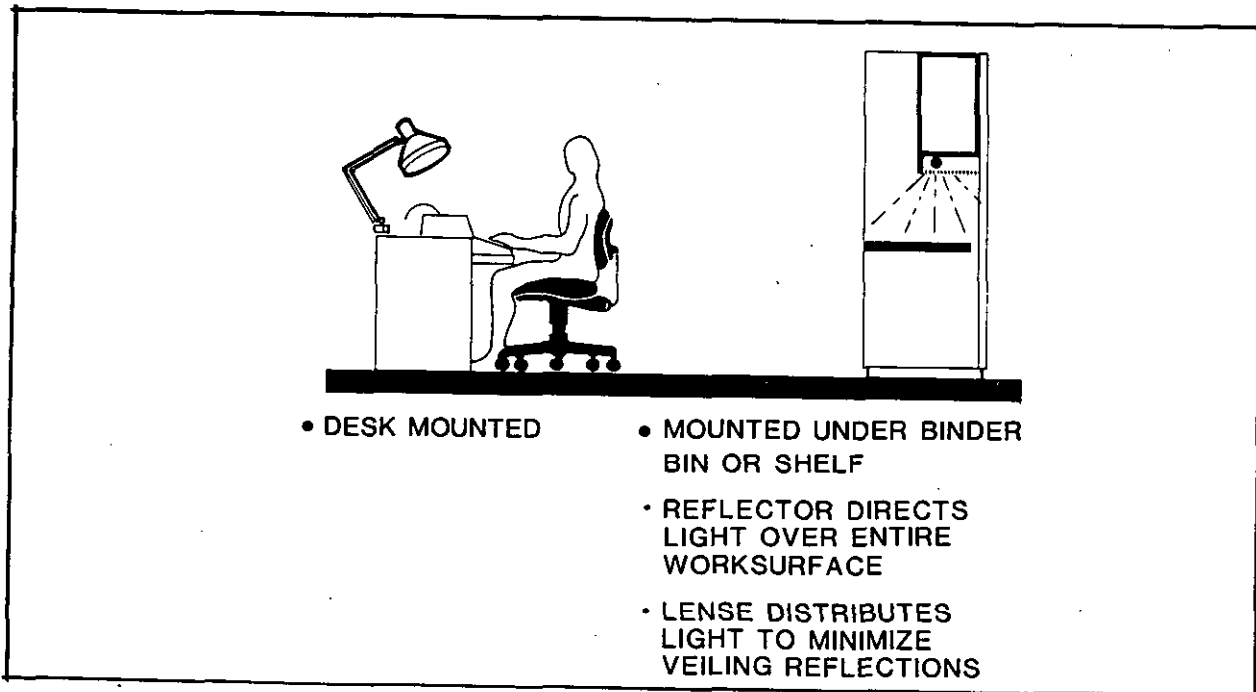


Figure 9  
Task Lighting

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4.8.1 Task Requirements. Consider what the person actually does and what is required to accomplish the task. Issues for consideration include:

- a) Frequency of meetings held in the work area and the number of participants at each meeting.
- b) Confidentiality of information handled and conversations held.
- c) Number, duration, and purpose of telephone conversations.
- d) Requirement for concentration and freedom from distractions in order to plan, read, write, etc.
- e) Storage for files, binders, reports, books, reference manuals, equipment, etc.
- f) Electronic equipment activities such as data entry, data retrieval, word processing, programming.

4.8.2 Furniture Options. There are three basic furniture options:

4.8.2.1 Conventional Furniture. Conventional furniture such as desks, chairs, tables, etc., accommodates tasks related to traditional work activities and equipment (typing, reading, writing, dictation, etc.) but does not always meet the needs of automated equipment. Some manufacturers are developing furniture items to support automated equipment in a conventional environment.

4.8.2.2 Systems/Modular Furniture. Structural panels that support work surfaces, lighting, and storage components provide privacy and acoustical control in an open environment. These systems allow great flexibility for changing organizations and provide components to satisfy almost any need.

