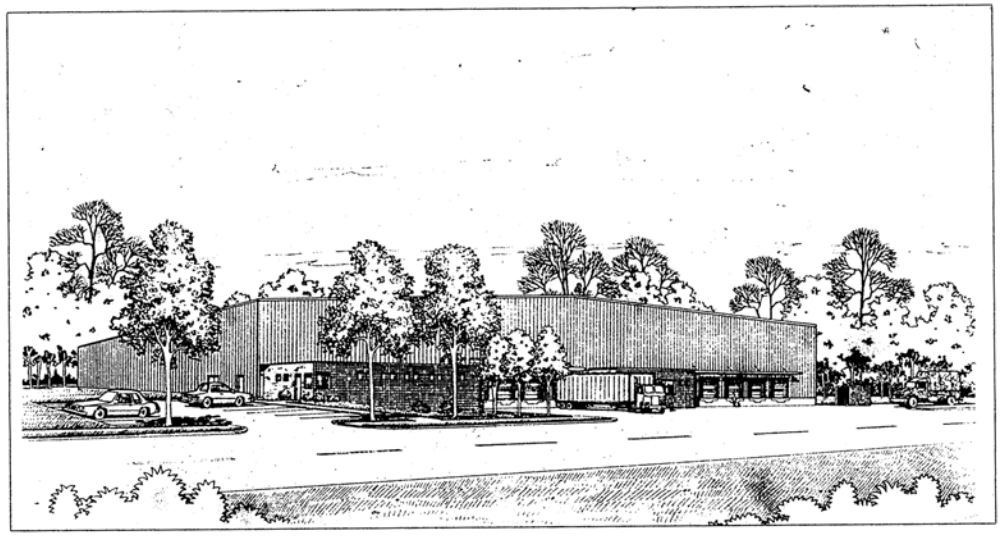
US Army Corps of Engineers
Norfolk District

US Army
Troop Support Agency

# STANDARD DEFINITIVE DESIGNS
# TROOP ISSUE SUBSISTENCE ACTIVITY

# TISA COLD/DRY STORAGE FACILITIES



THIS STANDARD DEFINITIVE DESIGN PACKAGE HAS BEEN DEVELOPED AS A GUIDE FOR DESIGN OF SMALL, MEDIUM AND LARGE TROOP ISSUE SUBSISTENCE ACTIVITIES "TISA" COLD/DRY STORAGE FACILITIES THROUGHOUT THE CONTINENTAL UNITED STATES (CONUS). THE FOLLOWING UNIQUE FUNCTIONAL AND TECHNICAL REQUIREMENTS MUST BE CONSIDERED FOR ADAPTION OF THIS STANDARD OUTSIDE CONTINENTAL UNITED STATES (OCONUS):

- EXTERIOR LIGHTING FOR ADMINISTRATIVE AND BREAKROOM AREAS
- EXTERNAL FORKLIFT CHARGING STATION
- EXTERNAL HOOK-UP FOR REEFER VANS
- BELOW GRADE SPRINKLER WATER STORAGE
- RAILROAD SPURS
- DOCK CONFIGURATION FOR SIDE LOADING/UNLOADING
- ALTERNATE WARTIME USES

THE PURPOSE OF THIS DESIGN PACKAGE IS TO PROVIDE STANDARD FUNCTIONAL LAYOUTS AND CRITERIA FOR SIZING TISA COLD/DRY STORAGE FACILITIES FOR THE DEPARTMENT OF THE ARMY FACILITIES STANDARDIZATION PROGRAM. THE SPECIFIC SIZING CRITERIA AND PROCESS IS INCLUDED TO AID IN THE PREPARATION OF DD FORM 1391, IN ADDITION THIS PACKAGE SERVES AS A GUIDE TO MILITARY DESIGN AGENCIES AND A/E FIRMS IN THE APPLICATION OF THE DESIGN TO A SPECIFIC PROJECT.

THE PROCESS AND CRITERIA FOR SIZING HAVE BEEN DEVELOPED TO DETERMINE THE OVERALL STORAGE REQUIREMENTS BASED ON THE INSTALLATIONS CATEGORIES OF TROOP STRENGTH. AN EXAMPLE OF THIS PROCESS IS INCLUDED IN THE REVIEW AND ANALYSIS DOCUMENT. THE OVERALL STORAGE REQUIREMENTS WILL BE DETERMINED BY THE INSTALLATION'S MASTER PLANNER AND TROOP ISSUE SUBSISTENCE OFFICER WITH ASSISTANCE FROM THE US ARMY TROOP SUPPORT AGENCY. THE INSTALLATION'S CALCULATED STORAGE REQUIREMENTS WILL BE VERIFIED BY THE MAJOR COMMAND AND TSA VIA SITE VISIT. TSA WILL UTILIZE THE VERIFIED STORAGE REQUIREMENTS TO DETERMINE SQUARE FOOTAGE AND OPTIMUM FACILITY CONFIGURATION PRIOR TO PREPARATION OF DD FORM 1391 BY THE INSTALLATION. TSA'S INVOLVEMENT WILL EXTEND THROUGH THE CONCEPT PHASE OF DESIGN.

THE SMALL, MEDIUM AND LARGE SIZE FACILITIES IN THIS PACKAGE HAVE BEEN DEVELOPED BASED ON AVERAGE LEVELS OF TROOP STRENGTHS FOR EACH INDIVIDUAL CATEGORY. THE PLANS FURTHER REFLECT AN ORGANIZATIONAL CONCEPT WHICH ALLOWS FLEXIBILITY AND EXPANSION TO THE FACILITY. INTEGRAL AND MANDATORY ELEMENTS OF THIS DESIGN PACKAGE ARE THE STORAGE AID SYSTEMS AND MATERIAL HANDLING EQUIPMENT WHICH ARE ESSENTIAL TO A FUNCTIONAL WAREHOUSE ENTITY.

A SUMMARY OF THE MAJOR MANDATORY AND OPTIONAL ELEMENTS OF THIS DESIGN PACKAGE ARE LISTED AS FOLLOWS:

MANDATORY

- FUNCTIONAL RELATIONSHIPS
- DATA TABLES
- PROCESS FOR SIZING
- DAYS OF SUPPLY (ALSO MINIMUM)
- NONCOMBUSTIBLE EXTERIOR ENVELOPE
- LOW TEMPERATURE STORAGE INTERIOR ENVELOPE
- STORAGE AID SYSTEMS
- MATERIAL HANDLING EQUIPMENT
- SPRINKLER SYSTEMS
- EMERGENCY GENERATOR HOOK-UP

OPTIONAL

- AISLE WIDTHS
- MINI/MAXI MART FUNCTION
- REACH THROUGH OPTION AT MAXI MART AISLE
- EXTERIOR ENVELOPE TYPE
- OFFICE AREA WALL TYPES
- ENGINEERING SYSTEMS
- MECHANICAL EQUIPMENT LOCATION
- EMERGENCY GENERATOR

THIS DEFINITIVE DESIGN PACKAGE HAS BEEN DEVELOPED AND REVIEWED WITH ASSISTANCE FROM THE US ARMY TROOP SUPPORT AGENCY, FORCES COMMAND, TRAINING AND DOCTRINE COMMAND, HEADQUARTERS - US ARMY CORPS OF ENGINEERS AND THE US ARMY CORPS OF ENGINEERS - NORFOLK DISTRICT.

WOLFBERG ALVAREZ AND ASSOCIATES
ARCHITECTURE • ENGINEERING
PLANNING • INTERIOR DESIGN

SOR/A

## INDEX

1. INDEX, GENERAL DESCRIPTION
2. FUNCTIONAL DIAGRAMS, FUNCTIONAL AND OPERATIONAL REQUIREMENTS
3. SITE PLANS, SITE DEVELOPMENT REQUIREMENTS
4. FLOOR PLAN-SMALL TISA, VERTICAL ZONING, BUILDING DATA & ARCHITECTURAL DESIGN OBJECTIVES
5. FLOOR PLAN-MEDIUM TISA, VERTICAL ZONING, BUILDING DATA & WAREHOUSE CONSIDERATIONS/SYSTEMS
6. FLOOR PLAN-LARGE TISA, VERTICAL ZONING, BUILDING DATA & FIRE PROTECTION
7. ELEVATIONS, BUILDING SECTIONS & ENGINEERING SYSTEMS
8. WAREHOUSE SECTION, STORAGE AID ELEVATION, WALL TYPES, CRITICAL DETAILS & ARCHITECTURAL AND STRUCTURAL SYSTEMS
9. SIZING CRITERIA

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|
| | | | | |

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

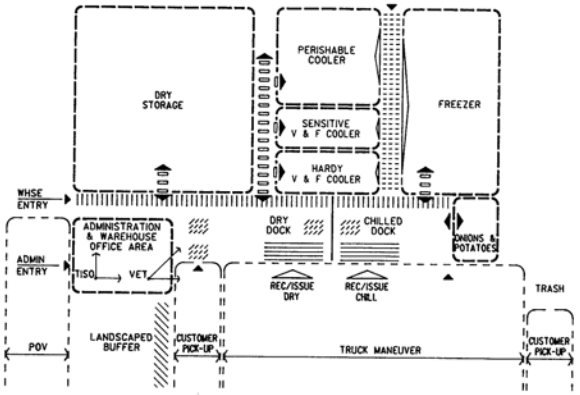
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

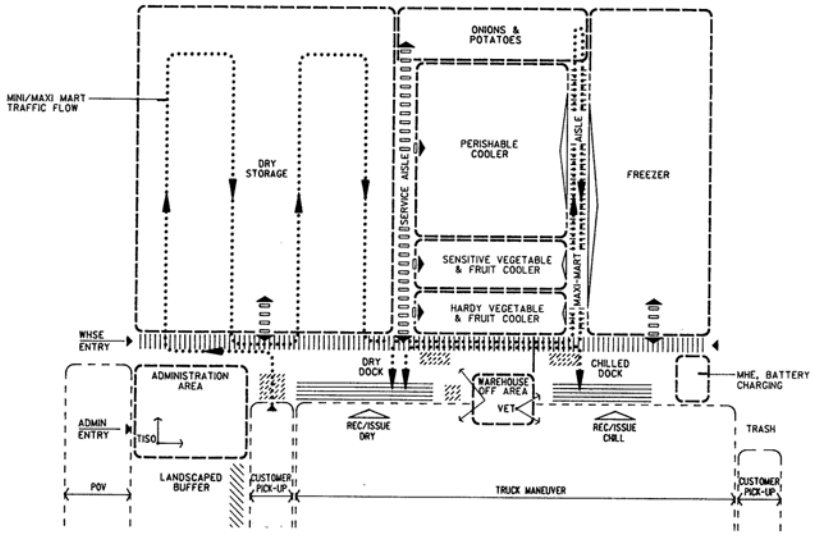
TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: NONE
TO ACCOMPANY SPECIFICATION NO
PROJECT NO. DEF 432-11-01
SHEET NO. 1
DATE: OCTOBER 1988
DRAWING NO.




