DRY STORAGE

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S	A-RATIONS (CONDIMENTS) PALLET POSITIONS REQ'D	A-RATIONS (CONDIMENTS) PALLET POSITIONS ML'S	A-RATIONS (CONDIMENTS) FLOW LANES REQ'D/ML'S	MRE (MEALS READY TO EAT) PALLET POSITIONS	T-RATIONS PALLET POSITIONS T-RATIONS	T-RATIONS PALLET POSITIONS MILK (UHT)	MEN
1,000	120	89	160	24	21	222	30	160	24	1,000
2,000	205	125	88	33	24	216	60	320	48	2,000
3,000	260	138	60	68	50	166	90	480	72	3,000
4,000	314	146	46	76	53	160	120	639	96	4,000
5,000	363	152	34	90	59	148	150	799	120	5,000
6,000	421	156	24	102	60	144	180	959	144	6,000
7,000	473	159	18	121	72	120	210	1119	168	7,000
8,000	522	161	16	132	77	112	240	1278	192	8,000
9,000	568	162	12	140	77	112	270	1438	216	9,000
10,000	625	164	10	148	80	106	300	1598	240	10,000
11,000	673	164	10	159	80	106	330	1757	264	11,000
12,000	722	164	10	168	80	106	360	1917	288	12,000
13,000	778	164	10	179	81	102	390	2077	312	13,000
14,000	825	164	10	183	81	102	420	2237	336	14,000
15,000	872	164	10	192	84	96	450	2396	360	15,000
16,000	918	164	10	198	84	96	480	2556	384	16,000
17,000	974	165	6	209	87	90	510	2716	408	17,000
18,000	1020	165	6	217	87	90	540	2875	432	18,000
19,000	1069	165	6	226	87	90	570	3035	456	19,000
20,000	1124	165	6	238	89	88	599	3195	480	20,000
21,000	1172	165	6	246	89	88	629	3355	504	21,000
22,000	1225	165	6	255	90	84	659	3514	528	22,000
23,000	1271	165	6	266	92	82	689	3674	552	23,000
24,000	1316	165	6	273	92	82	719	3834	575	24,000
25,000	1379	165	6	281	93	78	749	3994	599	25,000
26,000	1424	165	6	291	95	76	779	4153	623	26,000
27,000	1473	165	6	300	96	72	809	4313	647	27,000
28,000	1524	165	6	307	96	72	839	4473	671	28,000
29,000	1582	165	6	321	101	64	869	4632	695	29,000
30,000	1624	165	6	326	101	64	899	4792	719	30,000
31,000	1678	167	4	340	101	64	929	4952	743	31,000
32,000	1719	167	4	344	101	64	959	5112	767	32,000
33,000	1778	167	4	356	101	64	989	5271	791	33,000
34,000	1826	167	4	369	101	64	1019	5431	815	34,000
35,000	1874	168	0	383	101	64	1049	5591	839	35,000
36,000	1921	168	0	387	101	64	1079	5750	863	36,000
37,000	1975	168	0	396	101	64	1109	5910	887	37,000
38,000	2022	168	0	402	101	64	1139	6070	911	38,000
39,000	2077	168	0	412	102	60	1168	6230	935	39,000
40,000	2126	168	0	420	102	60	1198	6389	959	40,000

