

AD-A044 306

WHEELER INDUSTRIES INC WASHINGTON D C  
DESIGN CRITERIA FOR MEDICAL AND DENTAL SUITES IN AIRCRAFT CARRI--ETC(U)  
JUL 77 F B MERKLE

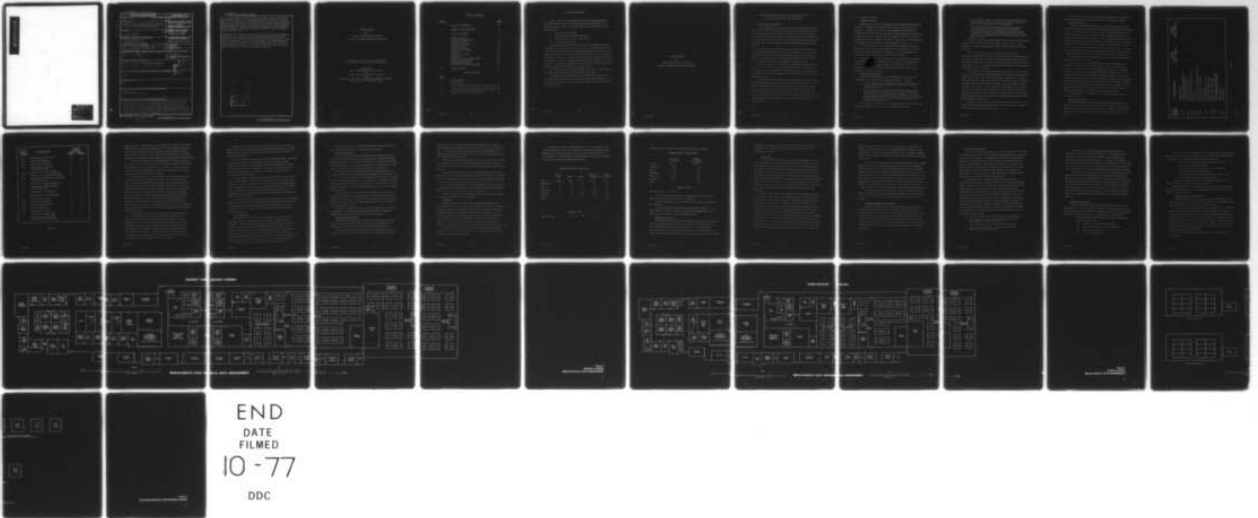
N00014-74-C-0404

F/G 6/12

NL

UNCLASSIFIED

1 of 1  
ADA044306



ADA 044306

DDC  
RECEIVED  
SEP 19 1977  
RECEIVED  
B

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER None	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER 9
4. TITLE (and Subtitle) Design Criteria for Medical and Dental Suites in Aircraft Carriers and Large Auxiliaries,	5. TYPE OF REPORT & PERIOD COVERED Technical Report, for Period April - July 1977	
	6. PERFORMING ORG. REPORT NUMBER None	
7. AUTHOR(s) Francis B. Merkle	8. CONTRACT OR GRANT NUMBER(s) N00014-74-C-0404 Modification P00003	
	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62758N, MF 51.524.021 NR207-019/10-29-76(444)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Wheeler Industries, Inc. 1120 19th Street, N.W. Washington, D.C. 20036	12. REPORT DATE July 1977	
	13. NUMBER OF PAGES 24	
11. CONTROLLING OFFICE NAME AND ADDRESS Bureau of Medicine and Surgery (Code 52) Office of Naval Research (Code 444) Washington, D.C.	14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Same	
	15. SECURITY CLASS. (of this report) Unclassified	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public use; distribution unlimited 16 F51524 17 MF51524021		<p style="text-align: center;">D D C</p> <p style="text-align: center;">RECEIVED</p> <p style="text-align: center;">SEP 19 1977</p> <p style="text-align: center;">B</p>
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Same		
18. SUPPLEMENTARY NOTES None		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Design Criteria Medical and Dental Suites → This study presents,		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Design Criteria for Medical and Dental Suites in Aircraft Carriers and Large Auxiliaries, July 1977, present in drawings and text, the functional design requirements of the Bureau of Medicine and Surgery for medical/dental suites in those types of ships. These suites are based upon design criteria which have been developed earlier for discrete types of dental and medical spaces, and are intended to combine appropriate numbers and types of such spaces into an optimal arrangement. → (Cont on p1473B)		

DD FORM 1473 1 JAN 73

EDITION OF 1 NOV 65 IS OBSOLETE  
S/N 0102-014-6601

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

390 313

LB

(cont'd)  
P 1473A

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

This technical report takes into account the existing equipment limitations and shipboard constraints. Using the present state-of-the-art as a baseline, an outline of an R&D program will be developed. Accomplishment of this program is expected to reduce or to eliminate, in future ships, the effects of the existing equipment limitations and shipboard constraints. The R&D program will be developed as the design criteria are worked out and will be incorporated in the final report.

Additionally, these design criteria are intended to assist the Naval Sea Systems Command in designing and building shipboard medical/dental suites which will most efficiently and economically accomplish their purpose. They embody arrangements of modern types of equipment, which take advantage of recent advances in techniques and equipment design and, at the same time, require a minimum of space. It is expected that they will provide a rational basis for the usual structural and arrangement drawings.

ACCESSION FOR	
NTIS	✓
SBC	<input type="checkbox"/>
UNCLASSIFIED	<input type="checkbox"/>
JIC I	
BY	
DISTRIBUTION/AVAILABILITY CODES	
Dist.	AVAIL. DIS. OF SPECIAL
A	

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DESIGN CRITERIA  
FOR  
MEDICAL AND DENTAL SUITES IN  
AIRCRAFT CARRIERS AND LARGE AUXILIARIES

Reproduction in whole or in part is permitted  
for any purpose of the United States Government

Sponsored by  
Office of Naval Research (Code 444)  
and  
Bureau of Medicine and Surgery (Code 52)  
under  
ONR Contract No. N00014-74-C-0404, Modification P00003  
Project No. 207-019/10-29-76 (444)

July 1977

## TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
	PROJECT DESCRIPTION	iii
I	GENERAL CONSIDERATIONS	1
II	SPECIFIC CRITERIA	2
	Populations Served	2
	Operational Requirements	2
	Component Spaces	4
	Arrangement Principles	4
	Ward Capacities	10
	Location in the Ship	11
	Operating Room Complex	11
	Storerooms	12
	Dispersion of Spaces	14
	Triage Areas	15
	Alternate Casualty Transfer Paths	16
	Personnel Considerations	17
	Multifunctional Spaces	18
	Modifications of Design Criteria	19
III	DRAWING NOTES	20

### LIST OF FIGURES

<u>Figure</u>		
1	Medical Spaces	5
2	Dental Spaces	8
3	Medical/Dental Suite Arrangement, Aircraft Carrier	22
4	Medical/Dental Suite Arrangement, Large Auxiliary	23
5	Detached Medical Department Spaces	24

## PROJECT DESCRIPTION

Design criteria for four representative types of shipboard Medical and Dental Suites are being developed under Contract No. N00014-74-C-0404, Modification P00003. The work is being done in four increments, as indicated below:

1. Amphibious Assault Ships
2. Aircraft Carriers and Large Auxiliaries
3. Cruisers and Medium-sized Auxiliaries
4. Frigates and Destroyers

These design criteria are intended to provide the optimal functional configuration for each representative type of suite, giving due weight to the current equipment limitations and the existing shipboard constraints. Using these design criteria, and those developed under earlier contracts and modifications, as a baseline, an outline for a related corrective R&D program will be developed. Future accomplishment of this program will reduce or eliminate the effects of the existing shipboard constraints and equipment shortcomings detected during the development of the design criteria.

The framework for the R&D program will be developed as work progresses and will be presented as an attachment to the final report.

The design criteria for medical/dental suites being developed under the current modification will be based upon design criteria for discrete types of dental and medical spaces which were developed under earlier contracts and modifications.

DESIGN CRITERIA  
FOR  
MEDICAL AND DENTAL SUITES IN  
AIRCRAFT CARRIERS AND LARGE AUXILIARIES

July 1977

DESIGN CRITERIA FOR MEDICAL AND DENTAL SUITES IN  
AIRCRAFT CARRIERS AND LARGE AUXILIARIES

I. GENERAL CONSIDERATIONS

These design criteria are intended by the Bureau of Medicine and Surgery to assist the Naval Sea Systems Command in designing and building medical/dental suites for future aircraft carriers, and large auxiliaries. It is expected that they will provide a rational basis for the usual structural and arrangement drawings; however, they are not intended to be working drawings. There is no intention to abridge good design and shipbuilding practice.

The objective is to provide an optimal arrangement of the types and numbers of medical and dental spaces which are required to support the assumed medical/dental missions of these types of ships. The types and numbers of spaces included are derived from a consideration of the operational capabilities necessary to support the assumed missions.

Adherence to the general arrangement shown is highly important if the objective is to be attained. It is realized that structural constraints encountered during the development of a specific design may require some deviations from the general arrangement shown, but such deviations should be kept to a minimum.

The spaces and items included are confined to those that are peculiar to the medical/dental requirements. There is no attempt to include features routinely included such as access hatches, fan rooms, ventilation ducts, etc. The locations and sizes of such items are affected by several constraints, such as the designs of the decks above and below the deck on which the medical/dental suite is situated. To the maximum extent feasible such features should be arranged to avoid interference with the medical/dental functions.

## II. SPECIFIC CRITERIA

### Populations Served

Design criteria have been developed for the medical/dental complexes for two broad groups of large ships, namely aircraft carriers, and large auxiliaries. A figure of 1,300 total accommodations has been taken as the lower line of demarcation for the types of ships included in this report; no upper limit has been assumed, but the modern aircraft carrier's manning, including the air wing, approximates 6,000. Ships such as destroyer tenders may be expected to fall within the "large auxiliary" category.