**FUNCTIONAL DIAGRAM**

**SMALL TISA**




**FUNCTIONAL DIAGRAM**

**MEDIUM & LARGE TISA**

## AISLE WIDTHS

THE SMALL MEDIUM AND LARGE FACILITIES REFLECT AISLE WIDTHS WHICH ARE CAPABLE OF HANDLING CUSTOMER SHOPPING (MINI/MAXI MART ACTIVITY) ALONG WITH NORMAL STOCKING BY EXPERIENCED WAREHOUSE PERSONNEL SIMULTANEOUSLY. A TEN FOOT AISLE WIDTH IS REQUIRED FOR BOTH. TYPICAL AISLE WIDTH IN THE MEDIUM AND LARGE FACILITIES IS TEN FEET OTHER THAN THE MAXI MART AISLE (FOURTEEN FEET) AND AISLES SERVING DRIVE-IN RACKS AND THE SECONDARY SERVICE TO COOLERS AT TWELVE FEET. THE SMALL FACILITY IS TWELVE FEET THROUGHOUT OTHER THAN THE MAXI-MART AISLE AT FOURTEEN FEET.

IT IS MANDATORY THAT THE MINIMUM WORKING AISLE NOT BE LESS THAN 10'-0". AISLE WIDTH SHALL ACCOMMODATE HANDLING OF A GROCERY MANUFACTURER ASSOCIATION (GMA) PALLET WITH A 53" LOAD LENGTH.

## FUNCTIONAL AND OPERATIONAL REQUIREMENTS

THIS STANDARD HAS BEEN DESIGNED TO MEET THE FUNCTIONAL AND OPERATIONAL REQUIREMENTS FOR "TISA" COLD/DRY STORAGE FACILITIES. THE SUPPORT CAPACITIES FOR VARIOUS TROOP STRENGTHS, PERSONNEL (BOTH ADMINISTRATIVE AND WAREHOUSE) ALONG WITH THE ASSOCIATED STORAGE CAPACITIES OF KEY WAREHOUSE AREAS ARE SPECIFICALLY DEFINED ON THE FLOOR PLAN SHEETS. THE PLAN IS ORGANIZED INTO FOUR FUNCTIONAL AREAS: STORAGE, ADMINISTRATIVE, WAREHOUSE OFFICE AND SUPPORT SPACES. THESE AREAS ARE ORGANIZED BY A LINEAR SPINE CONTAINING THE SUPPORT FUNCTIONS WHICH SERVE AND ORGANIZE ACCESS TO THE INDIVIDUAL STORAGE AREAS. THE WAREHOUSE OFFICE AREA IS CENTRALLY LOCATED (IN THE MEDIUM & LARGE SIZES) FOR ACCESS TO AND CONTROL OF THE DOCK FUNCTIONS. THE ADMINISTRATIVE OFFICE AREA IS LOCATED SO AS NOT TO INTERFERE WITH WAREHOUSE RELATED FUNCTIONS AND MAINTAINS ITS PRIMARY RELATIONSHIPS TO POV PARKING WHILE ALLOWING SPECIFIC INTERNAL SPACES SUCH AS BREAK-TRAINING AND TOILETS EASY ACCESS FROM ALL AREAS WITHIN. THE FUNCTIONAL RELATIONSHIPS DESCRIBED AND SHOWN ARE A MANDATORY ELEMENT OF THE DESIGN. THE FOUR FUNCTIONAL AREAS ARE FURTHER DEFINED AS FOLLOWS:

STORAGE AREAS  SIX SPECIFIC AREAS ARE INCLUDED IN THIS FACILITY TO ACCOMMODATE THE VARIOUS PRODUCTS STORED; DRY STORAGE, FRUIT & VEGETABLE COOLERS (TWO TEMPERATURES), PERISHABLE COOLER, ONION & POTATO COOLER AND THE FREEZER. THESE AREAS ARE FURTHER ORGANIZED ALONG THE SPINE IN ZONES OF DRY, FOUR TYPES OF COOLER AND THE FREEZER. THE COOLERS AND THE FREEZER ARE SEPARATED BY A MAXI-MART AISLE BY WHICH MAXI-MART CUSTOMERS GAIN ACCESS TO PRODUCT STORED IN CASE FLOW RACKS. THE "REACH THROUGH" ABILITY WITHIN THE AISLE IS AN OPTIONAL ELEMENT OF THE DESIGN. A SECONDARY SERVICE AISLE IS INCORPORATED BETWEEN THE DRY STORAGE AND COOLERS TO ALLOW REPLENISHMENT OF STOCK WITHIN THE COOLERS BY WAREHOUSE PERSONNEL. THIS SERVICE AISLE MAY BE RELOCATED TO REPLACE THE MAXI-MART AISLE IN THOSE FACILITIES WHICH DO NOT IMPLEMENT THE MAXI-MART OPTION.

SUPPORT  THIS ZONE OF THE FACILITY IS 40' WIDE (SMALL TISA) AND 50' WIDE (MEDIUM & LARGE TISA) AND RUNS THE ENTIRE LENGTH OF THE STORAGE AREAS. A CIRCULATION ZONE 12' WIDE IS LOCATED DIRECTLY ADJACENT TO STORAGE AREAS AND SHALL BE DEDICATED TO CART AND MATERIAL HANDLING EQUIPMENT CIRCULATION. MATERIAL HANDLING EQUIPMENT STORAGE AND BATTERY CHARGING IS LOCATED IN THE DRY DOCK AREA ADJACENT TO AN EXTERIOR WALL IN THE SMALL TISA AND WITHIN AN ENCLOSED AREA IN THE CHILLED DOCK IN THE MEDIUM AND LARGE TISA'S. FOUR WHEEL CART STORAGE IS LOCATED ON THE DRY DOCK AND IS PLACED IMMEDIATELY ADJACENT TO CUSTOMER PICK-UP AND DELIVERY PARKING. THE REMAINDER OF THE SUPPORT AREA IS DIVIDED BETWEEN THE DRY AND CHILLED DOCKS. THESE DOCKS SERVE AS MULTIPLE FUNCTION AREAS WHICH INCLUDE: RECEIVING/ISSUING, STAGING AND HOLDING, UNIT PILES, VETERINARY INSPECTION AND A SALVAGE AREA ADJACENT TO A WALL WITH A FLOOR DRAIN, SMALL 3-COMPARTMENT SINK WITH DRAINBOARD AND SPACE FOR A TABLE AND STAND UP STORAGE SHELF. THIS AREA SHALL BE KEPT COLUMN FREE AND OPEN TO ALLOW THE FLEXIBILITY REQUIRED IN A MULTI-FUNCTION SPACE. DELINEATION OF THE VARIOUS FUNCTIONS VIA PAINTED FLOOR TREATMENTS WILL AID IN ORGANIZATION OF THE SPACE.

WAREHOUSE OFFICE  THE LENGTH OF THE SUPPORT SPACE IN THE MEDIUM AND LARGE FACILITIES ALLOW FOR CENTRAL LOCATION BETWEEN THE DRY AND THE CHILLED DOCKS. THIS AREA HAS BEEN COMBINED WITH ADMINISTRATION IN THE SMALL SIZE DUE TO THE LENGTH OF DOCK REQUIRED. THE WAREHOUSE OFFICE INCLUDES SPACE FOR WAREHOUSE OFFICE PERSONNEL, DRIVER WAITING, JANITOR CLOSET AND VETERINARY OFFICE AND INSPECTION ROOM. THE VETERINARY OFFICE/INSPECTION ROOM IS LOCATED TO HAVE DIRECT VISUAL ACCESS TO THE DOCK AREA AS WELL AS INCOMING TRUCKS. A SECONDARY MEANS OF EGRESS IS ALSO REQUIRED FROM THE VETERINARY OFFICE. EXISTING MILITARY CRITERIA FOR THE VETERINARY OFFICE/LAB WITH RESPECT TO SIZE AND EQUIPMENT SHALL BE FOLLOWED. THE WAREHOUSE OFFICE IS THE CENTRAL CONTROL POINT FOR ALL WAREHOUSE AND DOCK FUNCTIONS. CAREFUL CONSIDERATION SHOULD BE GIVEN TO GLAZING THIS AREA IN ORDER TO MAINTAIN VISUAL ACCESS. DRIVER WAITING IS LOCATED WITHIN THE WAREHOUSE OFFICE IN ORDER TO LIMIT ACCESS OF UNAUTHORIZED PERSONNEL TO THE FACILITY.

ADMINISTRATION  THE ADMINISTRATIVE AREA PROVIDES BOTH DIRECT AND INDIRECT SUPPORT TO THE WAREHOUSE FUNCTIONS. VENDING, BREAK-TRAINING AND TOILET AREAS ARE DIRECTLY ACCESSIBLE FROM THE SUPPORT SPINE WHILE THE TISO, GENERAL ADMINISTRATION AND CONFERENCE ARE ORIENTED TO THE POV PARKING AND DIFFERENTIATED BY APPROPRIATE MATERIALS AND CONSIDERATIONS. AN ENCLOSED OFFICE IS PROVIDED FOR THE TISO WITH VIEW TO GENERAL ADMINISTRATION WHILE THE REMAINDER OF SPACE IS OPEN OFFICE TO MAINTAIN FLEXIBILITY WITHIN.

FLEXIBILITY AND EXPANSION ARE ACCOMPLISHED IN THE ORGANIZATION OF ADMINISTRATIVE/WAREHOUSE OFFICES AND STORAGE AREAS ON OPPOSITE SIDES OF THE LINEAR SUPPORT SPINE. A MAXIMUM TOTAL OF 25% EXPANSION TO THE INDIVIDUAL STORAGE AREAS IS REQUIRED AS INDICATED ON THE SITE PLAN. EXPANSION MAY VARY BY RATION TYPE AND STORAGE AID REQUIRED, HOWEVER, IT IS GENERALLY LIMITED TO PARALLEL WITH AND OPPOSITE TO THE SUPPORT SPINE. A COLUMN AND BEAM STRUCTURE ELIMINATES THE NEED FOR BEARING WALLS IN THE STORAGE AREAS AND FURTHER ENABLES EASE OF EXPANSION. CAREFUL CONSIDERATION SHOULD BE GIVEN TO THE ROOF SLOPE IN ORDER TO AVOID LIMITATION OF EXPANSION OR AVAILABLE STORAGE HEIGHT IN THE DESIGNATED DIRECTIONS.

IN GENERAL, ALL WALLS SEPARATING THE INDIVIDUAL STORAGE AREAS SHALL BE CONSIDERED FIXED DUE TO THEIR REQUIREMENT TO PROVIDE THERMAL SEPARATION. WALLS SEPARATING THE ADMINISTRATION & WAREHOUSE OFFICES FROM STORAGE SHALL BE FIRE RATED, FIXED PARTITIONS WITH NO PROVISION FOR EXPANDING INWARD (TOWARD STORAGE). CONSIDERATION SHOULD BE GIVEN TO SOUND TRANSMISSION CONTROL BETWEEN THE OFFICE AND STORAGE AREAS. A MINIMUM STC OF 40-45 SHALL BE PROVIDED.

