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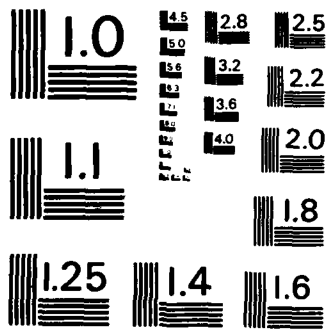

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MEDICAL FACILITY SUPPORT STUDY

Prepared by
Engineer Studies Center
US Army Corps of Engineers

November 1985

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This study analyzed the engineer wartime factors for hospitals used in the Force Analysis Simulation of Theater Administrative and Logistics Support (FASTALS) Construction Model. It calculates the engineer requirements needed to accomplish the hospital tasks in support of contingency operations in Europe, Southwest Asia, and Northwest Asia. Based on these evaluations, changes or adjustments to the model's workload factors were recommended. All the work estimates that were used to support the revised factors are documented so they can be reviewed and revised, as necessary.

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The Engineer Studies Ceneter (ESC), US Army Corps of Engineers (USACE), prepared this report under the sponsorship of the Commandant, US Army Engineer School, Fort Belvoir, Virginia. This analysis was developed and authored by Gerard F. Greco, Senior Project Manager.

This report was prepared for publication by Ms. Stacia L. Hall under the supervision of Ms. Donna L. Jones.

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I. INTRODUCTION

1. Purpose. This report describes the results of an evaluation of the engineer workload factors applied within the Force Analysis Simulation of the Theater Administrative and Logistic Support (FASTALS) Construction Model to generate requirements for an engineer force structure in support of hospital needs in the RCZ/COMMZ.

2. Background.

a. There are 23 engineer tasks and associated workload factors used in the current FASTALS Construction Model. The factors presented in this report address only Task No. 16--Hospitals. That model estimates the engineer requirements in three theaters of operation around the world: Europe, Southwest Asia (SWA), and Northeast Asia (NEA). Because of infrastructure, and climate and terrain differences among these areas, the model uses separate workload factors for each theater.

b. In December 1984, the US Army Engineer School (USAES) asked the Engineer Studies Center (ESC) to review each of the model's factors to ensure that they reflected the most austere standard of construction consistent with the theaters' construction policies. Where adjustments or changes were needed, ESC was to assign new factors and document how they were developed. ESC also was asked to update all factors which were associated with the use of facilities and installations from the Army Facility Components Systems (AFCS) to reflect the most current construction estimates and identifying codes.

c. This report represents ESC's response to that study request, as it relates to hospital support.

3. Organization. Sections II and III present the rationale and factor development for Europe and NEA, and SWA, respectively. A summary is presented in Section IV.

II. EUROPE AND NEA

4. Standard of Construction. Renovations of buildings of opportunity to austere standards for end use as General Hospitals.

5. Method. The basis is the 1,000-bed general hospital. Workload estimates were generated using the detailed engineering analysis under development at the US Army Engineer Division, Europe, in support of the "warm base" general hospital located in the Beitel complex, Netherlands. Assumptions were made in generating these factors regarding the ability to locate appropriate buildings of opportunity for hospital use, and, in addition, that utility services (i.e., water, sewer, power, and heat) were all available in required quantities and these systems were in operating condition.

a. Factor I--renovations without use of DMS. This engineer workload estimate is based on all hospital functions being located in buildings of opportunity. The factor is appropriate for use where deployed general hospital units will not have Deployable Medical Systems (DMS) available. Figure 1 provides a breakdown of the workload items considered in Factor I.

b. Factor II--renovations with use of DMS. This engineer workload estimate is based on the hospital core requirements (surgery, radiology, laboratory, pharmacy, intensive care, and central material supply), all functioning within individual International Standards Organization (ISO) shelters. A total of 13 ISO shelters plus two configured TEMPER tents would be employed, and all other hospital functions would be located in buildings of opportunity. The factor is appropriate for use where the general hospital unit will be utilizing DMS. Figure 2 provides a breakdown of the workload items considered in Factor II. Current Department of the Army (DA) programming indicates that fielding of DMS will be completed for all general hospital units by FY 91.