In the case of tenders, the medical/dental capabilities provided are greatly influenced by the requirements of the ships alongside; thus, if the needs of the ships alongside are considered, the potential population to be served is much larger than the crew of the tender itself.

The design criteria which follow have been based upon an assumption that the total number of accommodations for the carrier is approximately 6,000 and for the large auxiliary (tender) is approximately 2,000. The manning level affects directly the number of Quiet Rooms and the number of beds and berths in the Wards.

### Operational Requirements

In the case of the carrier, a basic assumption has been made that the ship is to be capable of functioning in two modes, as follows:

- a. In the noncombat mode, to provide the best feasible medical and dental facilities for the treatment of all ship, staff, and air wing personnel aboard.
- b. In the combat mode, to provide the best feasible medical and dental facilities for the treatment and care of battle casualties occurring within the ship or its planes. However, as a result of the conditions under which a carrier operates, major accidents in peacetime may produce a casualty load comparable to that resulting from enemy action.

With respect to the tender, a basic assumption has been made that the ship is to be capable of functioning in the following two modes:

- a. In the noncombat mode, to provide the best feasible medical and dental facilities for the treatment of all ship and staff personnel aboard, and of the personnel of ships alongside.
- b. In the combat mode, to provide the best feasible medical and dental facilities for the treatment and care of casualties occurring within the ship. In addition, the facilities should be capable of handling casualties occurring in the ships alongside, if an enemy attack takes place while the tender has ships nested alongside.

In addition, both types of ships might be called upon to provide medical assistance in the event of a major catastrophe ashore, such as a major earthquake. Another possible demand might be to assist in the evacuation of refugees.

While the carrier might not be considered to have a casualty evacuation responsibility, as does the LHA, it is entirely conceivable that the carrier might be called upon to receive casualties from other ships with less medical capability in a carrier task group if the task group comes under enemy attack. Such a casualty load would be superimposed on that resulting from attacks on the carrier itself.

With respect to the tender, the fact that the number of secure overseas bases is shrinking may put additional importance and heavy responsibilities on that type of ship. They may be called upon to operate closer to enemy territory than in past wars, and, therefore, may experience heavy casualties. If hospital ships are unavailable in the early stages of hostilities, as has generally been the case, the tender might be called upon to fill part of the gap left by the absence of the hospital ship. Conceivably, they could be called upon to provide a backup casualty receiving capability for such ships as the LHA and the LPH, even though the tenders might be operating at some distance from the landing site.

Finally, both carriers and tenders may be vulnerable to attack by such modern weapons as heat-seeking missiles from over the horizon, and may expect heavy casualties from such attacks.

The foregoing considerations emphasize the importance of providing comprehensive medical and dental capabilities in these types of ships.

#### Component Spaces

A first step in determining the types and numbers of spaces required involves a consideration of the desired medical/dental operational capabilities. This is a basic process which applies to the development of design criteria for the medical/dental suite of any type of ship. General information with respect to operational capabilities may be found in OPNAV Instruction 3501.2D, dated 24 July 1974 (For Official Use Only). In this particular case, two lists of spaces have been developed, and are shown in Figures 1 and 2. Figure 1 lists the medical spaces, and Figure 2 concerns the dental spaces. In most cases, design criteria for the discrete types of spaces have already been developed, and are identified in the lists by the date when they were issued.

Dimensions for the various types of spaces are shown in the pertinent design criteria for those spaces.

On the basis of the types and numbers of spaces which have been selected, three drawings have been developed, and are shown in Figures 3, 4 and 5. Figure 3, the "Medical/Dental Suite Arrangement for Aircraft Carriers" shows the desired general arrangement of the suite for that type of ship, together with its relationship to the Overflow Ward. The latter is a crew berthing space that is adjacent to the suite, which has been earmarked for use as an Overflow Ward. Similarly, Figure 4 shows the Medical/Dental Suite and the Overflow Ward for large auxiliaries, such as tenders. Figure 5 portrays the detached Medical Department spaces, such as the Auxiliary Battle Dressing Stations, for both carriers and large auxiliaries.

For convenience in use, Figures 3, 4 and 5 are grouped together at the end of the text.

#### Arrangement Principles

As mentioned earlier, the basic assumption has been made that the ships are to be capable of operating in two modes, namely, the noncombat, and the combat mode. The combat mode can be construed to include operations undertaken as the result of serious shipboard catastrophes or natural

<u>DATE OF DESIGN CRITERIA</u>	<u>MEDICAL SPACES</u>	<u>NUMBER OF SPACES</u>		<u>NUMBER OF BERTHS</u>	
		<u>Carrier</u>	<u>Auxiliary</u>	<u>Carrier</u>	<u>Auxiliary</u>
8/76	Audiometry Room	1	1		
11/75	Aviation Examining and EENT Room (Auxiliary Operating Room)	1	-		
12/74	Bacteriological Laboratory	1	1		
10/74	Battle Dressing Station (Auxiliary)	5	4		
3/75	Blood Bank	1	1		
11/75	Eye, Ear, Nose, and Throat (EENT) Room	-	1		
4/76	Eye Examination/Range Room	1	1		
-	Gowning Room	2	2		
11/76	Medical Department Office	1	1		
-	Medical and Training Library	1	1		
8/76	Medical Linen Issue Room	2	2		
4/76	Medical Office and Consultation Room (Minor Operating Room)	4	2		
7/75	Morgue Facility	1	-		
10/74	Operating Room	1	1		

Figure 1

<u>DATE OF DESIGN CRITERIA</u>	<u>MEDICAL SPACES</u>	<u>NUMBER OF SPACES</u>		<u>NUMBER OF BERTHS</u>	
		<u>Carrier</u>	<u>Auxiliary</u>	<u>Carrier</u>	<u>Auxiliary</u>
3/75	Pharmacy	1	1		
7/75	Physiotherapy/Cast Room	1	1		
-	Preventive Medicine & Occupational Health Office	1	1		
9/75	Quiet Room	4	2	16	8
11/76	Quiet Room Bath	4	2		
-	Radiation Health Safety Office	1	1		
8/76	Scrub Room and Substerile Area	1	1		
11/76	Specimen Collection Area	1	1		
3/75	Sterilizing Room	1	1		
3/75	Storeroom, Medical (Main)	3	3		
3/75	Storeroom, Medical (Ready Issue)	1	1		
11/75	Surgical Dressing Room/Main B.D.S (Auxiliary Operating Room)	1	1		
8/76	Surgical Gas and Equipment Room	1	1		
8/76	Surgical Machinery Room	1	1		

Figure 1 (Continued)

<u>DATE OF DESIGN CRITERIA</u>	<u>MEDICAL SPACES</u>	<u>NUMBER OF SPACES</u>		<u>NUMBER OF BERTHS</u>	
		<u>Carrier</u>	<u>Auxiliary</u>	<u>Carrier</u>	<u>Auxiliary</u>
4/76	Treatment Waiting Room and Medical Emergency Expansion Space (Casualty Receiving Space).	1	1		
-	Triage Area (Hangar Deck)	1	-		
-	Triage Area (Helicopter Platform)	-	1		
9/75	Utility Room	3	3		
12/74	Ward	1	1	62	42
11/76	Ward Bathroom	1	1		
7/75	Ward, Intensive Care/Recovery	1	1	12	12
7/75	Ward, Overflow	1	1	78	58
-	Washroom and Water Closet (Lavatory, Toilet, and Urinal)	1	1		
12/74	X-Ray Darkroom	1	1		
12/74	X-Ray Room	1	1		
	Total Number of Berths			168	120

Figure 1 (Continued)

<u>DATE OF DESIGN CRITERIA</u>	<u>DENTAL SPACES</u>	<u>NUMBER OF SPACES</u>	
		<u>Carrier</u>	<u>Auxiliary</u>
6/74	Dental Administrative Office	1	1
2/73	Dental Apparatus Room	1	1
6/74	Dental Linen Issue Room	1	1
6/74	Dental Officer's Office and Consultation Room	1	1
9/71	Dental Operating Room (General)	4	4
8/73	Dental Operating Room (Oral Surgery)	1	-
9/71	Dental Operating Room (Prev. Dentistry and Oral Hygiene)	1	1
9/71	Dental Operating Room (Prosthetic)	1	1
6/74	Dental Patient Waiting Room and Instruction Center	1	1
2/73	Dental Prosthetic Laboratory	1	1
-	Dental Scrub Room (Oral Surgery)	1	-
1/74	Dental Sterilizing Room	1	1
5/73	Dental Storeroom (Bulk)	1	1
5/73	Dental Storeroom (General)	1	1
1/74	Dental Utility Room	1	1
5/73	Dental X-Ray Darkroom	1	1
5/73	Dental X-Ray Exposure Room	1	1
-	Washroom and Water Closet (Lavatory, Toilet and Urinal)	1	1

Figure 2

disasters ashore. Each mode imposes a different set of conflicting demands upon the Medical and Dental Departments, and each exercises an influence on the layout. Overall, there are constraints arising from the fact that a ship is long and relatively narrow, and the need to conserve space without jeopardizing the capability of the medical/dental complex to perform efficiently.

In the arrangements which have been developed, priority is given to the requirements of the combat mode, which are more demanding than those of the noncombat mode. In the former case, the facility is functioning as an emergency medical/dental facility, and time is of the essence in handling casualties, when life and limb are at stake.

In the combat mode, it is assumed that the casualties from outside the ship will arrive by helicopter at the Flight Deck in the case of the carrier. The casualties would then be brought from the Flight Deck to the Hangar Deck Triage Area by airplane elevator. After arrival in the Hangar Deck, preliminary triage would be performed, and such emergency treatment as is required would be undertaken; casualties would then be moved as quickly as possible by Medevac elevator to the Treatment Waiting Room and Medical Emergency Expansion Space in the Medical/Dental Suite. This space is multifunctional, and will serve as a Casualty Receiving Space in the combat mode. Here, decisions will be made as to the disposition of each casualty, priorities established, and resuscitative and preoperative measures initiated.