THIS FACILITY IS DESIGNED TO OPERATE THE SAME FOR CONTRACTOR OR GOVERNMENT PERSONNEL. THE PICKING FUNCTION IS DESIGNED TO ACCOMMODATE EITHER WAREHOUSE OR CUSTOMER ACTIVITY VIA VERTICAL ZONING OF THE STORED PRODUCT AT THE APPROPRIATE HEIGHTS. PICK LEVEL POSITIONS AND OVERALL ZONING ARE FURTHER DETAILED ON THE FLOOR PLAN SHEETS AND THE STORAGE AID ELEVATION ON SHEET 8.

GENERAL FLOW THROUGH THE FACILITY STARTS AT CUSTOMER PARKING WHICH ENTERS ADJACENT TO THE FOUR WHEEL CART STORAGE. FROM THAT POINT, UTILIZING THE CIRCULATION SPINE, THE DRY STORAGE AREA IS ACCESSED. CIRCULATION CONTINUES ALONG THE SPINE INTO THE CHILLED DOCK. A SECONDARY CIRCULATION, PERPENDICULAR TO THE CHILLED DOCK CONTAINS THE REACH-THROUGH OPTION OF ACCESS TO THE COOLERS AND FREEZER. THIS MAXI MART AISLE ALSO CONTAINS DOORS FOR ACCESS BY PERSONNEL AND FOUR WHEEL CARTS ONLY. MATERIAL HANDLING EQUIPMENT USED TO REPLENISH THE COOLERS IS CONFINED TO THE SECONDARY SERVICE AISLE. PRODUCT IS THEN BROUGHT BACK TO THE UNIT PILE AREAS FOR INSPECTION BY WAREHOUSE PERSONNEL AND EVENTUAL STAGING FOR FINAL ISSUE.

THIS DESIGN IS CAPABLE OF HANDLING CUSTOMER SHOPPING WHICH IS REFERRED TO AS MINI, MAXI OR MINI/MAXI MART THOUGHOUT THIS PACKAGE. THE FOLLOWING ARE DEFINITIONS OF EACH:

MINI MART - CUSTOMER SHOPPING IN DRY STORAGE ONLY.

MAXI MART - CUSTOMER SHOPPING IN COOLERS AND FREEZER ONLY.

MINI/MAXI MART - CUSTOMER SHOPPING THROUGHOUT ALL STORAGE AREAS.

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|

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

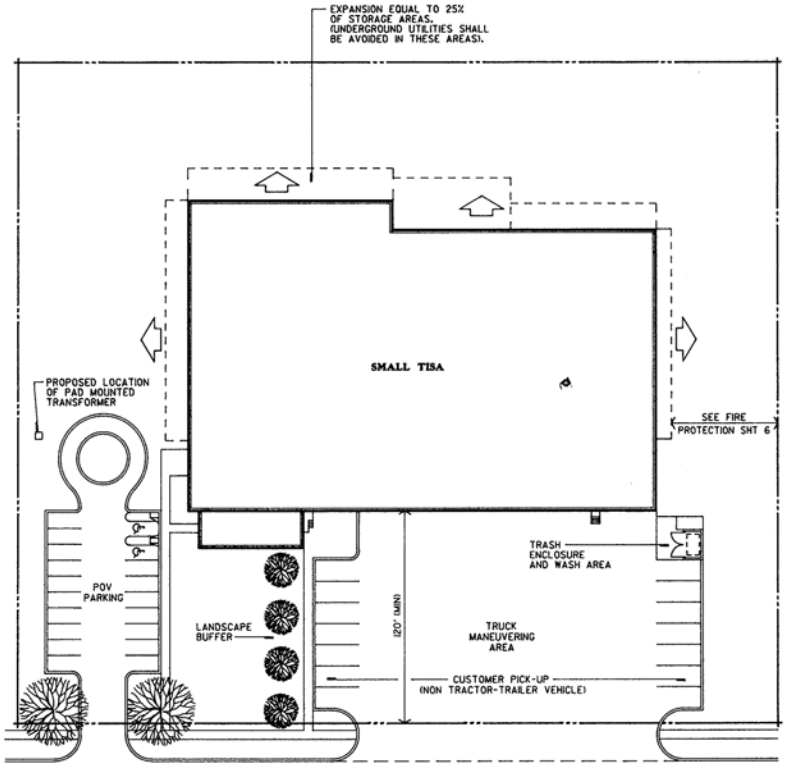
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: AS SHOWN
DATE: OCTOBER 1988
TO ACCOMPANY SPECIFICATION NO
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 2

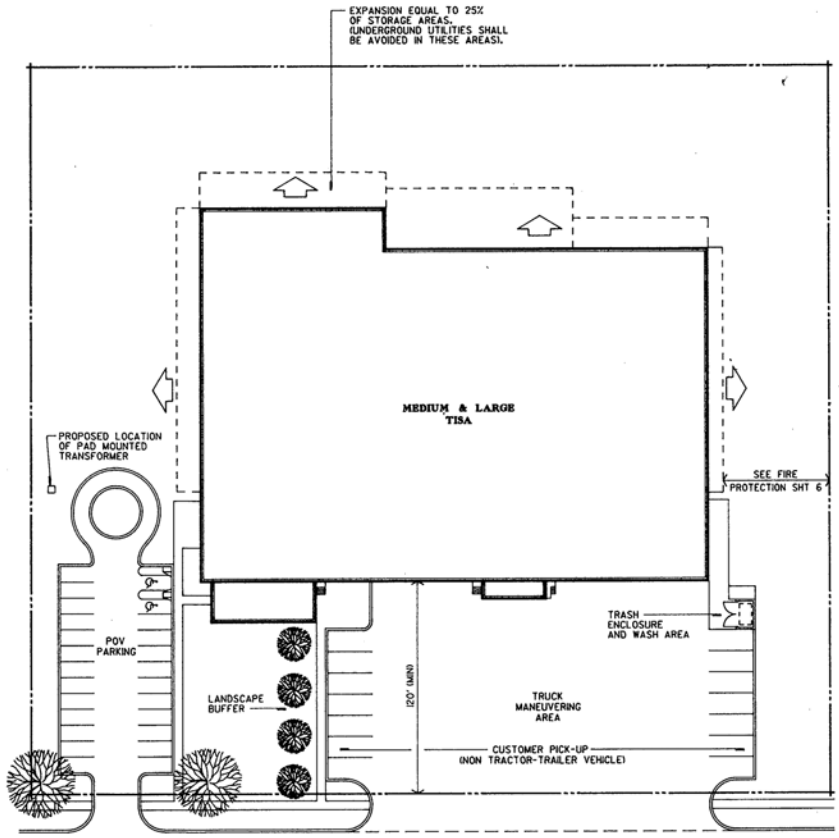



## SITE PLAN

**SMALL TISA**

30' 15 0 30 60 FT.

SITE AREA REQUIRED: 3.7 ACRES




## SITE PLAN

**MEDIUM & LARGE TISA**

30' 15 0 30 60 FT.

SITE AREA REQUIRED:
4.3 ACRES - MEDIUM
5.4 ACRES - LARGE

## SITE DEVELOPMENT REQUIREMENTS

THE PREFERRED SITE PLANS INCLUDED IN THIS PACKAGE HAVE BEEN DEVELOPED TO SHOW THE TYPICAL RELATIONSHIPS BETWEEN THE FACILITY, DESIGNATED EXPANSION AREAS AND THE VARIOUS LEVELS OF PARKING WHICH INCLUDE POV, CUSTOMER PICK-UP AND DELIVERY VEHICLES. SITE ACCESS FOR POV VERSUS DELIVERY VEHICLES WITH THEIR ASSOCIATED MANEUVERING AREAS ARE ALSO INDICATED. THE TOTAL AREA REQUIRED TO SITE THESE FACILITIES IS SHOWN ON THE DRAWINGS IN ACRES. THE TOTALS ALLOW FOR 25% EXPANSION OF THE KEY STORAGE AREAS WITHIN THE FACILITY WITHOUT IMPACT TO ADJOINING SITES. IN ADDITION, A 60 FOOT SEPARATION OF STRUCTURES IS ASSUMED FOR PURPOSES OF SITE AREA CALCULATIONS. THE SEPARATION MAY VARY DEPENDING ON THE SITE SELECTED.

KEY CONSIDERATIONS AND RELATIONSHIPS INVOLVED IN SITE SELECTION INCLUDE: ACCESS TO THE INSTALLATION TRUCK ROADWAY NETWORK, WAREHOUSE BUILDING TYPE RELATIVE TO THE INDUSTRIAL ZONE, SEGREGATION OF INCOMING TRACTOR TRAILERS FROM THE NON-INDUSTRIAL BASE ZONES, ADEQUATE SITE AREA, AVAILABLE UTILITIES, INDIRECT ACCESS TO RAIL AS A CONTINGENCY, AND ADJACENCY TO MOTOR POOLS.

CIRCULATION WITHIN THE SITE SHOULD PAY PARTICULAR ATTENTION TO THREE VEHICLE TYPES. THESE TYPES INCLUDE POV FOR VISITORS AND ADMINISTRATIVE/WAREHOUSE EMPLOYEES, CUSTOMERS PICK-UP AND DELIVERY TRUCKS AND THE PRIMARY DELIVERY TRUCKS (18 WHEELERS) INCLUDING COMMERCIAL VENDORS WITH THEIR ASSOCIATED MANEUVERING AREA. EACH VEHICLE AREA IS DESIGNED TO ALLOW DIRECT ACCESS TO ITS FACILITY ENTRY. FOR EXAMPLE, ALL EMPLOYEES ENTER THE FACILITY FROM THE POV PARKING DIRECTLY TO THE WAREHOUSE OR ADMINISTRATIVE AREA ACCORDINGLY. THE CUSTOMER PICK-UP AND DELIVERY PARKING HAS BEEN LOCATED ADJACENT TO THE MAIN MANEUVERING AREA WHICH HAS ACCESS TO THE DRY AND CHILL DOCK DOORS. THIS PARKING HAS BEEN INCORPORATED TO ELIMINATE DOCK DOORS BEING UTILIZED DURING THE TIME CUSTOMERS PARK FOR MINI-MAXI MART USE. CUSTOMERS ENTERING THE SITE FOR PRE-PICKED ORDERS WOULD GO DIRECTLY TO THE APPROPRIATE DOCK DOOR. FURTHER EXPLANATION OF SITE TO FACILITY RELATIONSHIPS IS DISCUSSED IN THE FUNCTIONAL AND OPERATIONAL REQUIREMENTS NARRATIVE.