4.8.2.3 Combination. Screening panels and conventional furniture may be used together to provide storage and privacy screening. This allows the reuse of existing equipment if required. It is sometimes difficult to achieve the optimum layout and space utilization with this approach.

4.8.3 Seating. The selection of the task chair is critical to the personal comfort, physical health, and productivity of the occupant. Chair selection should be based on the following guidelines:

- a) Adjustability. Allow the individual to adjust the seat height, back height, and tilt to meet his or her own needs.
- b) Support. The chair should support the body in the correct position, relieving pressure on the back and legs. The seat angle should be sloped 3 to 5 degrees from front to back, and the front edge should be designed to relieve pressure on the thighs. The back should be shaped to support the correct spinal curvature.
- c) Seat Height. Proper seat height allows the feet to rest on the floor while the thighs remain horizontal.

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d) Seat Width and Depth. The seat width and depth should evenly distribute body weight.

e) Armrests. Armrest designs should support the arm at the correct height but not impair movement. The armrest should be designed to allow the chair to be pulled close enough to the work surface to perform whatever task is required.

f) Task Chairs. Task chair bases should have casters to allow movement within the work area. Five-star bases do not tip over as easily and are more maneuverable than bases with only four prongs.

4.8.4 Evaluation of Workstation Design. Criteria for evaluating a workstation design include:

a) Adjustability. The user should be able to make minor height or angle adjustments to satisfy his individual needs.

b) Simplicity. With fewer components involved, inventory control and facility management are much easier.

c) Flexibility. The equipment should be easy to disassemble or reassemble with a minimum amount of effort and with simple tools. If possible, the workstation should be able to be moved as a whole unit.

d) Convenience. Frequently used equipment and reference material should be within easy reach of the user.

e) Visual Sight Line. The user should be able to see other workers when necessary.

f) Layout should allow free leg movement under the work surface.

g) Entrances. Entrances should be wide enough to allow ease of passage; 36 inches is comfortable, 32 inches minimum.

h) Storage. Enough of the correct type of storage should be provided (legal, letter, forms, card, tape, binder, etc.).

i) Stability. The surfaces should support heavy equipment loads and resist tipping. Panels should not sway or move when lateral pressure is applied.

j) Maintenance. The equipment should be easy to maintain. Surfaces should be easy to clean. Upholstery should be easy to replace. All materials should resist damage.

k) Construction. There should be no sharp corners or protruding edges.

l) Privacy. The workstation should provide appropriate visual and acoustical privacy.



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m) Cable Raceways. Power, data, and communication cables should be accommodated through convenient raceways and access points.

n) Lighting. Lighting should be adjustable and positioned to avoid glare and ceiling reflections.

4.8.5 Evaluation of Products and Vendors. Criteria for evaluating and comparing products and vendors include:

a) Comprehensive Product Line. The anticipated components should be available from one source.

b) Module. Heights and widths should correspond with the ceiling heights and building dimensions.

c) Responsiveness. The manufacturer and/or dealer should be available to provide training and to assist in solving problems.

d) Cost. Material and finish options should allow the user to tailor selections to fit budget constraints.

e) Aesthetics. The furnishings should support and extend the design concept of the facility.

f) Manufacturing Capability and Delivery Time. The vendor should be able to provide the amount of equipment required within a reasonable period of time. While production schedules vary, most manufacturers will deliver within 12 weeks of receipt of an order of a standard product. Some manufacturers offer rapid shipment (sometimes as little as 2 weeks) on limited product selections.

#### 4.9 Areas Housing Electronic Equipment

4.9.1 General Architectural Requirements. While most automated equipment no longer requires special environmental conditions and is often found contiguous with the office environment in an administration facility, certain applications require the concentration of equipment in a relatively small area. Areas housing electronic equipment require special treatment to assure operating efficiency, comfort of personnel, and fire safety. (Refer to MIL-HDBK-1008.) Special provisions are required when an area is designated as a Sensitive Compartmented Information Facility (SCIF). (Refer to Defense Intelligence Agency Memorandum (DIAM) 50-3, Control of Compromising Emanations.)