In the case of the large auxiliary, casualties coming from outside the ship by helicopter would be received at the Helicopter Platform. Preliminary triage would be performed there in the triage area, and such emergency treatment as is required would be initiated, after which the casualties would be moved as quickly as possible by Medevac elevator to the Treatment Waiting Room and Medical Emergency Expansion Space in the Medical/Dental Suite. In this multifunctional space decisions will be made as to the disposition of each casualty, priorities established, and resuscitative and preoperative measures undertaken.

In either type of ship, mass casualties from within the ship should be brought to the Treatment Waiting Room (Casualty Receiving Space) by the most feasible routes, possibly after emergency treatment at one of the Auxiliary Battle Dressing Stations.

From the Treatment Waiting Room (Casualty Receiving Space), casualties would be routed onward through the X-ray Room to the Operating Room (dedicated or auxiliary) to the Intensive Care/Recovery Ward, to the Ward, and to the Overflow Ward, if necessary. Of course, any step which is not needed may be bypassed. The arrangement of each suite is intended to facilitate the flow of casualties.

Although emphasis has been placed upon the importance of the combat mode, in which mass casualties are to be handled, the requirements of the noncombat mode have not been ignored, and the arrangements developed have been compromises intended to give due weight to the needs of the noncombat mode. For instance, the Surgical Dressing Room is directly across a passageway from the Treatment Waiting Room, so that the traffic flow during Sick Call is short and direct.

In the dental quarters, the general dental operating rooms are immediately contiguous to the Dental Patient Waiting Room and Instruction Center, and the dental operating room for preventive dentistry and oral hygiene is readily accessible to the large number of personnel who will receive instruction in dental self-care.

#### Ward Capacities

The numbers of Quiet Rooms and the numbers of beds and berths in the Wards should be based upon the total number of accommodations in the ships. These design criteria provide four Quiet Rooms, each with four berths, for the carrier and two such Quiet Rooms for the tender. For the carrier, 62 beds and berths are provided in the Ward; for the tender 42 beds and berths are available. These Ward capacities exceed slightly the requirements of the General Specifications for Ships of the United States Navy, which are one percent of the total number of accommodations for carriers (60 in this case), and two percent for tenders (40 in this case).

The numbers of berths in the Overflow Wards are roughly equal to the sums of the beds and berths in the Wards and Quiet Rooms.

#### Location in the Ship

Ideally, the Medical/Dental Suite should be so located in the ship that the Operating Room and Surgical Dressing Room are near the midships section and near the fore-and-aft center line, so as to minimize the effects of the ship's motion. It is particularly important to avoid location near the stern, in order to minimize the vibratory effects of the propellers.

In both types of ships, good accessibility is necessary in order to discharge efficiently the responsibility for providing day-to-day health care.

In the case of the carrier, the third deck may be the preferred location, if the overall ship design permits. The second deck is undersirable because of the noise that is prevalent in the hangar deck. Location in the 01 level or higher is probably ruled out by various considerations, such as high priority shop requirements.

With respect to the large auxiliary, somewhat more latitude exists in the choice of location. One guiding principle should be the provision of good access from the helicopter platform (by Medevac elevator if necessary) for casualties from outside the ship and by internal routes for casualties originating within the ship.

Both types of ships might expect to receive casualties by transfer-at-sea methods, and possibly from boats coming alongside. Appropriate transfer routes to the Medical/Dental Suite will be needed.

#### Operating Room Complex

The Surgical Dressing Room is intended to function as an auxiliary operating room and main battle dressing station in the handling of mass casualties. As such it forms part of the operating room complex.

In the combat mode, the operating rooms will probably be the bottle-neck in the flow of casualties. Accordingly, the operating room complex

should afford the best feasible traffic pattern through the X-ray Room to the Operating Rooms (dedicated or auxiliary) to the Intensive Care/Recovery Ward. Arrangement of the operating rooms as a pair offers space saving and permits supervision of two operating rooms by one senior surgeon, with the attendant saving in personnel.

Providing the necessary extra doors in the X-ray room and the operating rooms to permit a through traffic flow involves the loss of some bulkhead area which might be used for stowage, but the improved traffic flow justifies the loss.

The Scrub Room and Substerile Area serves both operating rooms and has been designed to permit four persons to scrub simultaneously. Windows have been provided between the scrub room and the operating rooms to permit the surgeons to watch preparations in the operating rooms while scrubbing.

A recessed washer-sterilizer has been provided in the Scrub Room and Substerile Area for emergency use and for taking care of the "dropped instrument." Also, a limited amount of stowage is included.

A wide "clean corridor" is included in order to facilitate litter traffic and to provide some holding area if needed.

#### Storerooms

Dental storerooms have been included within the boundary of the Medical/Dental Suite, as they are small. However, the medical storerooms are larger, and only a Ready Issue Storeroom has been included within the suite itself; the three Main Medical Storerooms will probably have to be located in the section of the ship devoted to storage. All storerooms must be so located that suitable temperatures can be provided, in order to preserve the shelf life of drugs and other temperature-sensitive stores. In addition, they should be readily accessible from the Medical/Dental Suite.

No space has been earmarked for the stowage of the intact Surgical Block(s), as it is assumed that provision for such supplies can be made in the general stores area of the ship.

The types and numbers of storerooms have been selected on the basis of the requirements of the Chief of the Bureau of Medicine and Surgery letter BUMED-49-dar, dated 8 December 1970, for ships having 1,000 or more accommodations. The approximate volumes provided for the several categories of storage are shown in the following tabulation.

Storeroom Volumes - Cubic Feet

	<u>Ready Issue</u>	<u>Main</u>	<u>3Main</u>	<u>Ready Issue +3Main</u>	<u>BUMED ltr. 12/8/70</u>
General	1,484	3,024	9,072	10,556	10,000
Refrigerated	21	21	63	84	50
Frozen	18	18	54	72	10
Flammable	13	29	87	100	50
Narcotics	18	54	162	180	150
Security	-	504	1,512	1,512	300
Acids	-	-	-	-	10

Volumes - Pints

Blood (in bags)	-	300	900	900	-
-----------------	---	-----	-----	-----	---

Expressed in metric units, the foregoing table appears as follows:

Storeroom Volume - Cubic Meters

	<u>Ready Issue +3 Main</u>	<u>BUMED ltr. 12/8/70</u>
General	298.91	283.17
Refrigerated	2.38	1.42
Frozen	2.04	.28
Flammable	2.83	1.42
Narcotics	5.10	4.25
Security	42.82	8.50
Acids	-	.28

Volumes - Liters

Blood (in bags)	425.86	-
-----------------	--------	---

No acid storage is provided, as modern medical practice does not justify a special medical storage for such material.

The tabulations above do not include the small storeroom included in the X-ray Room.

The three Main Medical Storerooms are included in Figure 5, "Detached Medical Department Spaces," to show their approximate size. The drawing is not intended to show orientation or location.

Dispersion of Spaces

The Main Medical Storerooms and the Auxiliary Battle Dressing Stations must be well dispersed for two reasons. The first is to avoid the loss of two or more similar spaces from the same major fire or weapon impact. The second reason is to facilitate accessibility for users of the spaces by shortening the distance to be traveled. In general, one main storeroom should

be forward, one amidships, and one aft. The battle dressing stations should be so located that they will be readily accessible to large concentrations of personnel.

#### Triage Areas

The triage areas are the points of entry of the casualties into the casualty-handling system. Preliminary triage takes place here, and determines the order in which casualties will be selected for onward routing in the system. Accurate judgment in establishing priority for onward routing is vital to the chances of survival of the critically injured. "First-come, first-served" is not necessarily a valid criterion in establishing priorities, for if all operating rooms become clogged with first arrivals who could afford to wait, the chances of survival of a critically-injured casualty in the next helicopter to arrive are seriously jeopardized. Accordingly, the triage areas must afford facilities which will facilitate making and executing vital decisions.

The first requirement is the capability to unload casualties quickly from helicopters. This implies ample space and the availability of litters to replace those taken from the helicopter, so that the vehicle can return to the beach for another load. Immediately after being unloaded, the casualty must be searched and any potential explosives must be removed before he is taken any further, unless it is certain that the need for such a search does not exist. This generally involves stripping the casualty. A "bunker" of some kind must be at hand to receive "booby traps", and other explosive devices. Once the safety from explosion has been established, the patient can be moved on to a sheltered area where conditions exist which will facilitate examination. Preliminary cleansing may be necessary, adequate light will be required, and there must be sufficient space around the

casualty to permit the surgeon to reach and examine him. If immediate lifesaving measures are necessary, equipment must be available to permit their initiation. Equipment and personnel must then be available to permit rapid onward movement of the patient, either to the Casualty Receiving Space or the Morgue.

Once the casualty has reached the Casualty Receiving Space, further triage will take place. Additional cleansing may be done, and additional lifesaving, resuscitative, and stabilization measures may be undertaken, together with debridement and other preoperative procedures. Possibly, the use of a portable X-ray machine may expedite matters. The performance of these functions will require sufficient deck space to permit examination and treatment of the casualty, electrical outlets, cleansing facilities, surgical lighting, oxygen and suction connections, X-ray illuminators, and the immediate availability of medical supplies. Extra litters must be available.

The steps listed above are the bare essentials, stated in general terms. Other steps, such as identification, charting, and safeguarding of personal effects are necessary, but are secondary to the safety of the patient.

#### Alternate Casualty Transfer Paths

While the Medevac elevators are the primary means of transfer of casualties from the points of arrival and their associated triage areas to the Casualty Receiving Space, the possibility of failure of the elevators or battle damage thereto does exist. The importance of fast transfer of casualties is such that alternate avenues of transfer should be provided. If vehicle ramps are included in the design of the ship, they would offer one alternate path if this use were to be borne in mind during the ramp design and layout.