THIS SITE HAS BEEN DESIGNED TO ALLOW PRIMARY ACCESS TO THE FACILITY DIRECTLY FROM AN INSTALLATION INDUSTRIAL SERVICE ROAD. IF SUCH ACCESS IS UNAVAILABLE, CAREFUL ATTENTION SHOULD BE GIVEN TO SECONDARY SERVICE ROADS AND THEIR ABILITY TO ACCOMMODATE THE REQUIRED VEHICLES. THE SITE TOPOGRAPHY SHALL BE CONSIDERED WHEN ORIENTING THE BUILDING WITHIN THE SITE PROVIDED OTHER FACTORS SUCH AS BUILDING ORIENTATION AS A RESULT OF ENERGY CONSIDERATIONS ARE NOT COMPROMISED. WHEN POSSIBLE THE BUILDING SHALL BE ORIENTED TO TAKE ADVANTAGE OF SLOPING TERRAIN BY UTILIZING NATURAL SITE GRADES TO DEVELOP THE ELEVATION DIFFERENTIAL REQUIRED AT THE TRUCK LOADING DOCKS. WHERE NATURAL SITE GRADES CANNOT BE UTILIZED ADVANTAGEOUSLY PREFERENCE SHALL BE GIVEN TO MAINTAINING THE BUILDING FINISH FLOOR ELEVATION CLOSE TO THE EXISTING SITE GRADES AND EXCAVATING FOR THE LOADING DOCK AREA OVER RAISING THE ENTIRE BUILDING FINISH FLOOR TO CREATE THE REQUIRED ELEVATION DIFFERENTIAL. THIS SITUATION WILL REQUIRE THAT THE SITE ADAPT DESIGNER ANALYZE THE DRAINAGE CONDITIONS CAREFULLY INCLUDING THE POTENTIAL FOR ADDITIONAL RUNOFF FROM THE ADJACENT SERVICE ROAD. FACTORS SUCH AS GROUND WATER ELEVATION AND FLOOD CRITERIA WILL ALSO IMPACT THE OVERALL SOLUTION.

HANDICAPPED ACCESSIBILITY TO THE FACILITY SHALL BE PROVIDED THROUGH ADMINISTRATION AND WAREHOUSE ENTRIES FROM THE POV PARKING. HANDICAPPED PARKING AS REQUIRED SHOULD BE INCORPORATED DIRECTLY ADJACENT TO THE ENTRY.

LANDSCAPING IS NOT A REQUIRED ELEMENT OF THE DESIGN NOR ESSENTIAL TO THE FACILITY TYPE, HOWEVER, CONSIDERATION SHOULD BE GIVEN TO PROVIDING A POCKET OF LANDSCAPING TO BUFFER THE TRUCK MANEUVERING FROM THE ADMINISTRATION AREA AND AT THE ENTRY TO THE POV PARKING.

SIGNAGE IN KEEPING WITH TM 5-807-10, DECEMBER 1983 AND THE INSTALLATIONS STANDARD SHOULD BE INCORPORATED TO IDENTIFY THE FACILITY. IT IS ALSO RECOMMENDED THAT TRUCK DOCK DOORS BE NUMBERED TO ALLEVIATE CONFUSION FOR TRUCKS ENTERING THE SITE. FURTHER SIGNAGE MAY BE DESIRED TO DELINEATE VARIOUS TYPES OF PARKING ON THE SITE.

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|
| | | | | |

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

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

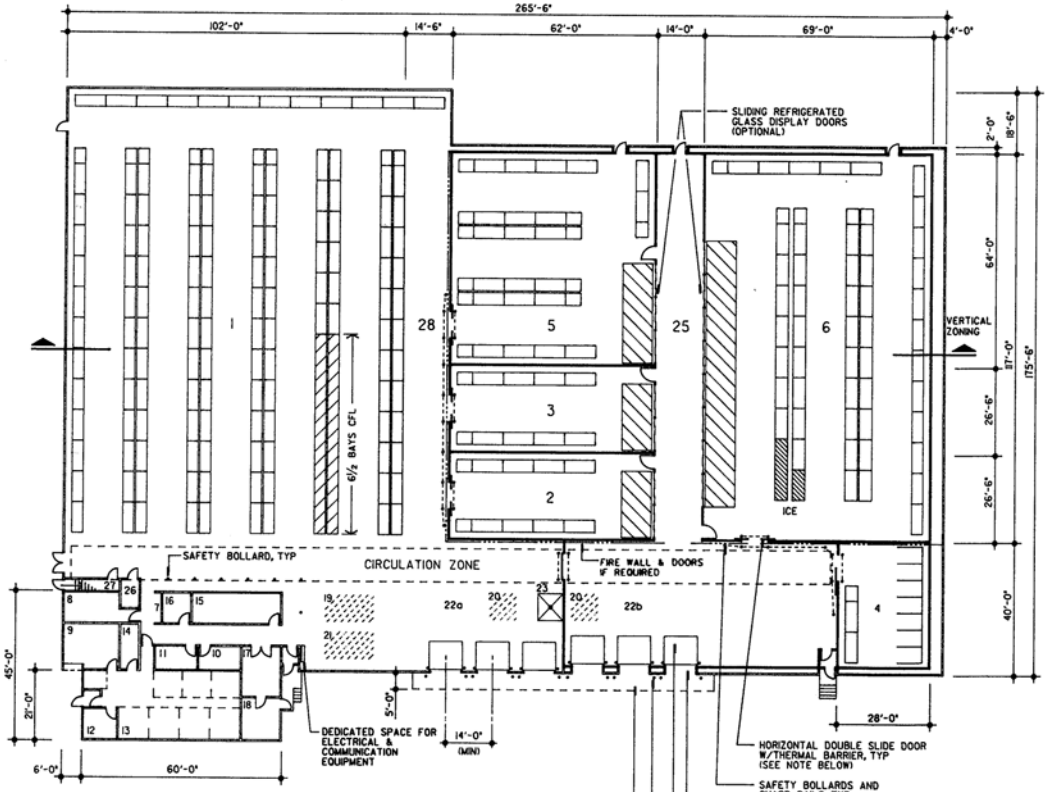
DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

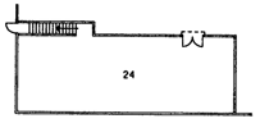
TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: AS SHOWN
DATE: OCTOBER 1988
TO ACCOMPANY SPECIFICATION NO
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 3

NORFOLK DISTRICT FILE NO. FL 734-L3




## FLOOR PLAN
### SMALL TISA




EQUIPMENT MEZZANINE OPTION

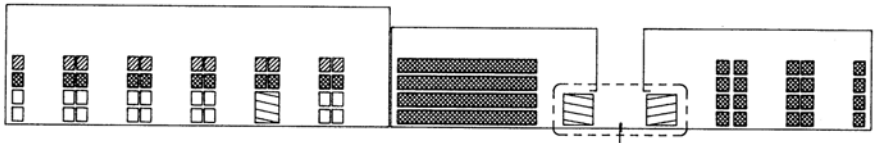
16' 8 0 8 16 32 FT.

WALL DESIGNATIONS

NONCOMBUSTIBLE WAREHOUSE ENVELOPE

FOAMED-IN-PLACE METAL SANDWICH PANEL

FIRE WALL & DOORS IF REQUIRED



## VERTICAL ZONING

MAXI MART AISLE WITH REACH THROUGH OPTION

- MRE & T-RATIONS
- RESERVE A-RATIONS
- CASE FLOW RACKS
- PICK POSITION

## BUILDING DATA

| AREA | NO. | SPACE | STORAGE TEMPERATURES | NET S.F. |
|---|---|---|---|---|
| STORAGE AREAS | 1 | DRY STORAGE | | 13,973 |
| | 2 | HARDY VEGETABLE & FRUIT COOLER | 40-45°F | 1,599 |
| | 3 | SENSITIVE VEGETABLE & FRUIT COOLER | 32-34°F | 1,599 |
| | 4 | ONIONS & POTATOES | 55-60°F | 1,066 |
| | 5 | PERISHABLE COOLER | 32-35°F | 3,875 |
| | 6 | FREEZER | -10°F | 7,888 |
| ADMINISTRATIVE AREA | 7 | VENDING | | 18 |
| | 8 | BREAK/TRAINING | | 160 |
| | 9 | CONFERENCE ROOM | | 216 |
| | 10 | MEN-TLTS & LOCKERS | | 84 |
| | 11 | WOMEN-TLTS & LOCKERS | | 84 |
| | 12 | TISO | | 90 |
| | 13 | GENERAL ADMIN (12-18) | | 837 |
| | 14 | STORAGE | | 74 |
| WAREHOUSE OFFICE AREA | 15 | WHSE OFFICE (4) | | 221 |
| | 16 | DRIVER WAITING | | 73 |
| | 17 | INSPECTION ROOM | | 172 |
| | 18 | VETERINARY OFFICE | | 138 |
| SUPPORT | 19 | CART STORAGE | | |
| | 20 | UNIT PILE | | |
| | 21 | MHE STORAGE, BATTERY CHARGING | | |
| | 22 | STAGING, HOLDING, VET INSPECTION | | |
| | | a. DRY DOCK | | |
| | | b. CHILLED DOCK | 45°F | |
| | 23 | SALVAGE AREA (SEE SHT 2 NARRATIVE) | | |
| | | TOTAL FOR DOCK CIRCULATION AND ACTIVITIES | | 7,527 |
| | 24 | EQUIPMENT MEZZANINE | | 1,495 |
| | 25 | MAXI-MART AISLE | 45°F | 1,631 |
| | 26 | JANITOR CLOSET (1) | | 20 |
| | 27 | SPRINKLER VALVE ROOM | | 16 |
| | 28 | SERVICE AISLE (COOLERS) | | 1,620 |
| | | WALL THICKNESS, ETC.. | | 2,438 |
| | | GROSS SQUARE FEET (TOTAL) | | 46,914 |

## TROOP CAPACITY

| | |
|---|---|
| BARRACK CAPACITY | 5,000 |
| CASH SALES (15%) | 713 * |
| HOSPITALS | 100 |
| RESERVES (WEEKEND) | 1,000 |
| RESERVES (14 DAY) | 750 |
| T-RATIONS | 2,500 |
| MRE'S | 2,500 |
| B-RATIONS | -0- |

* .15 OF 70% OR 95% BARRACK CAPACITY

## PERSONNEL

| | |
|---|---|
| ADMINISTRATION | |
| TISO | 1 |
| ADMIN. STAFF (5-7) | 7 |
| WAREHOUSE | |
| OFFICE | 2 |
| WAREHOUSEMEN (WITH MINI/MAXI) | 5 |
| VETERINARY STAFF | 2 |

## STORAGE CAPACITIES

| STORAGE AREA | PALLETS | FLOW LANES |
|---|---|---|
| DRY - A-RATIONS | 550 | 157 |
| DRY - MRE & T-RATIONS | 535 | N/A |
| FREEZER | 420 | 320 |
| COOLER - PERISHABLE | 216 | 120 |
| COOLER - SENSITIVE V & F | 72 | 60 |
| COOLER - HARDY V & F | 72 | 60 |
| ONION & POTATOES | 72 | 0 |

## MATERIAL HANDLING EQUIPMENT

| | |
|---|---|
| FOUR WHEEL CARTS | ** |
| PALLET TRANSPORTERS 3000 lb CAPACITY | 1 |
| COUNTERBALANCED FORKLIFT 3000 lb CAPACITY/15'-6" HEIGHT | 3 |
| DOUBLE DEEP FORKLIFT 3000 lb CAPACITY/20'-6" HEIGHT | N/A |
| STOCK SELECTOR 3000 lb CAPACITY/20'-0" HEIGHT | N/A |

** TO BE DETERMINED BY TISA PERSONNEL BASED ON THE ISSUE SCHEDULE AND EXTENT OF MINI AND/OR MAXI MART USE.

ALL MATERIAL HANDLING EQUIPMENT SHALL BE PROVIDED WITH A COLD PACKAGE.