4.9.1.1 Applicability. Criteria for communications facilities are contained in DM-12.01.

4.9.1.2 Equipment. The degree of special treatment varies according to the nature and extent of equipment. Generally, the following items require additional consideration: electronic data processing machines (EDPM), permanently installed radio receiver and transmitting equipment, and teletype equipment.

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4.9.1.3 Location. Areas housing electronic equipment must be isolated from areas accessible to the public. In one-story buildings, consider locating these areas away from the main lobby. In two-story buildings, consider locating these areas on the second floor. Electronic equipment areas should not be located adjacent to or below toilet areas, kitchens, or other areas containing plumbing, drain lines, or water piping.

4.9.2 Construction. The following criteria shall be used in construction planning. Material and building system selection shall be based on:

4.9.2.1 Exterior Walls. One of the following: concrete masonry units or brick, reinforced concrete (where required), or lightweight steel frame with metal curtain walls of galvanized metal, aluminum, or similar material.

4.9.2.2 Floors. In areas housing extensive equipment, provide floor systems for electrical flexibility. (Refer to Paragraph 4.4.)

4.9.2.3 Windows. In areas housing electronic equipment, windows can be provided if such provision does not reduce operating efficiency of the equipment or create a security hazard. Windows, if provided, should be placed high, except where they occur in offices or workstations. Double or triple glass windows with thermal barriers may be required, depending on outside design temperature. Window construction and finish should be of a type that requires minimum maintenance. For glazing requirements, refer to ANSI Specification Z97.1, Safety Glazing Materials Used in Buildings, and NFGS-08800, Glazing.

4.9.3 Heating and Ventilating Requirements. These standards and criteria apply primarily to planning and design of ventilating and air conditioning systems. They fulfill temperature and humidity control requirements for operation of electronic data computer systems and related areas, such as tape storage rooms, machine repair rooms, administration areas, and planning areas supporting an electronic data processing facility. Use NAVFAC DM-3 Series for general design criteria for heating, ventilating, and air conditioning equipment. For special heating, ventilating, and air conditioning requirements in communication areas, refer to NAVFAC DM-12.01. Climate and weather conditions can be obtained from P-89, Engineering Weather Data.

4.9.4 Fire Protection. See MIL-HDBK-1008 for details of fire protection requirements for air conditioning equipment and for electrical distribution installation.

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## Section 5: MODERNIZATION OF EXISTING ADMINISTRATIVE FACILITIES

5.1 Modernization. It is intended to bring the livability of existing semipermanent and permanent administration buildings to a level comparable with current standards in new construction. Buildings selected for modernization should be structurally sound, architecturally acceptable, and economically feasible, based on an actual feasibility study comparing modernization and new construction costs. NAVFAC criteria for new construction should be applied to modernization projects to the maximum extent feasible in accordance with good architectural and engineering judgement.

5.2 Architectural Requirements. The following items provide guidance on basic modernization techniques:

5.2.1 Lobby. The main entrance lobby should be made attractive. New entrance doors and the provision of canopies should be considered where covered entryways are not provided. All nonlobby functions such as vending machines, filing, shelving, etc., should be removed from the lobby and placed in an area specifically assigned for each function. A suitable display area indigenous to the local command is appropriate.

5.2.2 Acoustics. Provide acoustical treatment with high noise reduction coefficient (NRC) in all areas where there is a high noise level, particularly in data processing and message communication areas. Provide acoustical treatment with high sound transmission coefficient (STC) in areas requiring privacy, such as conference rooms. (Refer to the NAVFAC DM-1 Series.)

5.2.3 Floors. Where the present floor surface is concrete, install resilient floor tile or carpeting with appropriate base. If the present floor is of wood, tile, or linoleum, provide new tile or carpeting only if the existing floor is excessively worn and unattractive. The use of carpet shall be in accordance with NAVFAC DM-14.02, Carpet Selection Guide.