### Personnel Considerations

Full exploitation of the medical and dental capabilities of the facilities envisioned by these design criteria requires a substantial medical and dental staff for routine operations. The Hearing Conservation Program indicates the need for an Audiometer Room, and the program of preventive dentistry and oral hygiene supports a specialized dental space. A Physiotherapy Room is provided as experience has shown the great value of such a space in treating the numerous sprains and other injuries that occur daily in large numbers. In the case of the carrier, the aviation capability imposes a requirement for specialized spaces and personnel.

As mentioned earlier, operation in the combat mode imposes a heavier medical and dental personnel requirement than does the noncombat mode. Because the ships are combatants, they may have to function in the combat mode, with or without one or more Surgical Teams embarked. Without a Surgical Team aboard, the ship's personnel will have to provide the medical and dental support required to handle casualties inflicted by enemy action or major shipboard catastrophes. Under such circumstances the Battle Dressing Stations assume a major importance and impose a personnel requirement not mentioned heretofore. The design criteria for the latter type of space provide a facility that is intended to be capable of resuscitation, stabilization, treatment, and minor surgery, and in an emergency, of major surgery.

The foregoing considerations indicate three major requirements:

- a. The availability of adequate numbers of personnel in the ship's Medical and Dental Departments.
- b. The availability of required skills in these personnel.
- c. A plan for cross-utilization of personnel of the ship's Medical and Dental Departments.

Adherence to these principles will be necessary if the full capabilities of the facilities are to be realized. In the absence of such conditions, there will be pressure to "make do" by such expedients as using other categories of personnel, e.g., yeomen or storekeepers, to augment the medical and dental personnel. Such expedients have been tried in the past and have generally not been successful, usually as the result of lack of training, dedication, or availability of the substitute personnel.

While the necessity to augment the medical and dental personnel by Surgical Teams and Surgical Support Teams is generally recognized, the necessity to provide accommodations for such teams is often overlooked. Such augmentation may result in an increase of several fold in the numbers of medical and dental personnel on board. When considering the number of accommodations required for such personnel, it will be very important to take into account the augmentation plans for both officers and enlisted personnel. The personnel can be flown aboard, but the accommodations cannot be.

#### Multifunctional Spaces

Certain of the spaces which are needed for routine health care can perform other functions in addition to their primary uses, particularly in the way of providing space for members of the Surgical Teams and Surgical Support Teams when they are embarked. Some multifunctional spaces follow:

- a. Treatment Waiting Room and Medical Emergency Expansion Space, which can also:
  - (1) Serve as a Casualty Receiving Space
  - (2) Provide office space for the Surgical Teams
  - (3) Function as a classroom
  - (4) Act as training center

This space should be equipped with an accordion-type folding bulkhead which can be opened in the combat mode so as to make the space completely accessible to mass casualties arriving by Medevac elevator.

- b. Medical Office and Consultation Room, which can also serve as a minor operating room.
- c. Medical and Training Library, which can also provide office space for the Surgical Teams.
- d. Dental Waiting Room and Training Center, which can also provide office space for the Surgical Teams.

During routine carrier operations, the Morgue can serve as a refrigerated storeroom for properly packaged supplies.

Two Gowning Rooms are included, so as to make available additional space for the Surgical Teams and to provide separate facilities if female doctors or nurses are on board.

#### Modifications of Design Criteria

The application to specific types of ships of the generalized design criteria for discrete spaces which were developed earlier has required some modifications to the design criteria for certain spaces.

One example of such modification occurs in the case of the Treatment Waiting Room and Medical Emergency Expansion Space. For both the carrier and the large auxiliary, an accordion-type folding bulkhead is substituted for one bulkhead, in order that the room may be opened wide on the side toward the Medevac elevator and thus form a Casualty Receiving Space when operating in the combat mode. Of course, in such a situation the portable furniture normally in the space would be moved out to help achieve the multifunctional capability.

Other typical modifications applicable to both types of ships, are listed below:

1. Rearrange the Surgical Dressing Room so as to mate with a scrub room, and provide an additional door, in order to enhance its capability as an operating room.
2. Rearrange the X-ray Room and add two doors to provide good traffic flow.
3. Enlarge the Physiotherapy Room from 3.66m (12'-0") x 5.49m (18'-0") to 4.42m (14'-6") x 5.49m (18'-0").
4. Enlarge the Surgical Gas and Equipment Room from 3.35m (11'-0") x 4.88m (16'-0") to 4.57m (15'-0") x 4.88m (16'-0").
5. Enlarge the Intensive Care/Recovery Ward from 6.76m (22'-2") x 9.75m (32'-0") to 7.01m (23'-0") x 10.97m (36'-0").
6. Make minor modifications to locations of doors, direction of swing, etc., to facilitate the arrangement.

For the carrier:

7. Enlarge the Pharmacy from 3.05m (10'-0") x 5.26m (17'-3") to 3.05m (10'-0") x 6.10m (20'-0").

For the tender:

8. Enlarge the EENT Room from 3.81m (12'-6") x 5.49m (18'-0") to 3.81m (12'-6") x 6.10m (20'-0").

### III. DRAWING NOTES

The arrangement sketches are assemblies of various discrete types of spaces for which design criteria have already been developed. Although the original size and arrangement of each space was intended to be generally usable, there were a few cases in which modifications were required to adapt the spaces to a particular layout. Typical cases are mentioned earlier under "Modifications of Design Criteria."

It is infeasible in generalized layouts, such as these, to include such features as access hatches, ventilation ducts, fan rooms, etc., because they are so greatly influenced by the arrangements of the decks above and below. Accordingly, no attempt has been made to include them, but it is realized that their inclusion will necessarily influence the working plans. The same is true for such features as structural bulkheads. For

these reasons, no attempt has been made to fair the fore-and-aft boundaries of the arrangement sketches, which present a stepped appearance.

Dimensions have not been indicated on the sketches, in order to avoid clutter. In general, the dimensions of the various spaces can be derived from the separate design criteria for the spaces.

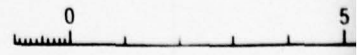
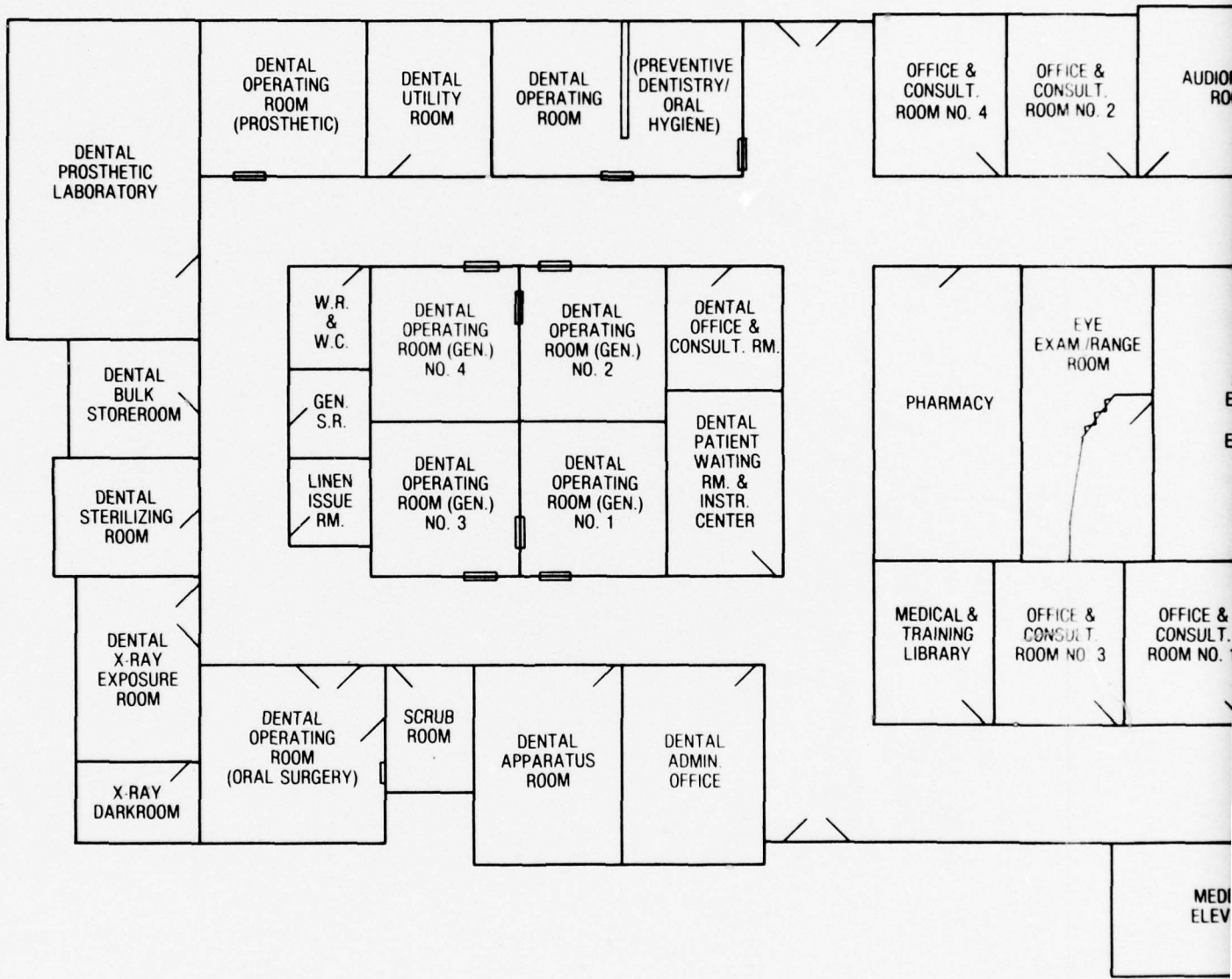
Conversion of dimensions between the U.S. Customary Units and the International System of Units (SI), commonly called the Metric System, may be made by reference to the following table.