## STORAGE AIDS

| | |
|---|---|
| PALLET RACK | |
| SINGLE DEEP | 1,960 |
| DOUBLE DEEP | 0 |
| DRIVE-IN | |
| 2 DEEP | 0 |
| 3 DEEP | 0 |
| 4 DEEP | 0 |
| CASE FLOW RACK | |
| 20 FACES | 660 |
| 15 FACES | 160 |

## ARCHITECTURAL DESIGN OBJECTIVES

THE OVERALL DESIGN OBJECTIVE OF THIS DEFINITIVE DESIGN PACKAGE IS TO ESTABLISH THE SPECIFIC PLAN RELATIONSHIPS AND BUILDING CONFIGURATION WHILE ALLOWING EXPANSION CAPABILITY AND INTERIOR FLEXIBILITY IN SITE ADAPTATION. IN ADDITION, THE FACILITY LAYOUT IS DESIGNED BASED ON THE STORAGE AID SYSTEM AND EQUIPMENT WHICH ARE INCLUDED AND ESSENTIAL IN ORDER TO MEET THE OVERALL OBJECTIVE.

THE PLAN SHAPE IS DERIVED FROM THE STORAGE AID SYSTEM, AISLE WIDTH AND CUBE REQUIRED FOR THE INDIVIDUAL STORAGE AREAS. THESE AREAS, TIED TO THE LINEAR SUPPORT/CIRCULATION SPINE WITH THE INTERSECTING ADMINISTRATION AND WAREHOUSE OFFICE AREAS, FORM THE OVERALL PLAN CONCEPT. DETAILED DISCUSSION OF THE STORAGE AREA AND RELATED SUPPORT IS CONTAINED IN THE FUNCTIONAL AND OPERATIONAL REQUIREMENTS AND WAREHOUSE CONSIDERATIONS NARRATIVES.

THE INTERIOR PLANNING MODULE FOR THE ADMINISTRATION AND WAREHOUSE OFFICE AREAS MAY VARY SLIGHTLY, HOWEVER, AN APPROXIMATE MODULE OF 10 FEET WILL ALLOW FOR FLEXIBILITY IN ACCOMMODATING MULTIPLE WORK STATIONS. THESE AREAS REQUIRE ACOUSTICAL SEPARATION FROM THE WAREHOUSE. A MINIMUM STC OF 40-45 SHALL BE PROVIDED. THESE AREAS SHALL HAVE THE TYPICAL OFFICE FINISHES INCLUDING ACOUSTICAL TILE CEILINGS, PAINTED GYPSUM WALLBOARD AND CARPETING. THE ADMINISTRATIVE AND WAREHOUSE OFFICE AREAS AND THEIR SUPPORT SPACES SHALL BE HANDICAPPED ACCESSIBLE.

A U.S.D.A. APPROVED FINISH SHALL BE PROVIDED ON ALL INTERIOR SURFACES IN THE STORAGE AND SUPPORT SPACES. ALL OTHER FINISHES FOR THESE SPACES SHALL BE U.S.D.A. APPROVED INCLUDING THE STORAGE AID SYSTEM, CONCRETE MASONRY UNITS, ETC...

INTERIOR SIGNAGE FOR THE FACILITY IS OPTIONAL, HOWEVER, CONSIDERATION SHOULD BE GIVEN TO PROVIDING GENERAL PRODUCT LOCATION SIGNAGE WHICH IS FLEXIBLE AT BOTH THE DRY STORAGE END AISLES AND IN THE SECONDARY CIRCULATION ACCESSING THE COOLERS AND FREEZER. FLOOR DEMARCATION OF DEFINED AREAS WITHIN THE SUPPORT SPACE SUCH AS THE UNIT PILE, CIRCULATION ZONES AND CUSTOMER FLOW ARE RECOMMENDED. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH TM 5-807-10, DECEMBER 1983.

THE BASIC OCCUPANCY CLASSIFICATION OF THIS BUILDING IS UNIFORM BUILDING CODE GROUP-B, DIVISION-4 FOR STORAGE AREAS AND GROUP-B, DIVISION-2 OFFICE BUILDING CLASSIFICATION FOR THE ADMINISTRATIVE AND WAREHOUSE OFFICE AREAS. ANTICIPATED OCCUPANT LOADS ARE DEFINED ON THE FLOOR PLAN SHEETS. SPECIAL CONSIDERATION SHOULD BE GIVEN TO THE MATERIAL HANDLING EQUIPMENT STORAGE/BATTERY CHARGING AREA. FURTHER BUILDING CLASSIFICATIONS ARE CONTAINED IN THE FIRE PROTECTION NARRATIVE ON SHEET NO. 6.

PROVISIONS FOR PHYSICAL SECURITY/ANTI-TERRORISM SHALL BE DETERMINED AND INCORPORATED BY THE USING AGENCY. THE OMAHA DISTRICT ENGINEER OFFICE PROTECTIVE DESIGN CENTER OF EXPERTISE WILL PROVIDE TECHNICAL GUIDANCE UPON REQUEST.

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|

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

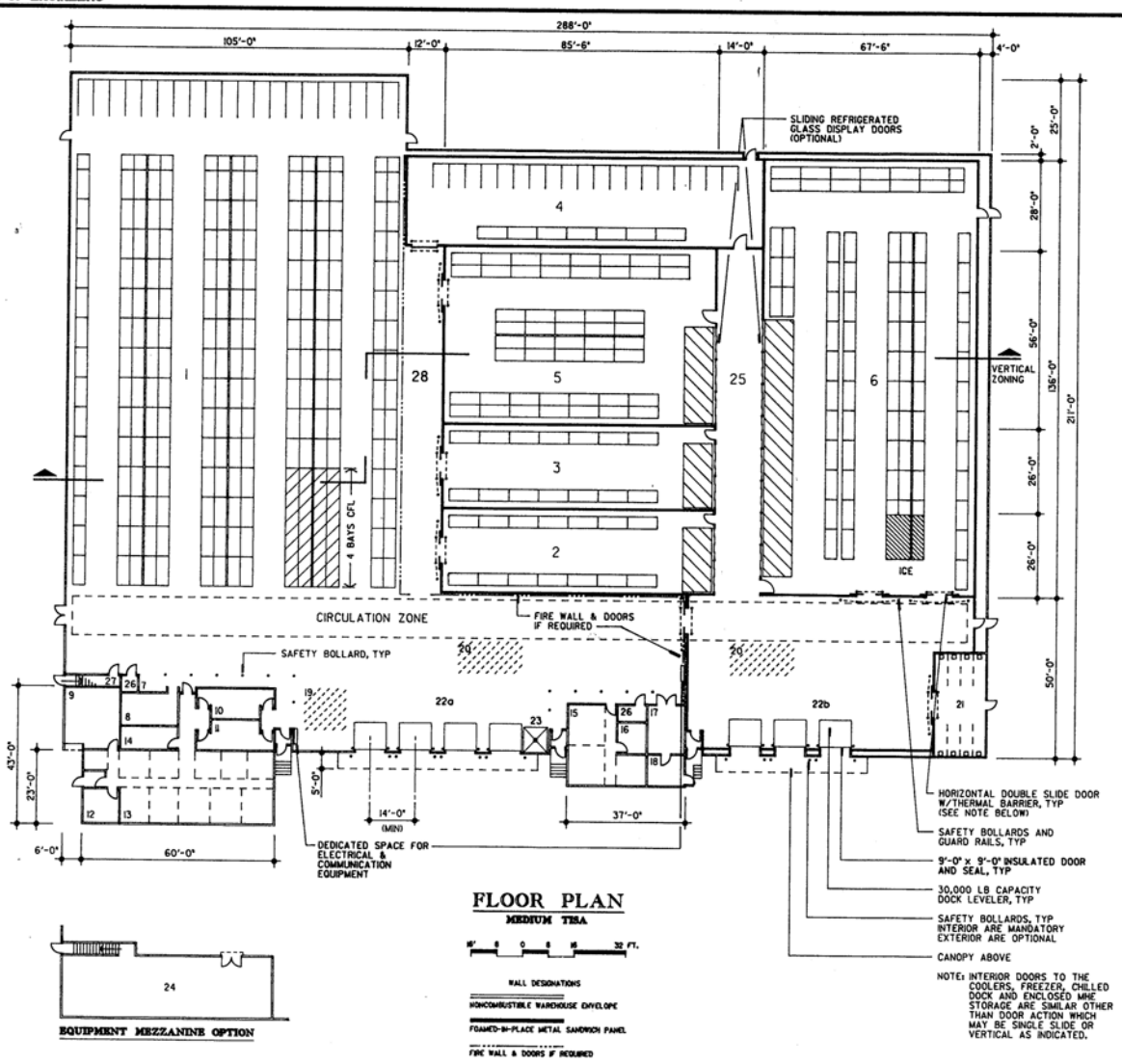
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

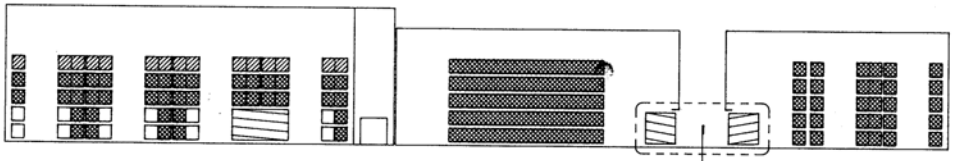
SCALE: AS SHOWN
TO ACCOMPANY SPECIFICATION NO.
PROJECT NO. DEF 432-11-01
SHEET NO. 4
DATE: OCTOBER 1988
DRAWING NO.