5.2.4 Interior Finishes. Where interior finishes need replacement, they shall conform to the interior finish requirements in MIL-HDBK-1190 and MIL-HDBK-1008.

5.2.5 Colors. Colors shall conform to NAVFAC P-309 and DM-1.01.

5.2.6 Signage. To assist the users and visitors of the building, a signage system shall be provided. Refer to NAVFAC NFGS-10440.

5.2.7 Fire Protection. Fire protection shall conform to MIL-HDBK-1008.

5.2.8 Handicapped Facilities. Handicapped facilities shall conform to MIL-HDBK-1190 and the NAVFAC DM-1 Series.

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5.3 Structural Requirements. Modernization of existing structures shall be investigated and upgraded seismically in accordance with NAVFAC P-355. Where modifications are made to improve functional operations, the structural system can be modified, provided that the new loading distribution caused by such modifications does not overload existing members. When it is determined that the structural system will not meet the design loads, those members that are considered inadequate should be strengthened, modified, and/or replaced. The structural systems should be inspected; where deficiencies are noted, maintenance and repair work should be performed.

5.4 Electrical Requirements. Lighting, power, and telephone systems should be in accordance with the requirements of the NAVFAC DM-4 Series, NFPA-70, and Paragraphs 4.4 and 4.5.

5.4.1 Reuse. Wiring and transformer capacities should be checked for adequacy with respect to current and future load requirements and upgraded as necessary. Equipment judged to be in safe and operable condition should be reused.

5.4.2 Special Systems. Special systems requirements should be in accordance with the NAVFAC DM-32 Series, Storage, and as outlined in Paragraph 4.9.

5.4.3 Lighting. Where lighting intensities are deficient, existing lighting fixtures should be supplemented or replaced with more efficient lighting fixtures for the required intensity.

5.5 Mechanical Requirements. The following mechanical requirements should be observed in the modernization of existing buildings: The number of plumbing fixtures specified in MIL-HDBK-1190 should be provided. New toilet accessories should be provided where deficiencies exist. Plumbing should conform to the minimum requirements set forth in the NAVFAC DM-3 Series.

5.6 Energy Conservation. In an existing building, the site (geographic location), orientation, controls, equipment sizes, and selections are essentially fixed. However, the values of other basic parameters such as ventilation, infiltration, building envelope, "U" factor (walls, floor, glass, roof), and shading can be improved and should be evaluated as accurately as possible for energy and cost-effective improvement. The existing HVAC equipment should be evaluated and potentially modified to comply with the energy conservation requirements in DM-3.03. (Refer to the NAVFAC DM-3 Series and MIL-HDBK-1190.)

5.7 Toxic Materials. Existing building products containing asbestos or other toxic materials should be removed in accordance with NFGS-02075, Removal and Disposal of Asbestos Materials; OPNAVINST 5100.23B, Navy Occupational Safety and Health Program; OSHA Standards 1910 Series; and other current Federal and industry standards.

5.8 Fire Protection and Life Safety. Fire protection and life safety requirements shall be in accordance with MIL-HDBK-1008 and NFPA 101.

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## Section 6: FLAGSTAFFS

6.1 Definitive Design. Flagstaffs shall be constructed of seamless 6063-T6 aluminum tubing, stainless steel or steel with diameters, wall thicknesses and tapered lengths consistent with recommended industry standards. (Refer to Paragraph 6.3 and Figure 10.)

6.2 Wind Loads. When designing for wind loads, determine wind pressures on flagstaffs by either of the following equations:

EQUATION:  $P = 0.00307 ChV^2$  (1-1)

where:

P = pressure on projected area (psf)  
 Ch = height corrected coefficient =  $(h/30)^{2/7}$   
 h = height above ground (ft)  
 (No corrections below 30 ft.)  
 V = wind velocity (mph)  
 (0.00307 is coefficient including flat plate resistance and dimensional factors.)