#### INCH-MILLIMETER EQUIVALENTS

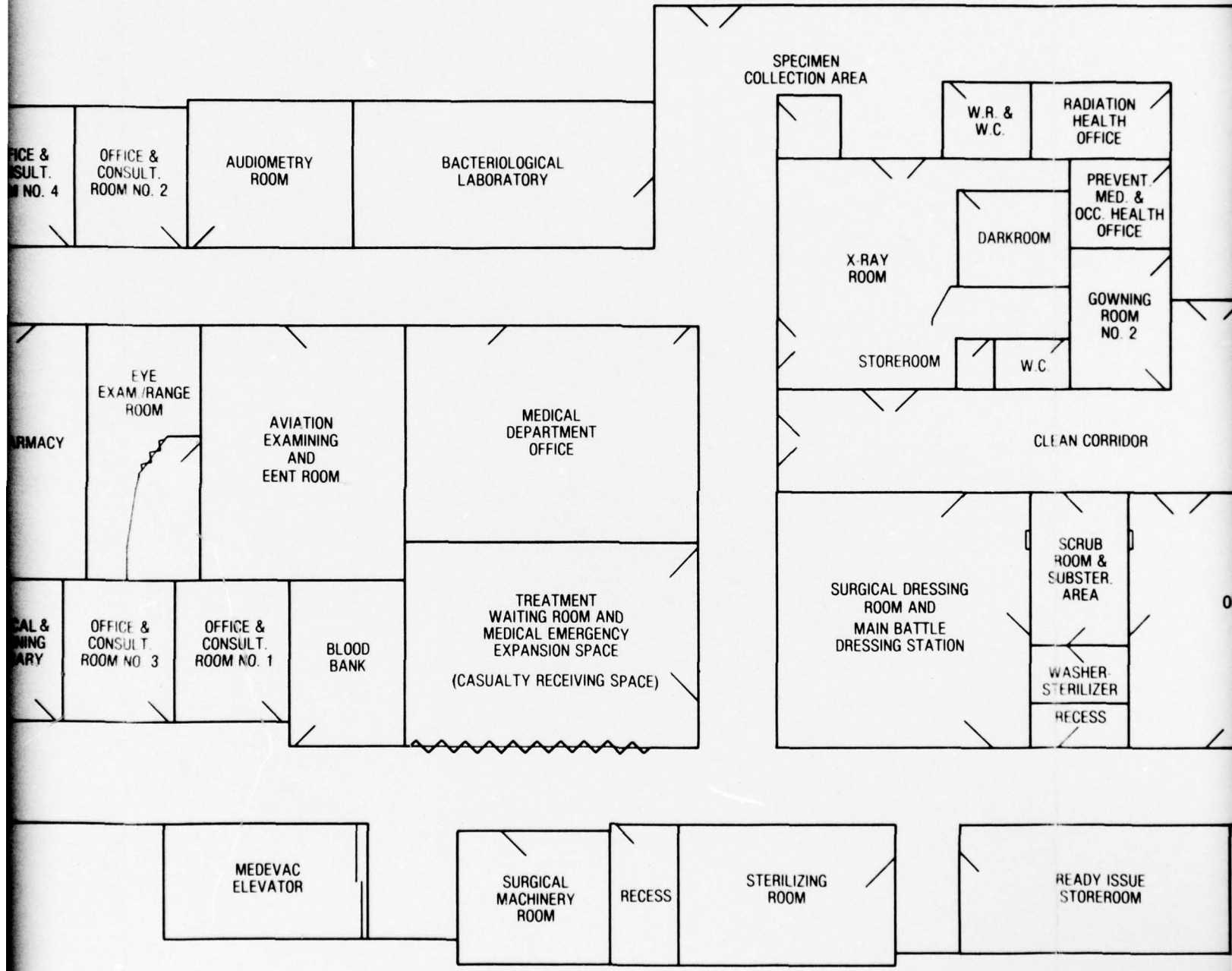
in	0	1	2	3	4	5	6	7	8	9
mm										
0		25.4	50.8	76.2	101.6	127.0	152.4	177.8	203.2	228.6
10	254.0	279.4	304.8	330.2	355.6	381.0	406.4	431.8	457.2	482.6
20	508.0	533.4	558.8	584.2	609.6	635.0	660.4	685.8	711.2	736.6
30	762.0	787.4	812.8	838.2	863.6	889.0	914.4	939.8	965.2	990.6
40	1016.0	1041.4	1066.8	1092.2	1117.6	1143.0	1168.4	1193.8	1219.2	1244.6
50	1270.0	1295.4	1320.8	1346.2	1371.6	1397.0	1422.4	1447.8	1473.2	1498.6
60	1524.0	1549.4	1574.8	1600.2	1625.6	1651.0	1676.4	1701.8	1727.2	1752.6
70	1778.0	1803.4	1828.8	1854.2	1879.6	1905.0	1930.4	1955.8	1981.2	2006.6
80	2032.0	2057.4	2082.8	2108.2	2133.6	2159.0	2184.4	2209.8	2235.2	2260.6
90	2286.0	2311.4	2336.8	2362.2	2387.6	2413.0	2438.4	2463.8	2489.2	2514.6
100	2540.0									

Note: All values in this table are exact, based on the relationship that 1 in = 25.4mm. By manipulation of the decimal point, any decimal value or multiple of an inch may be converted to its exact equivalent in millimeters, centimeters, or meters.

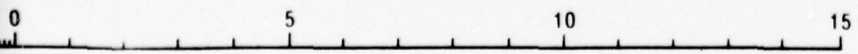
This table is taken from the American Society for Testing and Materials Standard for Metric Practice, E380-76.