## FLOOR PLAN
MEDIUM TISA



EQUIPMENT MEZZANINE OPTION




## VERTICAL ZONING

- MRE & T-RATIONS
- RESERVE A-RATIONS
- CASE FLOW RACKS
- PICK POSITION

## BUILDING DATA

| AREA | NO. | SPACE | STORAGE TEMPERATURES | NET S.F. |
|---|---|---|---|---|
| STORAGE AREAS | 1 | DRY STORAGE | | 16,692 |
| | 2 | HARDY VEGETABLE & FRUIT COOLER | 40-45°F | 2,155 |
| | 3 | SENSITIVE VEGETABLE & FRUIT COOLER | 32-34°F | 2,155 |
| | 4 | ONIONS & POTATOES | 55-60°F | 3,066 |
| | 5 | PERISHABLE COOLER | 32-35°F | 4,647 |
| | 6 | FREEZER | -10°F | 8,978 |
| ADMINISTRATIVE AREA | 7 | VENDING | | 18 |
| | 8 | BREAK/TRAINING | | 172 |
| | 9 | CONFERENCE ROOM | | 316 |
| | 10 | MEN-TLTS & LOCKERS | | 177 |
| | 11 | WOMEN-TLTS & LOCKERS | | 177 |
| | 12 | TISO | | 115 |
| | 13 | GENERAL ADMIN (12-18) | | 1,157 |
| | 14 | STORAGE | | 122 |
| WAREHOUSE OFFICE AREA | 15 | WHSE OFFICE (4) | | 444 |
| | 16 | DRIVER WAITING | | 81 |
| | 17 | INSPECTION ROOM | | 160 |
| | 18 | VETERINARY OFFICE | | 99 |
| SUPPORT | 19 | CART STORAGE | | |
| | 20 | UNIT PILE | | |
| | 21 | MHE STORAGE, BATTERY CHARGING | | |
| | 22 | STAGING, HOLDING, VET INSPECTION | | |
| | | a. DRY DOCK | | |
| | | b. CHILLED DOCK | 45°F | |
| | 23 | SALVAGE AREA (SEE SHT 2 NARRATIVE) | | |
| | | TOTAL FOR DOCK CIRCULATION AND ACTIVITIES | | 12,014 |
| | 24 | EQUIPMENT MEZZANINE | | 1,235 |
| | 25 | MAXI-MART AISLE | 45°F | 1,505 |
| | 26 | JANITOR CLOSET (2) | | 68 |
| | 27 | SPRINKLER VALVE ROOM | | 16 |
| | 28 | SERVICE AISLE (COOLERS) | | 1,290 |
| | | WALL THICKNESS, ETC.. | | 2,768 |
| | | GROSS SQUARE FEET (TOTAL) | | 59,627 |

## TROOP CAPACITY

| | |
|---|---|
| BARRACK CAPACITY | 15,000 |
| CASH SALES (15%) | 2,138 * |
| HOSPITALS | 400 |
| RESERVES (WEEKEND) | 2,500 |
| RESERVES (14 DAY) | 2,500 |
| T-RATIONS | 5,000 |
| MRE'S | 5,000 |
| B-RATIONS | -0- |

* .15 OF 70% OR 95% BARRACK CAPACITY

## PERSONNEL

| | |
|---|---|
| ADMINISTRATION | |
| TISO | 1 |
| ADMIN. STAFF (8-11) | 11 |
| WAREHOUSE | |
| OFFICE | 3 |
| WAREHOUSEMEN (WITH MINI/MAXI) | 8 |
| VETERINARY STAFF | 2 |

## STORAGE CAPACITIES

| STORAGE AREA | PALLETS | FLOW LANES |
|---|---|---|
| DRY - A-RATIONS | 1,327 | 140 |
| DRY - MRE & T-RATIONS | 1,069 | N/A |
| FREEZER | 860 | 320 |
| COOLER - PERISHABLE | 500 | 100 |
| COOLER - SENSITIVE V & F | 140 | 60 |
| COOLER - HARDY V & F | 140 | 60 |
| ONION & POTATOES | 260 | 0 |

## MATERIAL HANDLING EQUIPMENT

| | |
|---|---|
| FOUR WHEEL CARTS | ** |
| PALLET TRANSPORTERS 3000 lb CAPACITY | 1 |
| COUNTERBALANCED FORKLIFT 3000 lb CAPACITY/15'-6" HEIGHT | 2 |
| DOUBLE DEEP FORKLIFT 3000 lb CAPACITY/20'-6" HEIGHT | 4 |
| STOCK SELECTOR 3000 lb CAPACITY/20'-0" HEIGHT | OPTIONAL |

** TO BE DETERMINED BY TISA PERSONNEL BASED ON THE ISSUE SCHEDULE AND EXTENT OF MINI AND/OR MAXI MART USE.

ALL MATERIAL HANDLING EQUIPMENT SHALL BE PROVIDED WITH A COLD PACKAGE.

## STORAGE AIDS

| | |
|---|---|
| PALLET RACK | |
| SINGLE DEEP | 945 |
| DOUBLE DEEP | 2,876 |
| DRIVE-IN | |
| 2 DEEP | 260 |
| 3 DEEP | 300 |
| 4 DEEP | 0 |
| CASE FLOW RACK | |
| 20 FACES | 560 |
| 15 FACES | 120 |

## WAREHOUSE CONSIDERATIONS/SYSTEMS

THE WAREHOUSE DESIGNS HAVE BEEN DEVELOPED USING THE STATE-OF-THE-ART STORAGE AIDS AND MATERIAL HANDLING EQUIPMENT BASED ON THE RANGE OF STORAGE INVENTORIES AND THROUGHPUT REQUIRED FOR A SMALL, MEDIUM AND LARGE TISA. THE STORAGE LAYOUT OPTIMIZES THE MINI/MAXI MART CONCEPTS OF CUSTOMER SELF SERVICE ISSUE WITHIN AN EFFICIENT PALLETIZED UNIT LOAD STORAGE WAREHOUSE WITH MAXIMUM EXPANDABILITY. THE INCLUSION OF AN ISSUE SELECTION CORRIDOR WITH GLASS PANEL DOORS PROVIDES ACCESS TO REFRIGERATED STOCK ITEMS WITHOUT SPECIAL CLOTHING.

THE SMALL TISA WAREHOUSE THROUGHPUT RATE IS SUCH THAT THE USE OF MULTIPLE TYPES OF MATERIAL HANDLING VEHICLES, ONE TYPE FOR DOCK OPERATIONS AND AN ALTERNATE TYPE FOR STORAGE SUPPORT OPERATIONS, WOULD PRODUCE LOW UTILIZATION OF EACH TYPE VEHICLE AND A LOSS IN PRODUCTIVITY WHEN AN OPERATOR CHANGES VEHICLES. THE COUNTERBALANCED FORKLIFT VEHICLE ACCOMMODATES VEHICLE LOADING/UNLOADING AS WELL AS THE STORAGE RELATED FUNCTIONS IN SINGLE DEEP PALLET RACK IN A 12 FOOT STORAGE AND END AISLES. ELECTRIC PALLET TRANSPORTERS (PALLET JACKS) ARE UTILIZED TO SUPPORT ISSUE FUNCTIONS IN THE STORAGE AREA (S) NOT INCLUDED IN THE MINI/MAXI MART CONCEPT. FOUR (4) WHEEL CARTS ARE TO BE UTILIZED BY MINI/MAXI MART CUSTOMERS.

THE MEDIUM AND LARGE TISA WAREHOUSE STORAGE SYSTEM UTILIZES A COMBINATION OF DOUBLE DEEP AND SINGLE DEEP PALLET RACK TO EFFICIENTLY STORE LARGER INVENTORY LOTS AT A HIGHER TURNOVER RATE WITH A DEEP REACH FORKLIFT OPERATING IN A 10 FOOT WIDE AISLE. THE AISLE SUPPORTING THE DRIVE-IN RACK FOR MRE, T-RATION AND VEGETABLE AND FRUIT COOLERS ARE 12 FOOT WIDE TO ALLOW OPTIONAL DIRECT STORAGE TO VEHICLE LOADING FOR CONTINGENCY SITUATIONS. END AISLES ARE 12 FEET WIDE TO ALLOW EASY VEHICLE TURNS. COUNTERBALANCED FORKLIFTS ARE USED TO LOAD AND UNLOAD VEHICLES AT THE DOCK DOORS. ELECTRIC PALLET TRANSPORTERS (PALLET JACKS) ARE UTILIZED TO SUPPORT ISSUE FUNCTIONS BY A WAREHOUSEMAN IN THE STORAGE AREAS NOT INCLUDED IN THE MINI/MAXI MART CONCEPT. FOUR (4) WHEEL CARTS ARE UTILIZED BY MINI/MAXI MART CUSTOMERS.

INVENTORY IS STORED IN STORAGE RACKS WITHIN A VERTICAL STORAGE ZONE CONCEPT. THE FIRST AND SECOND LEVELS OF THE SINGLE AND DOUBLE DEEP ARE USED AS ISSUE PICK LOCATIONS. THE THIRD LEVEL AND ABOVE ARE USED FOR RESERVE STOCK STORAGE AND ANY REMAINING CAPACITY ABOVE THE STOCK RESERVE FOR STORAGE OF MRE, T-RATIONS AND T-RATION SUPPORT ITEMS. ADDITIONAL STORAGE CAPACITY FOR MRE, T-RATIONS AND T-RATION SUPPORT ITEMS IS PROVIDED IN DRIVE-IN RACK. CASE FLOW RACK PROVIDES ONE LANE FOR FULL CASES AND ANOTHER FOR OPEN CASES FOR THOSE INVENTORY ITEMS WITH VERY SMALL INVENTORIES. AS AN OPTION, THE CASE FLOW RACK CAN BE INCREASED TO PROVIDE ISSUE LOCATIONS FOR ALL STOCK ITEMS STORED IN THE SECOND LEVEL PALLET LOCATIONS.

A COMPUTERIZED INTERACTIVE STOCK LOCATOR SYSTEM IN COMBINATION WITH A SINGLE DEEP PALLET RACK AND MULTIPLE DEEP DRIVE-IN PALLET RACK (WHEN REQUIRED FOR LARGE QUANTITIES OF MRE & T-RATIONS) PROVIDES FOR EFFICIENT UTILIZATION OF STORAGE SPACE AND IMPROVED MANAGEMENT CONTROL. PORTABLE HAND HELD COMPUTER TERMINALS WITH BAR CODE READERS ARE UTILIZED FOR PHYSICAL INVENTORY VALIDATION, RECEIPT TAKE-UP, MINI/MAXI MART CHECK-OUT AND VETERINARY INSPECTION OF STOCK.

RECEIPTS ARE UNLOADED AND STAGED ON THE DOCK FOR VETERINARY INSPECTION. AFTER INSPECTION, MATERIAL IS STORED IN LOCATIONS DETERMINED BY COMPUTER WITH DESIGNATED ZONES BASED ON COMMODITY AND ISSUE FREQUENCY CONSIDERATIONS. ORDER SELECTION IS FROM PALLETS AND FLOW RACK AT FLOOR LEVEL WITH SOME SLOW MOVING ITEMS WITH 1/2 PALLET OR LESS QUANTITIES ON THE SECOND LEVEL. UNIT PILES, IF USED, ARE STORED IN THE DOCK AREA ALONG THE CIRCULATION ZONE AISLE.

A STOCK SELECTOR VEHICLE IS AN OPTION TO ASSIST IN THE REPLENISHMENT OF CASE FLOW RACK AND INSPECTION OF INVENTORY. THE STORAGE OF POTATOES AND/OR ONIONS FOR MEDIUM AND LARGE WAREHOUSES COULD BE LOCATED IN THE REFRIGERATED DOCK AREA AS AN OPTION DEPENDENT ON THE STORAGE INVENTORY REQUIREMENTS.

PALLET RACK MAY BE UTILIZED ABOVE THE DOCK DOORS FOR STORAGE OF EMPTY PALLETS. DESIGN OF THE STORAGE AID SYSTEMS WITHIN VARIOUS SEISMIC ZONES SHALL BE IN ACCORDANCE WITH UBC AND THE RACK MANUFACTURERS INSTITUTE (RMI).