FACTOR I: WORKLOAD ESTIMATE FOR A 1,000-BED GENERAL HOSPITAL IN EUROPE OR NEA BASED ON RENOVATIONS WITHOUT USE OF DMS

Item	Labor in Manhours
Utilities distribution and modifications	14,800
Partitions, openings, and ceilings	3,000
General cleaning and selective painting	2,000
Heating system modifications	800
Air Conditioning for surgery and ICU	1,000
Ramps (mobile)	100
Vaults (pharmacy, arms)	200
New flooring in selective areas	200
Flammable and gas storage	400
Helipad	200
Fence and lighting	500
Total	23,200

Figure 1

FACTOR II: WORKLOAD ESTIMATE FOR A 1,000-BED GENERAL HOSPITAL IN EUROPE OR NEA BASED ON RENOVATIONS WITH USE OF DMS

Item	Labor in Manhours
Utilities distribution and modifications	3,600
Partitions, openings, and ceilings	1,500
General cleaning and selective painting	2,000
Heating system modifications	400
Ramps (mobile)	100
New flooring in selective areas	100
Flammable and gas storage	400
Grading, footings, and paving	500
Walkways, overhead cover (buildings to ISOs)	300
Helipad	200
Fence and lighting	500
Total	9,600

Figure 2

III. SWA

6. Standard of Construction. This installation, classified initial standard, is the most austere in the AFCS.

a. Factor I--new construction without use of DMS. This engineer workload estimate is based on administrative, housing, and non-medical hospital functions being sheltered in unframed tents. Tents with frames are used for wards and for other medical functions which can tolerate such housing. Ten percent of the tentage with frames are dedicated to Intensive Care Units. Wood-framed buildings are used for all remaining facilities.

b. Factor II--new construction with use of DMS. This engineer workload estimate is also based on administrative, housing, and non-medical hospital functions being sheltered in unframed tents. Tents with frames are again used for wards and other hospital functions which can tolerate this housing, but the ten percent of shelters normally dedicated to Intensive Care Units would be housed with the use of DMS/ISO shelters. The hospital core requirements such as surgery, radiology, laboratory, pharmacy, and central material supply would function within individual ISO shelters. All remaining hospital functions would be located in wood-framed buildings.

7. Method. The basis is the 1,000-bed hospital, AFCS Installation GH 1021.[1] As the buildings and utilities are not listed in TM 5-301 for desert climate, construction manhours for temperate climate are multiplied by a factor of 1.15 to arrive at an estimate of desert climate engineer effort. Manhours to construct the installation are divided by 1,000 to achieve the manhours/bed factors. Results for Factor I and Factor II are shown in Figures 3 and 4, respectively.

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[1]TM 5-302, Change 4, Drawing GH 1011-1061, Sheet 1.

FACTOR I: WORKLOAD ESTIMATE FOR A 1,000-BED HOSPITAL CONSTRUCTION IN SWA—WITHOUT USE OF DMS
(Desert Climate)

Facility				Manhours						
				Horizontal		Vertical		General		
Item	Size or Unit	AFCS Number	Quantity	Unit	Net	Unit	Net	Unit	Net	Total
Tentage w/frames	16' x 32'	72520 AC	117	2	234	9	1,053	7	819	2,106
Buildings										
Centralized Materiel	40' x 120'	51010 LD	1	89	89	5,730	5,730	421	421	6,240
EENT and Pharmacy	30' x 70'	51010 KT	1	64	64	2,768	2,768	188	188	3,020
Laboratory & Dental	40' x 120'	53020 CV	1	89	89	5,345	5,345	421	421	5,855
Latrine	10' x 20'	72321 BD	6	2	12	230	1,380	37	222	1,614
Surgery	40' x 150'	51010 LH	1	103	103	8,266	8,266	519	519	8,888
Utility #3	30' x 60'	51010 MJ	15	53	795	3,434	51,510	162	2,430	54,735
Utility #9	30' x 50'	51010 MP	1	55	55	2,877	2,877	137	137	3,069
X-ray	40' x 90'	53020 CP	1	87	87	4,206	4,206	321	321	4,614
Hardstand	1,000 SY	85210 BF	18.8	376	7,069	0	0	136	2,557	9,626
Road	mile	85130 FK	1.2	3,849	4,619	0	0	1,699	2,039	6,658
Sump, Fire	10,000 gal	84330 AC	6	18	108	124	744	133	798	1,650
Water Tank	21,000 gal	84120 AE	1	0	0	483	483	0	0	483
Site Preparation	acre	87190 AA	38.9	101	3,929	0	0	37	1,439	5,368
Water Distribution	50,000 GPD	84210 DC	1	879	879	1,904	1,904	868	868	3,651
Sewage	25,000 GPD	83111 AY	1	664	664	1,633	1,633	1,219	1,219	3,516
Electric Distribution	139.7 KW	81240 BG	1	679	679	7,136	7,136	2,012	2,012	9,827
Total					19,475		95,035		16,410	130,920