# AIRCRAFT CARRIAGE



METERS

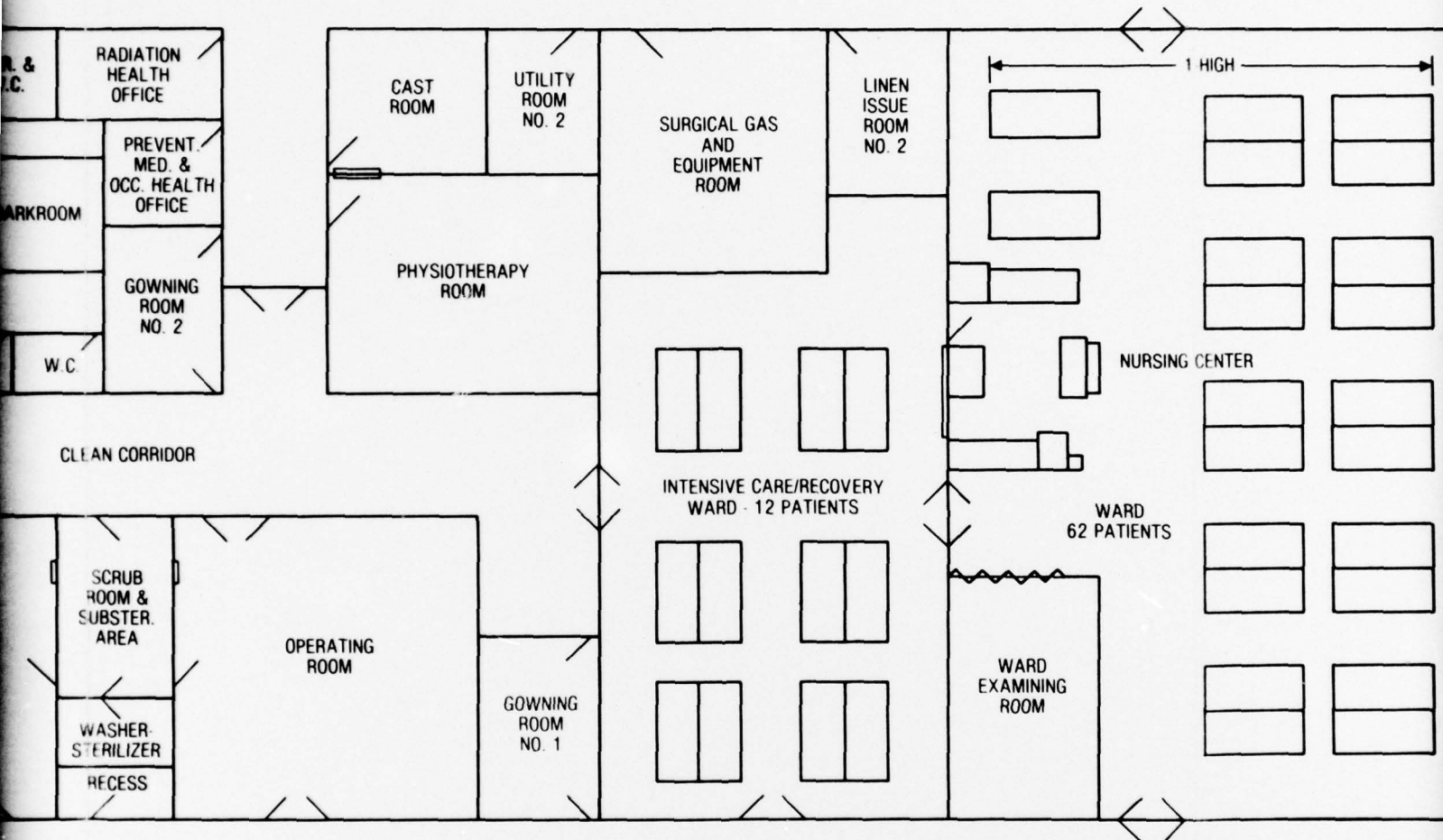


SCALE: 1/0.96 cm = 1 m

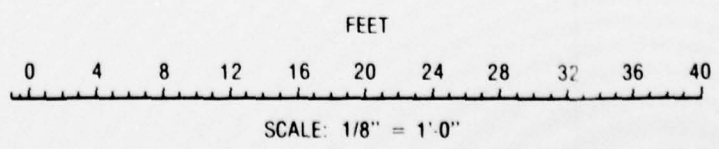
# MEDICAL/DENTAL SUITE A

2

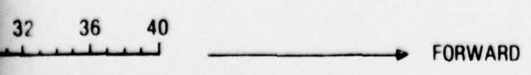
# AIRCRAFT CARRIER



## MENTAL SUITE ARRANGEMENT



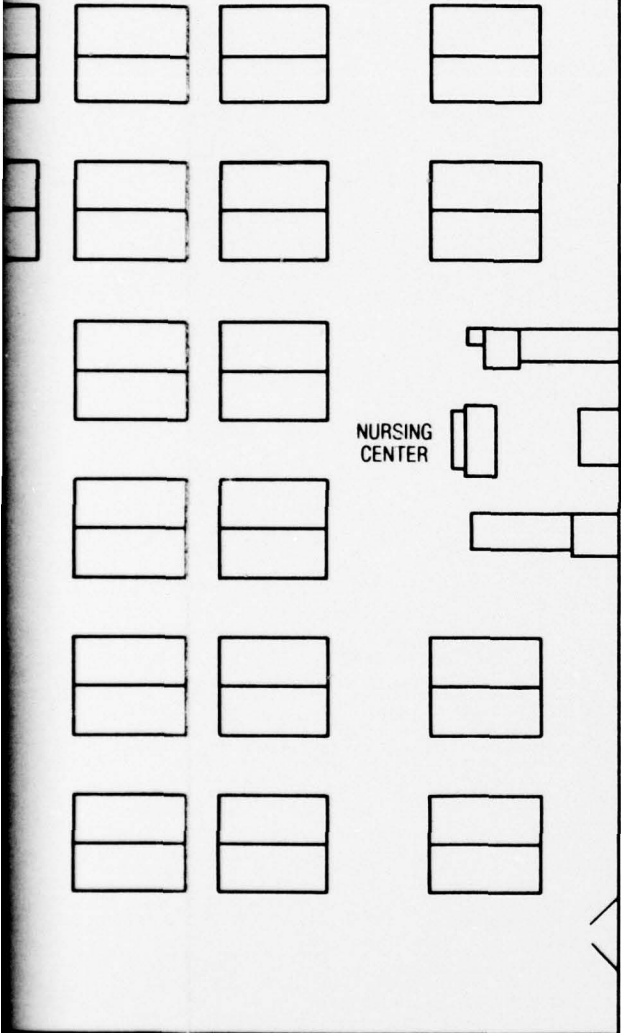
3



4

OVERFLOW WARD  
78 PATIENTS  
(CREW BERTHING)

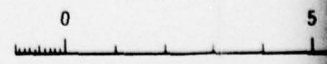
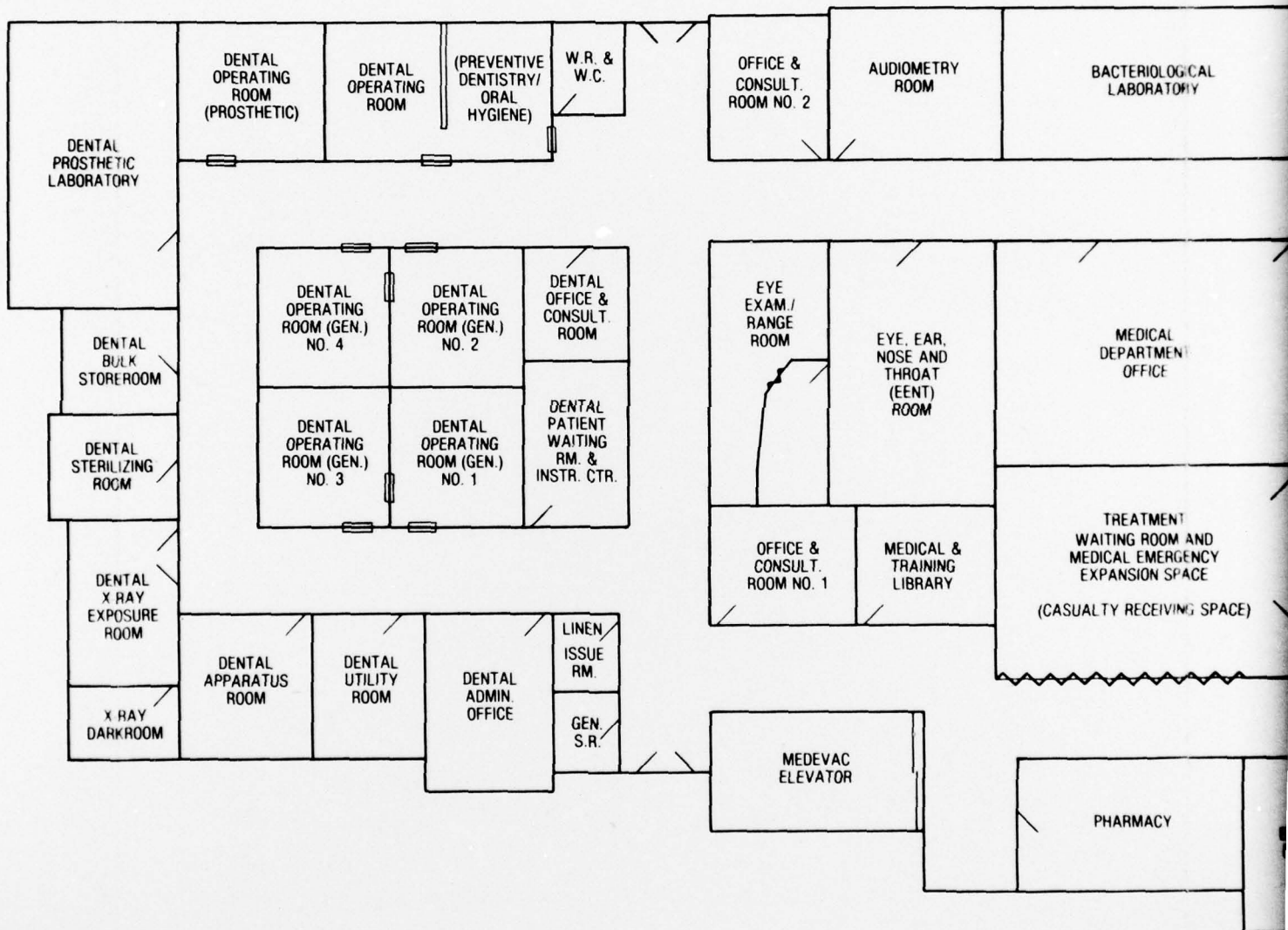
2-HIGH