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|

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

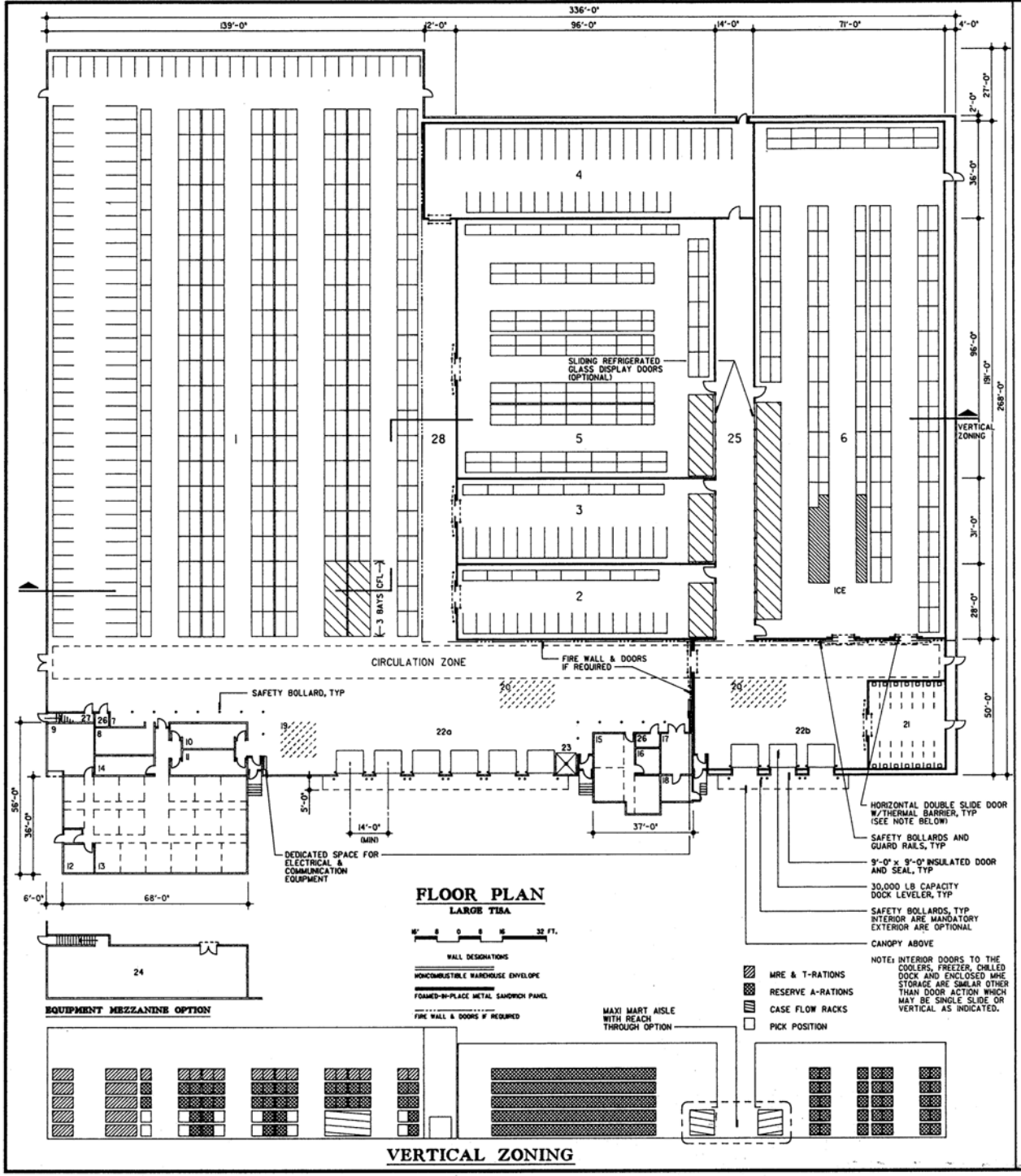
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: AS SHOWN
DATE: OCTOBER 1988
TO ACCOMPANY SPECIFICATION NO.
PROJECT NO. DEF 432-11-01
DRAWING NO. 5




## BUILDING DATA

| AREA | NO. | SPACE | STORAGE TEMPERATURES | NET S.F. |
|---|---|---|---|---|
| STORAGE AREAS | 1 | DRY STORAGE | | 30,015 |
| | 2 | HARDY VEGETABLE & FRUIT COOLER | 40-45°F | 2,613 |
| | 3 | SENSITIVE VEGETABLE & FRUIT COOLER | 32-34°F | 2,945 |
| | 4 | ONIONS & POTATOES | 55-60°F | 4,270 |
| | 5 | PERISHABLE COOLER | 32-35°F | 9,073 |
| | 6 | FREEZER | -10°F | 13,300 |
| ADMINISTRATIVE AREA | 7 | VENDING | | 27 |
| | 8 | BREAK/TRAINING | | 202 |
| | 9 | CONFERENCE ROOM | | 298 |
| | 10 | MEN-TLTS & LOCKERS | | 236 |
| | 11 | WOMEN-TLTS & LOCKERS | | 236 |
| | 12 | TISO | | 80 |
| | 13 | GENERAL ADMIN (12-18) | | 2,124 |
| | 14 | STORAGE | | 147 |
| WAREHOUSE OFFICE AREA | 15 | WHSE OFFICE (4) | | 507 |
| | 16 | DRIVER WAITING | | 81 |
| | 17 | INSPECTION ROOM | | 160 |
| | 18 | VETERINARY OFFICE | | 99 |
| SUPPORT | 19 | CART STORAGE | | |
| | 20 | UNIT PILE | | |
| | 21 | MHE STORAGE, BATTERY CHARGING | | |
| | 22 | STAGING, HOLDING, VET INSPECTION | | |
| | | a. DRY DOCK | | |
| | | b. CHILLED DOCK | 45°F | |
| | 23 | SALVAGE AREA (SEE SHT 2 NARRATIVE) | | |
| | | TOTAL FOR DOCK CIRCULATION AND ACTIVITIES | | 14,220 |
| | 24 | EQUIPMENT MEZZANINE | | 1,387 |
| | 25 | MAXI-MART AISLE | 45°F | 2,170 |
| | 26 | JANITOR CLOSET (2) | | 68 |
| | 27 | SPRINKLER VALVE ROOM | | 16 |
| | 28 | SERVICE AISLE (COOLERS) | | 1,860 |
| | | WALL THICKNESS, ETC... | | 3,365 |
| | | GROSS SQUARE FEET (TOTAL) | | 89,519 |

## TROOP CAPACITY

| | |
|---|---|
| BARRACK CAPACITY | 25,000 |
| CASH SALES (15%) | 3,563 * |
| HOSPITALS | 800 |
| RESERVES (WEEKEND) | 5,000 |
| RESERVES (14 DAY) | 5,000 |
| T-RATIONS | 10,000 |
| MRE'S | 10,000 |
| B-RATIONS | -0- |

* .15 OF 70% OR 95% BARRACK CAPACITY

## PERSONNEL

| | |
|---|---|
| ADMINISTRATION | |
| TISO | 1 |
| ADMIN. STAFF (12-18) | 18 |
| WAREHOUSE | |
| OFFICE | 3 |
| WAREHOUSEMEN (WITH MINI/MAXI) | 16 |
| VETERINARY STAFF | 3 |

## STORAGE CAPACITIES

| STORAGE AREA | PALLETS | FLOW LANES |
|---|---|---|
| DRY - A-RATIONS | 2,163 | 68 |
| DRY - MRE & T-RATIONS | 2,138 | N/A |
| FREEZER | 1,370 | 320 |
| COOLER - PERISHABLE | 940 | 120 |
| COOLER - SENSITIVE V & F | 184 | 60 |
| COOLER - HARDY V & F | 244 | 75 |
| ONION & POTATOES | 288 | 0 |

## MATERIAL HANDLING EQUIPMENT

| | |
|---|---|
| FOUR WHEEL CARTS | ** |
| PALLET TRANSPORTERS 3000 lb CAPACITY | 2 |
| COUNTERBALANCED FORKLIFT 3000 lb CAPACITY/15'-6" HEIGHT | 4 |
| DOUBLE DEEP FORKLIFT 3000 lb CAPACITY/20'-6" HEIGHT | 7 |
| STOCK SELECTOR 3000 lb CAPACITY/20'-0" HEIGHT | OPTIONAL |

** TO BE DETERMINED BY TISA PERSONNEL BASED ON THE ISSUE SCHEDULE AND EXTENT OF MINI AND/OR MAXI MART USE.

ALL MATERIAL HANDLING EQUIPMENT SHALL BE PROVIDED WITH A COLD PACKAGE.

## STORAGE AIDS

| | |
|---|---|
| PALLET RACK | |
| SINGLE DEEP | 718 |
| DOUBLE DEEP | 4,960 |
| DRIVE-IN | |
| 2 DEEP | 1,068 |
| 3 DEEP | 765 |
| 4 DEEP | 0 |
| CASE FLOW RACK | |
| 20 FACES | 540 |
| 15 FACES | 180 |

## FIRE PROTECTION

OCCUPANCY: UNIFORM BUILDING CODE - TABLE NO. 5-A
B2 - OFFICE AREAS
B4 - STORAGE AREAS

NFPA 101, CLASSIFICATION OF HAZARD OF CONTENTS:
STORAGE-ORDINARY HAZARD CONTENTS

NFPA 13, CLASSIFICATION OF OCCUPANCY
ORDINARY HAZARD (GROUP 2)

NFPA 231C, CLASSIFICATION OF STORAGE
CLASS II- COMMODITY CLASSIFICATION (COLD STORAGE)
CLASS III- COMMODITY CLASSIFICATION (DRY STORAGE)
CONVENTIONAL WOOD PALLETS
OPEN STORAGE RACK SYSTEM & CASE FLOW LANES
NONENCAPSULATED PACKAGING
STORAGE HEIGHT - VARIES, SEE SHEET NO. 8
STORAGE RACK CONFIGURATION - SEE SHEET NOS. 4, 5, 6 & 8

TYPE OF CONSTRUCTION: MIL-HDBK-1008, TABLE 2-1 (ADAPTED FROM UBC)
II N NONCOMBUSTIBLE

OCCUPANT LOADS:
VARIES BY FACILITY SIZE AND SPECIFIC INSTALLATION REQUIREMENTS
SEE PERSONNEL CATEGORY OF BUILDING DATA-SHEETS 4, 5 & 6

TRAVEL DISTANCE TO EXITS:
400 FEET (MAX) UBC-SEC. 3303 (d)
400 FEET (MAX) NFPA 101-CHAPTER 29, STORAGE OCCUPANCIES

AREA LIMITATIONS:
FIRE AREAS NOT EXCEEDING 40,000 SQUARE FEET SHALL BE PROVIDED IN ACCORDANCE WITH MIL-HDBK-1008 REQUIREMENTS FOR GENERAL WAREHOUSES. FIRE AREAS IN WAREHOUSES SHALL BE SEPARATED BY WALLS WHICH HAVE 4-HOUR FIRE RESISTANCE RATINGS. THE FIREWALLS MAY BE ELIMINATED UP TO 120,000 SQUARE FEET IF THE FIRE PROTECTION AUTHORITY OF THE MACOM DETERMINES THE FOLLOWING CONDITIONS ARE MET:
- THE INCREASED SIZE OF THE FIRE AREA IS REQUIRED FOR EFFICIENT OPERATION.
- POSSIBLE ADDITIONAL LOSS DUE TO FIRE IS RECOGNIZED AND ACCEPTABLE.
- AUTOMATIC SPRINKLER AND ALARM SYSTEMS ARE INCLUDED AS DESCRIBED IN THE ARMY STANDARD DESIGN.