FREEZER

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S	ICE T-RATIONS PALLET POSITIONS	MEN
1,000	80	59	48	10	1,000
2,000	121	71	24	20	2,000
3,000	162	75	16	29	3,000
4,000	202	80	6	39	4,000
5,000	237	80	6	48	5,000
6,000	272	80	6	58	6,000
7,000	305	80	6	67	7,000
8,000	347	80	6	77	8,000
9,000	382	81	4	86	9,000
10,000	414	81	4	96	10,000
11,000	451	81	4	105	11,000
12,000	486	81	4	115	12,000
13,000	521	83	0	124	13,000
14,000	558	83	0	134	14,000
15,000	592	83	0	143	15,000
16,000	635	83	0	153	16,000
17,000	669	83	0	162	17,000
18,000	700	83	0	172	18,000
19,000	736	83	0	181	19,000
20,000	772	83	0	191	20,000
21,000	799	83	0	200	21,000
22,000	843	83	0	210	22,000
23,000	878	83	0	219	23,000
24,000	916	83	0	229	24,000
25,000	948	83	0	238	25,000
26,000	983	83	0	248	26,000
27,000	1016	83	0	257	27,000
28,000	1055	83	0	267	28,000
29,000	1089	83	0	276	29,000
30,000	1126	83	0	286	30,000
31,000	1157	83	0	296	31,000
32,000	1205	83	0	305	32,000
33,000	1236	83	0	315	33,000
34,000	1269	83	0	324	34,000
35,000	1302	83	0	334	35,000
36,000	1340	83	0	343	36,000
37,000	1378	83	0	353	37,000
38,000	1415	83	0	362	38,000
39,000	1448	83	0	372	39,000
40,000	1485	83	0	381	40,000

PERISHABLE COOLER

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S	T-RATIONS (BREAD) PALLET POSITIONS
1,000	36	18	24	12
2,000	59	21	18	23
3,000	83	24	12	35
4,000	105	26	10	46
5,000	128	27	6	58
6,000	152	30	0	69
7,000	173	30	0	81
8,000	193	30	0	92
9,000	216	30	0	104
10,000	238	30	0	115
11,000	258	30	0	127
12,000	279	30	0	138
13,000	299	30	0	150
14,000	322	30	0	161
15,000	343	30	0	173
16,000	362	30	0	184
17,000	384	30	0	196
18,000	405	30	0	207
19,000	427	30	0	219
20,000	449	30	0	230
21,000	470	30	0	242
22,000	492	30	0	253
23,000	511	30	0	265
24,000	534	30	0	276
25,000	557	30	0	288
26,000	578	30	0	299
27,000	601	30	0	311
28,000	621	30	0	322
29,000	643	30	0	334
30,000	664	30	0	345
31,000	686	30	0	357
32,000	707	30	0	368
33,000	726	30	0	380
34,000	750	30	0	391
35,000	768	30	0	403
36,000	790	30	0	414
37,000	813	30	0	426
38,000	832	30	0	437
39,000	853	30	0	449
40,000	875	30	0	460

SENSITIVE VEGETABLE & FRUIT COOLER

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S
1,000	14	12	48
2,000	18	15	36
3,000	21	18	24
4,000	25	18	24
5,000	28	18	24
6,000	30	18	24
7,000	32	18	24
8,000	35	18	24
9,000	36	18	24
10,000	46	23	8
11,000	47	23	8
12,000	49	23	8
13,000	51	23	8
14,000	54	23	8
15,000	58	23	8
16,000	61	23	8
17,000	63	23	8
18,000	65	23	8
19,000	70	23	8
20,000	71	23	8
21,000	75	23	8
22,000	76	23	8
23,000	79	23	8
24,000	81	23	8
25,000	84	23	8
26,000	86	23	8
27,000	90	24	0
28,000	91	24	0
29,000	95	24	0
30,000	97	24	0
31,000	98	24	0
32,000	101	24	0
33,000	106	24	0
34,000	107	24	0
35,000	110	24	0
36,000	113	24	0
37,000	117	24	0
38,000	120	24	0
39,000	121	24	0
40,000	123	24	0

HARDY VEGETABLE & FRUIT COOLER

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S	T-RATIONS PALLET POSITIONS
1,000	13	11	16	1
2,000	20	11	6	2
3,000	21	17	0	3
4,000	29	17	0	3
5,000	35	17	0	4
6,000	39	17	0	5
7,000	42	17	0	5
8,000	47	17	0	6
9,000	51	17	0	7
10,000	55	20	0	7
11,000	59	20	0	8
12,000	63	20	0	9
13,000	68	20	0	10
14,000	71	20	0	10
15,000	77	20	0	11
16,000	80	20	0	12
17,000	84	20	0	12
18,000	90	20	0	13
19,000	93	20	0	14
20,000	97	20	0	14
21,000	101	20	0	15
22,000	106	20	0	16
23,000	109	20	0	17
24,000	115	20	0	17
25,000	119	20	0	18
26,000	123	20	0	19
27,000	125	21	0	19
28,000	128	21	0	20
29,000	136	21	0	21
30,000	140	21	0	21
31,000	142	21	0	22
32,000	146	21	0	23
33,000	151	21	0	23
34,000	156	21	0	24
35,000	159	21	0	25
36,000	165	21	0	26
37,000	170	21	0	26
38,000	173	21	0	27
39,000	176	21	0	28
40,000	180	21	0	28