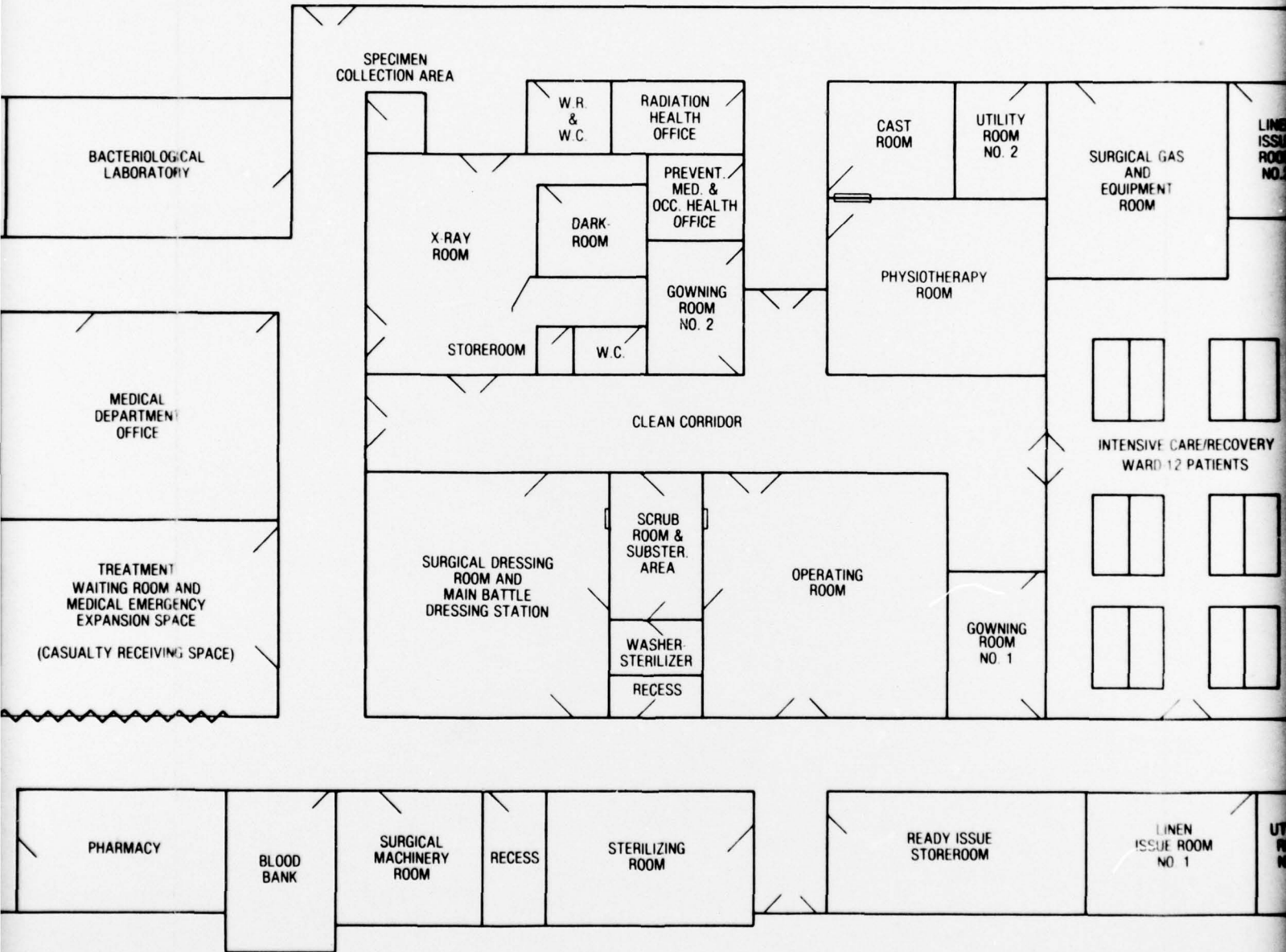
5

**Figure 3**  
**AIRCRAFT CARRIER**  
**MEDICAL/DENTAL SUITE ARRANGEMENT**

6



# LARGE AUXILIARY



METERS

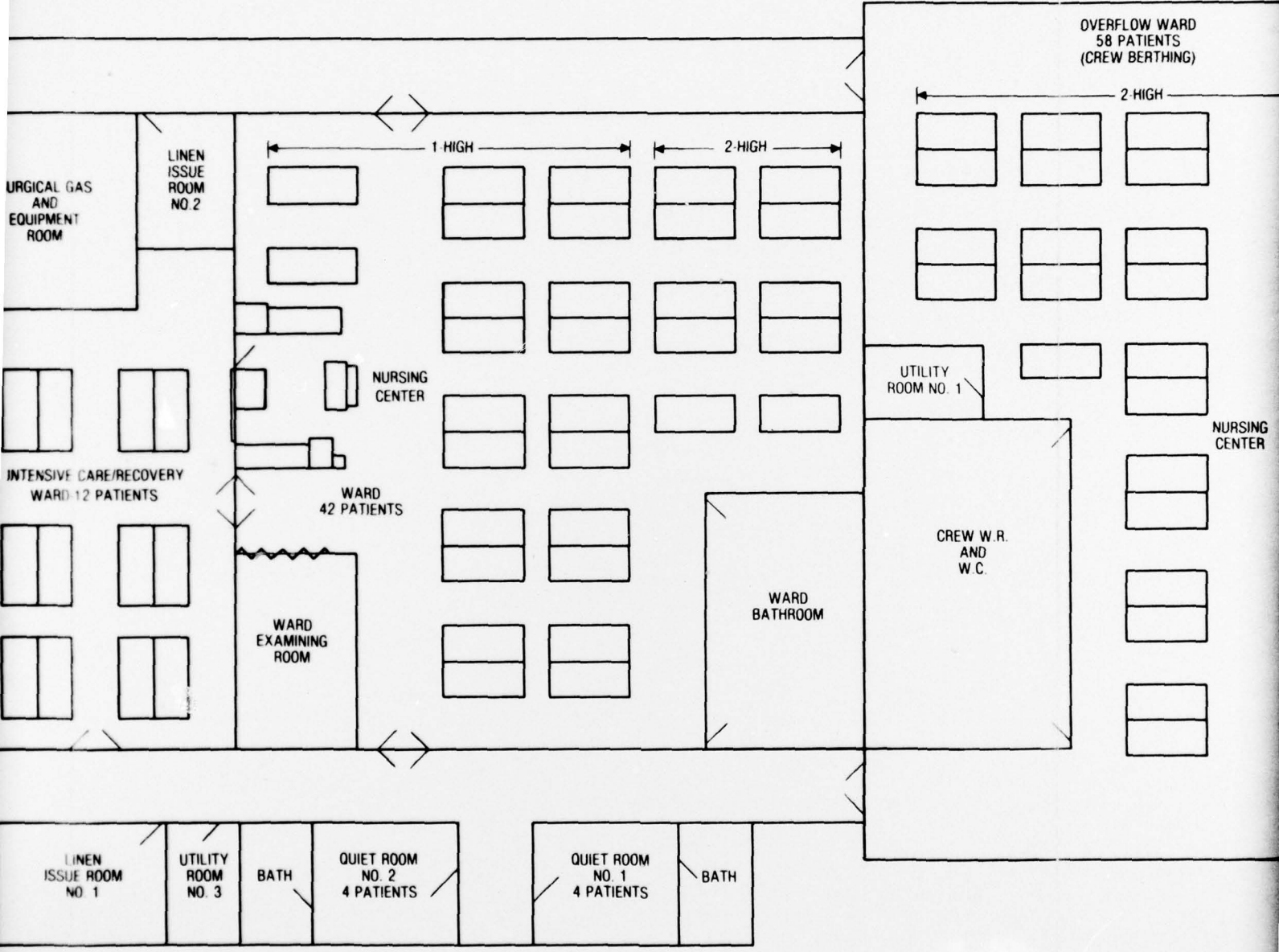


SCALE: 1/8.96 cm = 1 m.

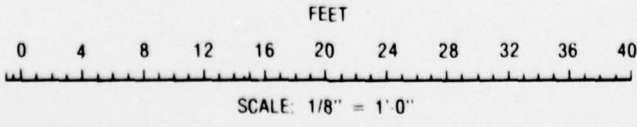
## MEDICAL/DENTAL SUITE ARRANGE

2

**ILIARY**



**TE ARRANGEMENT**



FORWARD

3

OVERFLOW WARD  
58 PATIENTS  
(CREW BERTHING)