EQUATION:  $P_m = 0.00579 Ch_m V_m^2$  (1-2)

where:

$P_m$  = pressure on projected area (KSM - kilograms/square meter)  
 $V_m$  = wind velocity (KPH - kilometers per hour)  
 $Ch_m$  = height correction coefficient =  $(h/9.14)^{2/7}$   
 $h_m$  = height above ground (m-meters)  
 (No corrections below 9.14 meters)

### 6.3. Types.

6.3.1 Ground-Set. Use the following criteria to establish desirable proportions:

6.3.1.1 Relationship to Nearest Building. Use poles 50 percent higher than the building for one-story buildings and 25-percent higher than the building for two-story buildings.

6.3.1.2 Height Versus Ball Diameter. Use the following dimensions:

HEIGHT (ft.)	BALL DIAMETER (in.)
Up to 30.....	6
40 to 50.....	8
60 to 70.....	10

6.3.2 Vertical Wall-Set. The distance between wall brackets shall be a minimum of 10 percent of overall pole length. Poles 30 feet in length or less need two brackets. Use three brackets for poles over 30 feet in length.

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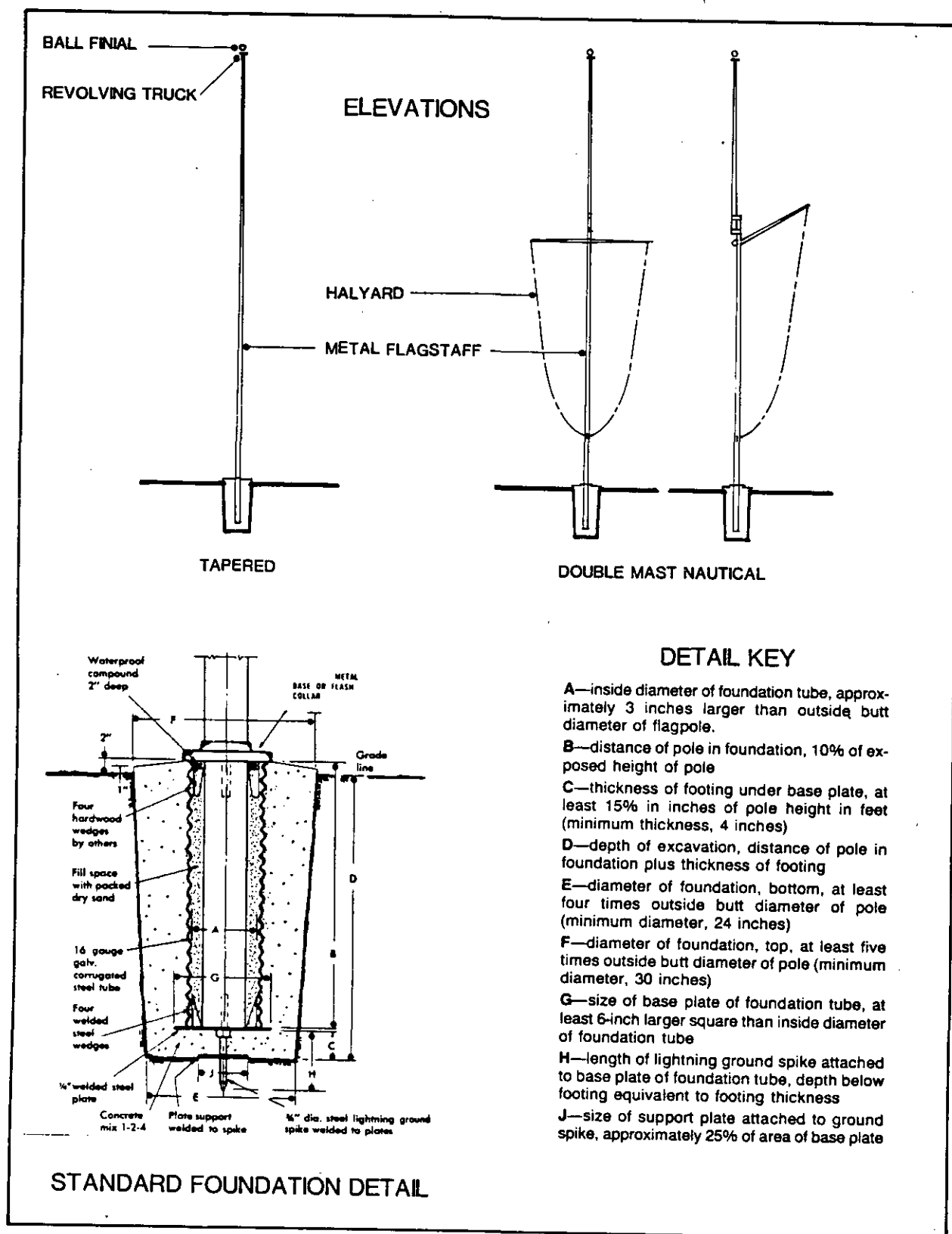