ONION & POTATO COOLER

MEN	A-RATIONS PALLET POSITIONS REQ'D	A-RATIONS PALLET POSITIONS ML'S	A-RATIONS FLOW LANES REQ'D/ML'S
1,000	13	6	4
2,000	24	8	0
3,000	29	8	0
4,000	38	8	0
5,000	44	8	0
6,000	53	8	0
7,000	61	8	0
8,000	69	8	0
9,000	76	8	0
10,000	84	8	0
11,000	93	8	0
12,000	99	8	0
13,000	107	8	0
14,000	116	8	0
15,000	121	8	0
16,000	131	8	0
17,000	139	8	0
18,000	147	8	0
19,000	153	8	0
20,000	162	8	0
21,000	170	8	0
22,000	178	8	0
23,000	185	8	0
24,000	192	8	0
25,000	200	8	0
26,000	209	8	0
27,000	216	8	0
28,000	225	8	0
29,000	231	8	0
30,000	239	8	0
31,000	247	8	0
32,000	256	8	0
33,000	262	8	0
34,000	271	8	0
35,000	279	8	0
36,000	286	8	0
37,000	295	8	0
38,000	301	8	0
39,000	310	8	0
40,000	317	8	0

PROCESS FOR DETERMINATION OF TOTAL STORAGE REQUIREMENTS

ENTER TROOP STRENGTHS PER CATEGORY.

1. BARRACKS CAPACITY _____
2. TRADOC FACILITY (LINE 1. x .95) _____
3. FORSCOM FACILITY (LINE 1. x .70) _____
4. 14 DAY RESERVES IN TRAINING _____
5. HOSPITAL BED CAPACITY _____
6. TOTAL (2 OR 3 PLUS 4 & 5) _____
7. CASH SALES (LINE 2 OR 3 x .15) _____
8. TOTAL (LINES 6 AND 7) _____
9. WEEKEND RESERVES - 2 LUNCHES PER WEEKEND
   WEEKEND RESERVES SUPPORTED _____

FACTOR APPROPRIATE TROOP STRENGTH CATEGORIES INTO A COMPOSITE NUMBER FOR A-RATION DETERMINATION.

10. DRY - LINE 9 x .075= _____ + LINE 8 _____ = _____
11. DRY - ACCESSORIES & CONDIMENTS (A&C) -
    LINE 9 x .075 = _____ + LINE 8 _____ = _____
12. FREEZE -
    LINE 9 x .064 = _____ + LINE 8 _____ = _____
13. PERISHABLE COOLER -
    LINE 9 x .065 = _____ + LINE 8 _____ = _____
14. SENSITIVE VEGETABLE & FRUIT COOLER -
    LINE 9 x .130 = _____ + LINE 8 _____ = _____
15. HARDY VEGETABLE & FRUIT COOLER -
    LINE 9 x .211 = _____ + LINE 8 _____ = _____
16. ONIONS & POTATOES -
    LINE 9 x .072 = _____ + LINE 8 _____ = _____

DIRECTLY ENTER DATA POINT TABLES WITH COMPOSITE NO.S FROM LINES 10-16. INTERPOLATE AS REQUIRED AND DETERMINE THE A-RATIONS REQUIREMENT PER STORAGE AREA.