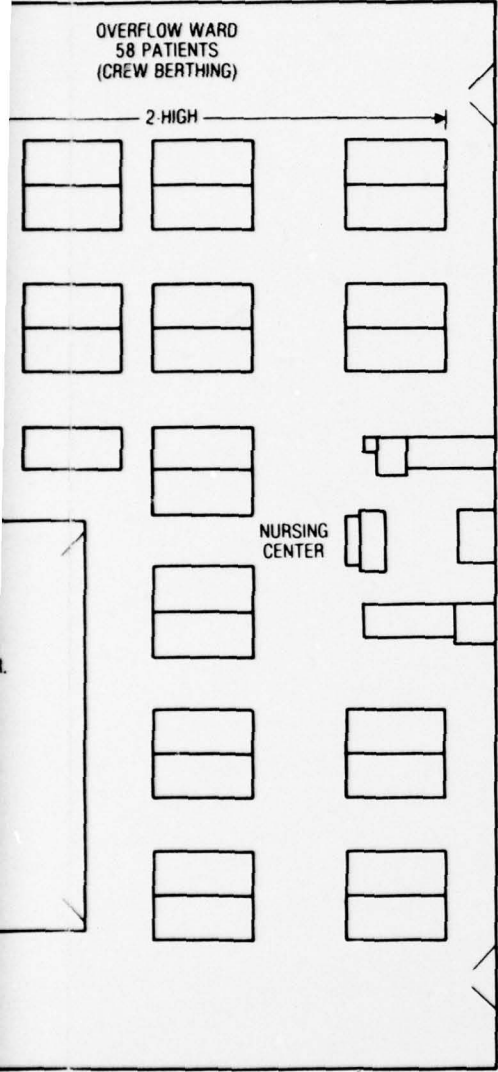
2-HIGH

NURSING  
CENTER

FORWARD

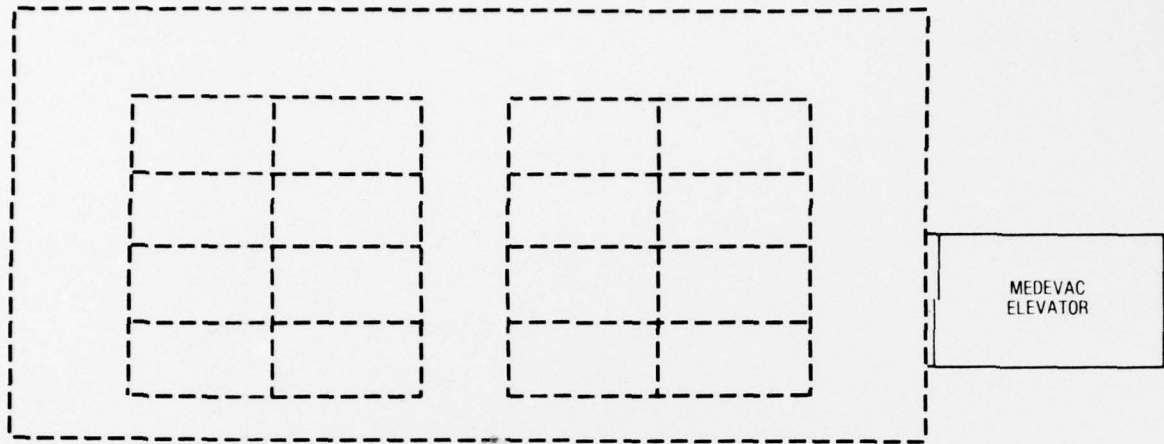
4

M

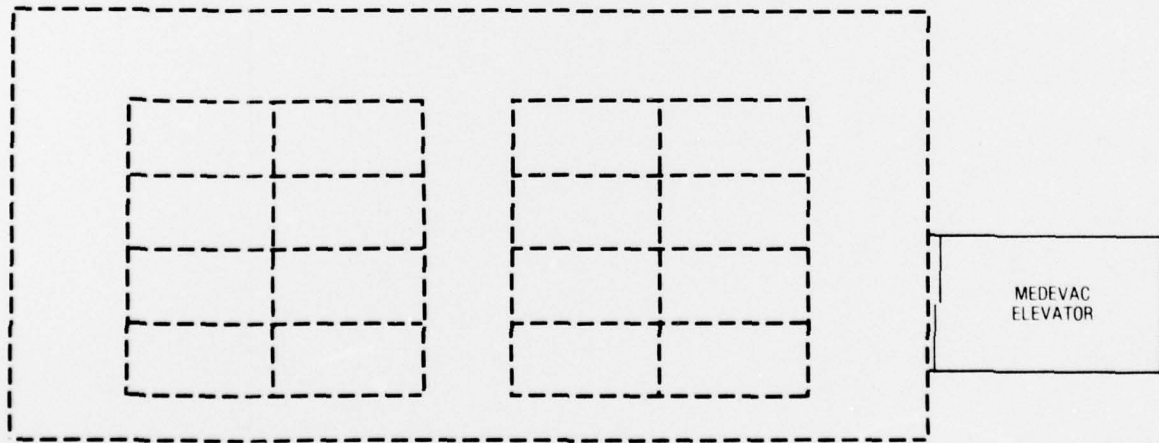


**Figure 4**  
**LARGE AUXILIARY**  
**MEDICAL/DENTAL SUITE ARRANGEMENT**

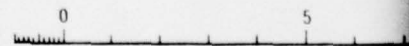
5



HANGAR DECK TRIAGE AREA



HELICOPTER PLATFORM TRIAGE AREA



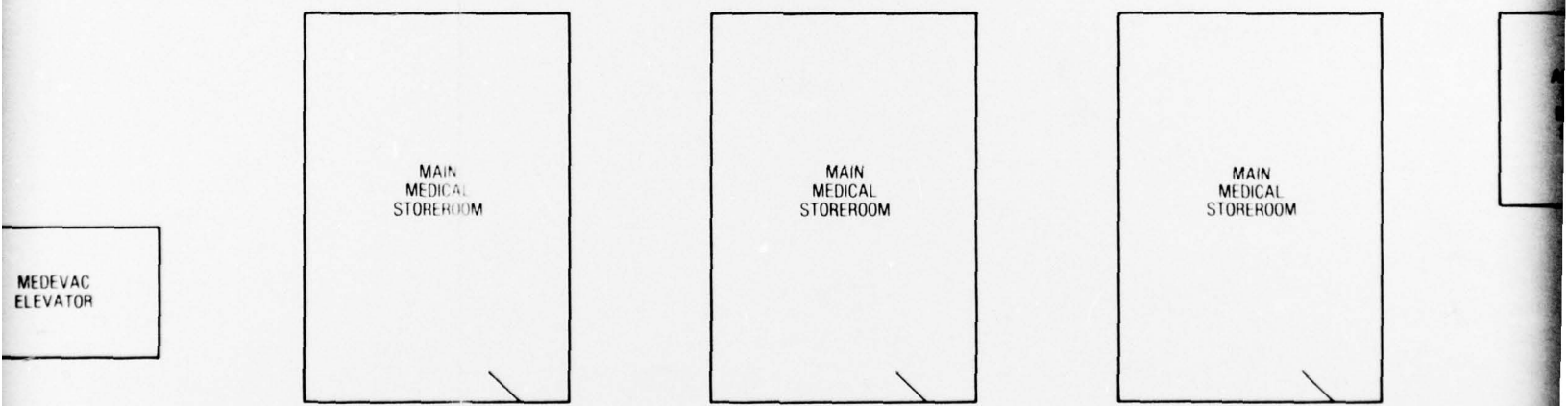
SCALE: 1/4"

# AIRCRAFT CARRIER



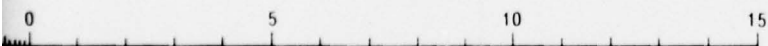
MAIN MEDICAL STOREROOMS  
(TO BE DISTRIBUTED IN THE STOREROOM SECTION OF THE SHIP, WITH GOOD ACCESS FROM THE MEDICAL/DENTAL SUITE. NO PARTICULAR ORIENTATION IS IMPLIED.)

# LARGE AUXILIARY



MAIN MEDICAL STOREROOMS  
(TO BE DISTRIBUTED IN THE STOREROOM SECTION OF THE SHIP, WITH GOOD ACCESS FROM THE MEDICAL/DENTAL SUITE. NO PARTICULAR ORIENTATION IS IMPLIED.)

METERS

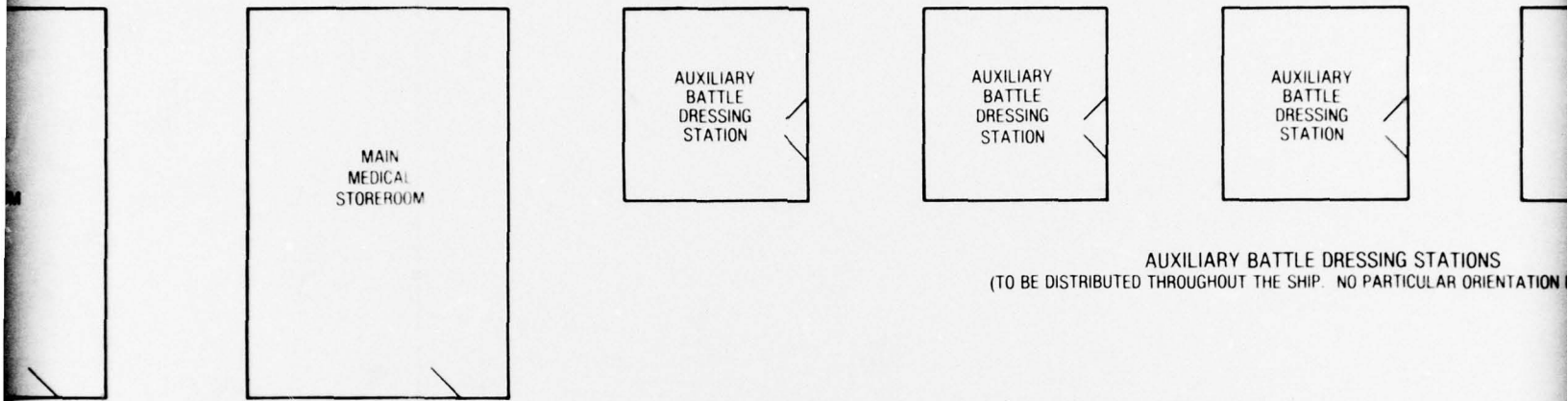


SCALE: 1/0 96 cm = 1 m

# DETACHED MEDICAL DEPARTMENT

2

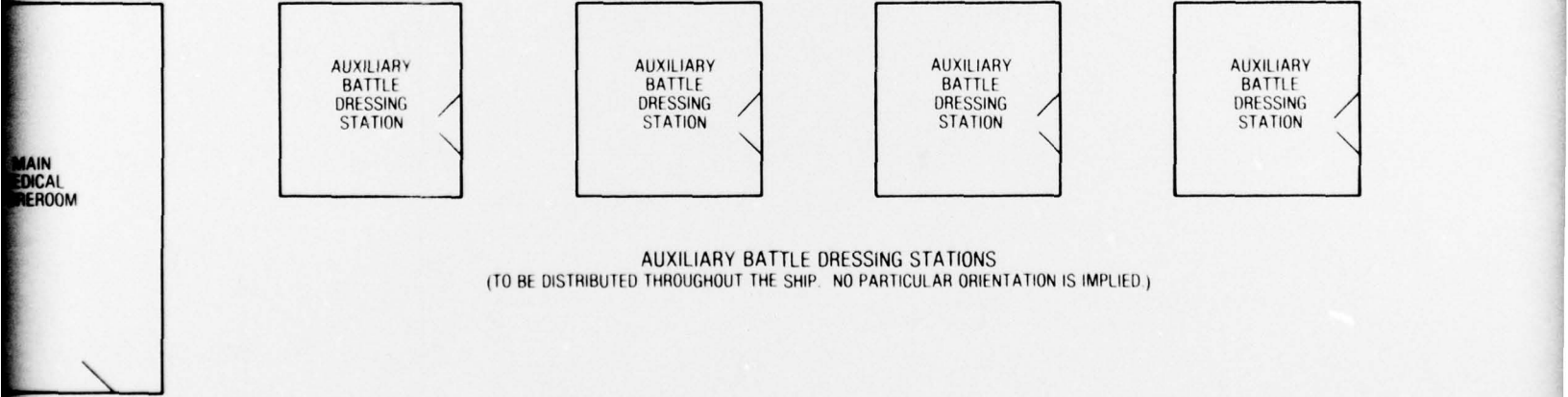
# CARRIER



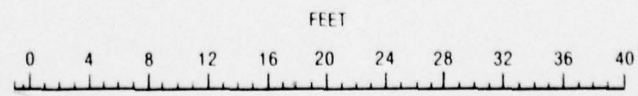
AUXILIARY BATTLE DRESSING STATIONS  
(TO BE DISTRIBUTED THROUGHOUT THE SHIP. NO PARTICULAR ORIENTATION IS IMPLIED.)

REEROOMS  
ON OF THE SHIP, WITH GOOD ACCESS  
(NO PARTICULAR ORIENTATION IS IMPLIED.)

# AUXILIARY



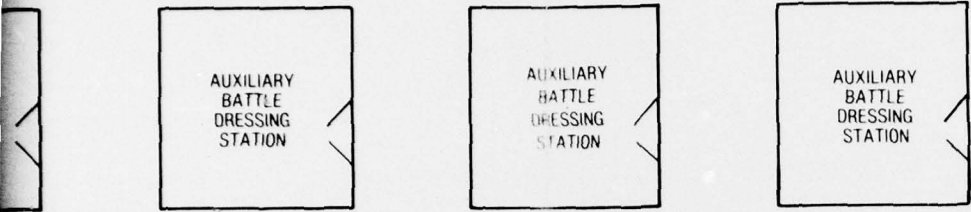
AUXILIARY BATTLE DRESSING STATIONS  
(TO BE DISTRIBUTED THROUGHOUT THE SHIP. NO PARTICULAR ORIENTATION IS IMPLIED.)



SCALE: 1/8" = 1' 0"

# AL DEPARTMENT SPACES

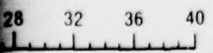
3



AUXILIARY BATTLE DRESSING STATIONS  
(DISTRIBUTED THROUGHOUT THE SHIP. NO PARTICULAR ORIENTATION IS IMPLIED.)



(IMPLIED)



4

**Figure 5**  
**DETACHED MEDICAL DEPARTMENT SPACES**