Figure 10  
Flagpole Details

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6.4 Pull Loads. Determine pull by using either of the following equations:

EQUATION: (1)  $\text{Pull} = CAV^2$  (1-3)

where: Pull = resistance (lb)  
C = 0.0003 (a constant factor)  
A = area of flag (sq. ft.)  
V = wind velocity (mph)

EQUATION: (2)  $\text{Pull} = C_m A_m V_m^2$  (1-4)

where: Pull = resistance (N)  
C<sub>m</sub> = 0.00125 (a constant factor)  
A<sub>m</sub> = area of flag (sq. M)  
V<sub>m</sub> = wind velocity (KPH)

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- A117.1                    Specifications For Making Buildings and Facilities Accessible by Physically Handicapped People

Department of the Navy, Copies of Design Manuals (DMs), Publications (Ps), Military Handbooks (MIL-HDBKs), and Chief of Naval Operations Instructions (OPNAVINSTs) can be obtained from the U.S. Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120. Copies of Definitive Designs (DDs) can be obtained from any of the following Engineering Field Division Offices:

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Naval Facilities Engineering Command  
Pearl Harbor, HI 96869  
Telephone: (808) 471-8436

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P.O. Box 10068  
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## REFERENCES (Continued)

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 Naval Facilities Engineering Command  
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DM-14.02	Carpet Selection Guide
DM-32 Series	Storage
MIL-HDBK-1190	Facility Planning and Design Guide

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P-80	Facility Planning Criteria for Navy and Marine Corps Shore Installations
P-89	Engineering Weather Data
P-272	Definitive Designs for Naval Shore Activities
P-309	Color for Naval Shore Facilities
P-355	Seismic Design for Buildings
NFGS-02075	Removal and Disposal of Asbestos Materials
NFGS-08800	Glazing
NFGS-10440	Signs
DD-1404370	Parking Area Criteria for Vehicles

Office of the Chief of Naval Operations

OPNAVINST 5100.23B	Navy Occupational Safety and Health Program
OPNAVINST 5510.1G	Information and Personnel Security Program Regulations
OPNAVINST 5530.14A	Physical Security and Loss Prevention Manual, 16 September 1985

National Fire Protection Association (NFPA), Batterymarch Park, Quincy, MA 02269.

NFPA 70	National Electric Code
NFPA 101	Life Safety Code

Naval Intelligence Command (NIC) 31, Physical Security Standards for Sensitive Compartmented Information Facilities - Defense Intelligence Agency Memorandum (DIAM) 50-3, Control of Compromising Emanations. Copy can be obtained from Naval Intelligence Command, 4600 Silver Hill Road, Washington, DC 20389.

Occupational Safety and Health Act of 1970 (OSHA). Public Law 91-596. Copies can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Uniform Federal Accessibility Standards. Federal Register, Vol. 49, No. 153, August 7, 1984. Copies can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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