	PALLETS	ML'S	LANES
17. DRY - W/O A&C - LINE 10			
18. DRY - A&C - LINE 11			
19. DRY TOTAL - LINE 17 + 18			
20. FREEZER - LINE 12			
21. COOLER - PERISHABLE LINE 13			
22. SENSITIVE VEGETABLE & FRUIT COOLER LINE 14			
23. HARDY VEGETABLE & FRUIT COOLER LINE 15			
24. ONIONS & POTATOES LINE 16			

DETERMINE TROOP STRENGTHS FOR FIELD FEEDING AND ENTER DATA POINT TABLES, DESIGN VALUES, TO DETERMINE MRE, T-RATION AND SUPPORT ITEMS REQUIREMENTS PER STORAGE AREA.

25. T & MRE RATIONS
    MEN IN FIELD (PEAK TRAINING MONTH) _____

	PALLETS
26. DRY - T-RATIONS	
27. DRY - MILK (UHT)	
28. DRY - MRE	
29. TOTAL DRY (LINE 26+27+28)	
30. FREEZER (ICE)	
31. COOLER - PERISHABLE (BREAD)	
32. COOLER - HARDY V & F (FRUIT)	

ADD THE INDIVIDUAL STORAGE REQUIREMENTS FROM STEPS 17-24 & 25-32 AS INDICATED TO DETERMINE THE GROSS NO. OF PALLETS AND FLOW LANES FOR EACH STORAGE AREA.

	PALLETS	ML'S	LANES
33. DRY - A-RATIONS - LINE 19			
34. DRY - MRE & T - LINE 29			
35. FREEZER - LINE 20 + 30			
36. COOLER - PERISHABLE LINE 21 + 31			
37. COOLER-SENSITIVE V & F LINE 22			
38. COOLER-HARDY V & F LINE 23+32			
39. ONIONS & POTATOES - LINE 24			

SUMMARY

THE TOTAL STORAGE REQUIREMENTS SHALL BE COMPARED TO THOSE FOR EACH SIZE DEFINITIVE (SEE BUILDING DATA ON SHEETS 4, 5 & 6). THE APPROPRIATE DEFINITIVE SHALL FORM THE BASIS BY WHICH TSA WILL DEVELOP A BLOCK DIAGRAM AND APPROXIMATE SQUARE FOOTAGE REQUIREMENT FOR THE INSTALLATION.

GENERAL DESCRIPTION

THE SIZE AND SHAPE OF A TISA WAREHOUSE IS DEPENDENT ON THE TROOP STRENGTH THE FACILITY IS TO SUPPORT AND THE NUMBER OF STORAGE AREAS REQUIRED WITHIN THE FACILITY BASED ON STORAGE TEMPERATURES AND HUMIDITIES REQUIRED TO ACCOMMODATE THE RANGE OF SUBSISTENCE ITEMS. THIS DEFINITIVE ALLOWS ADAPTATION TO THE TISA REQUIREMENTS BASED ON LOCALLY COMPUTED TROOP STRENGTHS GIVING CONSIDERATION TO THE VARIANCE IN STORAGE INVENTORY IN THE DRY (SEMI-PERISHABLE), FREEZER, PERISHABLE COOLER, SENSITIVE AND HARDY VEGETABLE & FRUIT COOLERS, ONION AND POTATO STORAGE AND MRE & T-RATIONS.

A SERIES OF DESIGN STORAGE INVENTORY TABLES HAVE BEEN DEVELOPED BY STORAGE AREA TYPE FOR A-RATIONS, MRE, T-RATIONS AND A-RATIONS REQUIRED TO SUPPLEMENT OTHER RATIONS. THE DESIGN STORAGE INVENTORY HAS BEEN BASED ON THE MASTER MENU PLANNING SYSTEM AND ACCOUNTS FOR THE SEASONAL VARIANCE IN INVENTORY. THE MENU LINE ITEMS (ML'S) AS EXPRESSED IN THE MASTER MENU HAVE BEEN INCREASED BY 50 PERCENT TO ALLOW FOR VARIETY VARIANCE THROUGH THE USE OF ALTERNATE NATIONAL STOCK NUMBERS (NSN) OR LOCAL STOCK NUMBER ITEMS PROCURED BY A TISA. STOCK NUMBERS WITH LESS THAN ONE QUARTER OF A PALLET ARE STORED IN CASE FLOW LANES. ONE LANE IS PROVIDED FOR FULL CASE SELECTION AND ONE FOR PARTIAL CASE SELECTION (A 100% FACTOR). INVENTORY WITH CASE QUANTITIES GREATER THAN THOSE DEFINED FOR FLOW LANES ARE INTENDED TO BE STORED IN SINGLE OR DOUBLE DEEP PALLET RACK. A 10 PERCENT ALLOWANCE FOR PALLET RACK AND A 15 PERCENT ALLOWANCE FOR MULTI-DEEP DRIVE-IN RACK HAS BEEN INCLUDED IN THE DESIGN INVENTORY TO ACCOUNT FOR LOSSES DUE TO LOT SIZE VARIANCE AND FLUCTUATIONS IN TURNOVER RATES.