Figure 3

FACTOR II: WORKLOAD ESTIMATE FOR A 1,000-BED HOSPITAL CONSTRUCTION IN SWA—WITH USE OF DMS
(Desert Climate)

Facility				Manhours						
				Horizontal		Vertical		General		
Item	Size or Unit	AFCS Number	Quantity	Unit	Net	Unit	Net	Unit	Net	Total
Tentage w/frames	16' x 32'	72520 AC	105.3	2	211	9	948	7	737	1,896
Buildings:										
Latrine	10' x 20'	72321 BD	6	2	12	230	1,380	37	222	1,614
Utility #3	30' x 60'	51010 MJ	15	53	795	3,434	51,510	162	2,430	54,735
Utility #9	30' x 50'	51010 MP	1	55	55	2,877	2,877	137	137	3,069
Hardstand	1,000 SY	85210 BF	18.8	376	7,069	0	0	136	2,557	9,626
Road	mile	85130 FK	1.2	3,849	4,619	0	0	1,699	2,039	6,658
Sump, Fire	10,000 gal	84330 AC	6	18	108	124	744	133	798	1,650
Water Tank	21,000 gal	84120 AE	1	0	0	483	483	0	0	483
Site Preparation	acre	87190 AA	38.9	101	3,929	0	0	37	1,439	5,368
Water Distribution	50,000 GPD	84210 DC	1	879	879	1,904	1,904	868	868	3,651
Sewage	25,000 GPD	83111 AY	1	664	664	1,633	1,633	1,219	1,219	3,516
Electric Distribution	139.7 KW	81240 BG	1	679	679	7,136	7,136	2,012	2,012	9,827
Total					19,020		68,615		14,458	102,093

Figure 4

IV. SUMMARY

8. <u>Summary of Factors</u>. The following engineer workload factors are considered appropriate for use with the FASTALS model for the conditions described. Factors are shown with two values: the total effort for the task (which is the sum of the skilled and unskilled engineer efforts), and the skilled engineer effort. This is done to conform to the FASTALS model format, and to provide the breakdown in the event unskilled labor can be supplied by the host nation.

a. European and NEA theaters. Factor is based on renovating buildings of opportunity to austere standards and without use of DMS:

Total Task:	23.2 Manhours/Bed
Skilled Engineer Effort:	20.4 Manhours/Bed

b. European and NEA theaters. Factor is based on renovating building of opportunity to austere standards and with use of DMS:

Total Task:	9.6 Manhours/Bed
Skilled Engineer Effort:	8.4 Manhours/Bed

c. SWA theater. Factor is based on new construction of facilities to austere standards and without use of DMS:

Total Task:	130.9 Manhours/Bed
Skilled Engineer Effort:	114.5 Manhours/Bed

d. SWA theater. Factor is based on new construction of facilities to austere standards and with use of DMS:

Total Task:	102.1 Manhours/Bed
Skilled Engineer Effort:	87.6 Manhours/Bed

9. <u>Discussion of Findings</u>.

a. Workload factors for this task in the European and NEA theaters are based on the availability and use of existing host-nation structures and utilities. Limited renovation or alteration efforts were considered in the estimates for labor needed to transform a typical existing building(s) into a hospital. These estimates were developed both with and without consideration of using DMS to satisfy hospital core requirements. This was done so that planners may take full credit for the phase-in of DMS, since a single factor will be needed that represents the proportion of DMS fielded for the particular year under analysis.

b. For the SWA theater, host-nation facilities and utilities were not assumed to be available; therefore, the workload factors are based on the construction of minimum standard AFCS hospitals and both with and without the availability of DMS. It is assumed that a general hospital can be initially deployed and operated using organic tentage (with or without DMS); however, construction of selected buildings would be started as soon as engineer capabilities allowed. If sustained general hospital operations are to be maintained and the planned quality of care offered, upgrading of facilities will be required.

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