THE DAYS OF SUPPLY INCORPORATED INTO THE TABLES ARE AS FOLLOWS:

DRY (SEMI-PERISHABLE)	30 DAYS
MILK UHT	15 DAYS
FREEZER	30 DAYS
ICE "T" SUPPLEMENT	3 DAYS
PERISHABLE COOLER	30 DAYS
FRESH MILK	3 DAYS
BREAD	3 DAYS
SENSITIVE VEGETABLE	3 DAYS
SENSITIVE FRUIT	7 DAYS
"T" SUPPLEMENT	3 DAYS
ONIONS AND POTATOES	15 DAYS
MRE AND T-RATIONS	15 DAYS

THE FORM IN THE ADJACENT LEFT COLUMN HAS BEEN PROVIDED TO CALCULATE THE STORAGE INVENTORY. IT IS NECESSARY THAT THE FORM BE COMPLETED IN LINE NUMBER SEQUENCE. THE STORAGE INVENTORY VALUES VERSUS TROOP STRENGTH FOR ALL RANGES OF VALUES ARE NOT LINEAR; THEREFORE, IT IS NECESSARY TO DEVELOP THE COMPOSITE TROOP SUPPORT REQUIREMENT IN THE TOP SECTION OF THE FORM AND INTERPOLATE THE TABLES. DO NOT CONSTRUCT THE INVENTORY VALUES BY ADDING DIFFERENT LINES OF THE TABLE(S).

THE PHILOSOPHY OF TROOP STRENGTH SUPPORT CALCULATIONS IS AS FOLLOWS:

- FULL A RATIONS OR EQUIVALENT:
  BARRACKS CAPACITY
  HOSPITAL BED CAPACITY
  14 DAY RESERVE TRAINING SCHEDULE
- CASH SALES
  15% TROOPS
  (HISTORICAL AVERAGE)
- WEEKEND RESERVES
  2 LUNCHES PER WEEKEND BASED ON RATIO 2 WEEKEND LUNCHES (VOLUME) PER WEEK TO FULL A RATION (VOLUME) PER MONTH.
- MRE & T RATIONS
  2 T RATIONS AND 1 MRE RATION WITH SUPPLEMENTARY SUPPORT PER MAN PER DAY IN THE FIELD.

THE DATA TABLES AND PROCESS FORM ARE MANDATORY ELEMENTS OF THE SIZING CRITERIA. THE DAYS OF SUPPLY ARE MANDATORY AND MINIMUM REQUIRED.

NOTE: REFERENCE SHALL BE MADE TO THE REVIEW AND ANALYSIS DOCUMENT FOR MORE DETAILED DISCUSSION OF ISSUES INCLUDING THE VARIETY AND PALLET RACK UTILIZATION FACTORS. DERIVATION OF THE DECIMAL FACTORS USED IN LINES 10 THRU 16 ARE ALSO EXPLAINED IN THE REVIEW AND ANALYSIS. DOCUMENT AVAILABLE AT TROOP SUPPORT AGENCY.

REV	DATE	DESCRIPTION	BY	APP

WOLFBERG/ALVAREZ & ASSOCIATES
ARCHITECTURE • ENGINEERING • PLANNING
ARLINGTON, VIRGINIA

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: SORA
DRAWN: CADD
CHECKED: BC
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: NONE
TO ACCOMPANY SPECIFICATION NO
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 9
DATE: OCTOBER 1988