FOR FIRE AREAS GREATER THAN 120,000 SQUARE FEET, A WAIVER IS REQUIRED FROM CEEC-CD. THESE CONDITIONS ARE REQUIRED TO BE ADDRESSED IN THE DD FORM 1391, PARAGRAPHS D1 OR D5.

SITE FIRE PROTECTION
THE REQUIRED FIRE FLOW TO THE FACILITY SHALL BE DELIVERED FROM IMMEDIATE GROUPINGS OF FIRE HYDRANTS WITHIN 300 FEET OF THE FACILITY PLUS WATER REQUIREMENTS FOR INTEGRAL SUPPORT OF THE SUPPRESSION SYSTEM IN ACCORDANCE WITH TM 5-813-6, WATER SUPPLY FOR FIRE PROTECTION.

SEPARATION OF STRUCTURES
MIL-HDBK-1008, CHAPTER 2, SECTION 2.3
ULTIMATE SEPARATION VARIES BASED ON ADJACENT EXISTING BUILDINGS, EXPOSURE CLASSIFICATION, ETC.... SEE TABLES 2-4 and 2-5

UNIFORM BUILDING CODE, SEC. 506-3.(b)
UNLIMITED AREA INCREASE REQUIRES FACILITY TO BE ENTIRELY SURROUNDED AND ADJOINED BY PUBLIC SPACE, STREETS OR YARDS NOT LESS THAN 60 FEET IN WIDTH.

SUPPRESSION SYSTEM
THE SUPPRESSION SYSTEM SHALL CONSIST OF A FULLY SPRINKLERED BUILDING AS REQUIRED BY MIL-HDBK-1008 CHAPTER 6, PARAGRAPH 6.1.3. A HYDRAULICALLY DESIGNED WET PIPE FIRE SPRINKLER SYSTEM SHALL BE PROVIDED IN THE ADMINISTRATIVE, WAREHOUSE OFFICE, SUPPORT AND DRY STORAGE AREAS IN ACCORDANCE WITH NFPA 13 AND MIL-HDBK-1008 CHAPTERS 5 & 6. THE COOLERS, FREEZER AND CHILLED DOCK SHALL BE PROTECTED WITH A PRE-ACTION TYPE SYSTEM WHERE WATER FLOW IS CONTROLLED BY AN ELECTRICALLY OR PNEUMATICALLY OPERATED DRY PIPE VALVE. IN ADDITION TO THE CEILING SYSTEM IN ALL STORAGE AREAS, IN RACK SPRINKLERS SHALL BE PROVIDED FOR THE STORAGE RACKS, EITHER WET OR PRE-ACTION TYPE AS STATED ABOVE. DENSITY REQUIREMENTS AND RACK SPRINKLER DESIGN SHALL BE IN ACCORDANCE WITH NFPA 231-C "RACK STORAGE OF MATERIALS".

NOTE: THESE ITEMS ARE NOT INTENDED TO BE ALL INCLUSIVE. A COMPLETE CRITERIA INVESTIGATION SHALL BE DONE DURING SITE ADAPT DESIGN. ALL CLASSIFICATIONS SHALL BE VERIFIED WITH THE AUTHORITY HAVING JURISDICTION.

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|

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

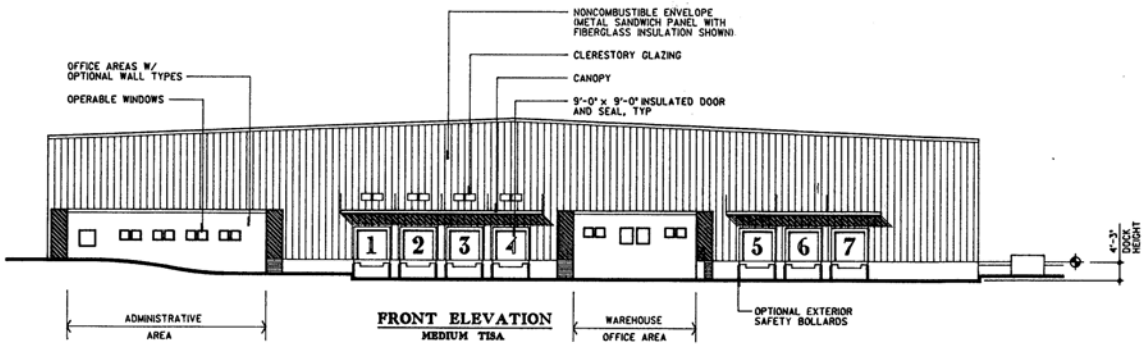
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
NORFOLK, VA.

DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

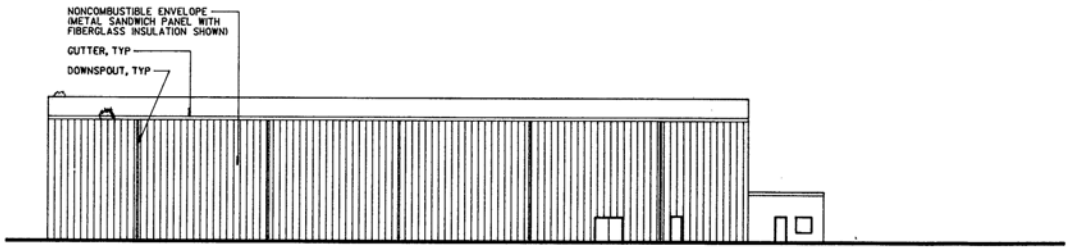
DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

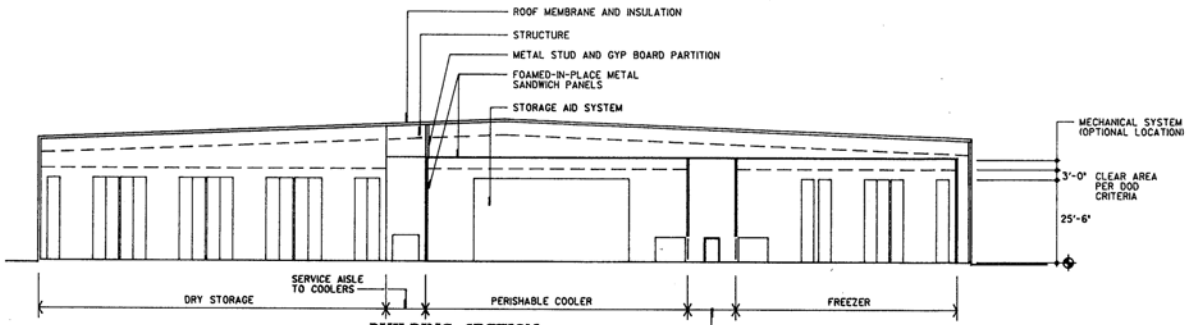
SCALE: AS SHOWN
DATE: OCTOBER 1988
TO ACCOMPANY SPECIFICATION NO.
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 6



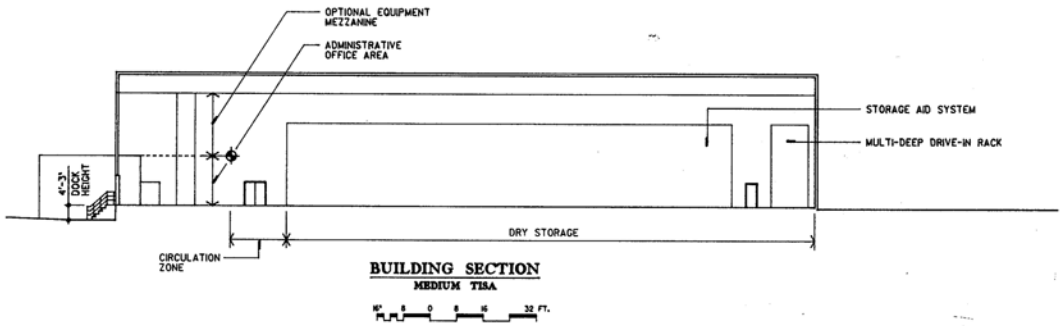

**FRONT ELEVATION**
**MEDIUM TISA**




**SIDE ELEVATION**
**MEDIUM TISA**




**BUILDING SECTION**
**MEDIUM TISA**




**BUILDING SECTION**
**MEDIUM TISA**

## MECHANICAL (HVAC) SYSTEMS

THE A/E SHALL REVIEW VARIOUS HEATING, VENTILATING, AIR CONDITIONING AND REFRIGERATION SYSTEMS FOR APPROPRIATE APPLICATION IN THE GEOGRAPHICAL AREA IN WHICH THE PROJECT OCCURS. ELEGIBILITY OF ADMINISTRATIVE FACILITIES FOR AIR CONDITIONING SHALL BE BASED ON CRITERIA FOUND IN ARCHITECTURAL AND ENGINEERING INSTRUCTIONS (A&EI)-DESIGN CRITERIA, DATED MARCH 13, 1987. THE HVAC AND REFRIGERATION SYSTEMS SHALL TAKE INTO ACCOUNT AVAILABLE SOURCES OF ENERGY (SUCH AS EXISTING CENTRAL REFRIGERATION AND HEATING PLANTS), LIFE CYCLE COST ANALYSIS OF THE PROPOSED SYSTEMS, ENERGY CONSERVATION MEASURES INCLUDING THE UTILIZATION OF HEAT REJECTED FROM THE REFRIGERATION EQUIPMENT, AND LOCAL CONDITIONS. EASE OF MAINTENANCE MUST BE AN IMPORTANT CONSIDERATION IN THE SYSTEM SELECTION PROCESS.

CRITERIA FOR DRY STORAGE FACILITIES SHALL BE BASED ON GENERAL PROVISIONS OF D.O.D. 4145.19-R-1. MECHANICAL VENTILATION SHALL BE PROVIDED AT THE PROPER RATE TO PREVENT DRY STORAGE ROOM TEMPERATURE FROM EXCEEDING 90°F. MECHANICAL COOLING MAY BE PROVIDED IN AREAS WHERE THE INTERIOR STORAGE AREA TEMPERATURE CANNOT BE MAINTAINED AT 90°F BY MECHANICAL VENTILATION ALONE. DESIRABLE SPACE RELATIVE HUMIDITY IS 40-55 PERCENT. SPACE HEATING SHALL BE PROVIDED TO MAINTAIN A TEMPERATURE OF 40°F. ADDITIONAL VENTILATION INCLUDING THE ATTIC SPACE AND WALL CAVITY AT LOW TEMPERATURE STORAGE AREAS SHALL BE PROVIDED.

REFRIGERATED STORAGE DESIGN TEMPERATURES FOR THE DIFFERENT AREAS WILL BE AS FOLLOWS:

| | | |
|---|---|---|
| SENSITIVE VEGETABLE & FRUIT COOLER | 32-34°F | 90-95% RH |
| HARDY VEGETABLE & FRUIT COOLER | 40-45°F | 90-95% RH |
| PERISHABLE COOLER | 32-35°F | |
| ONION & POTATOES | 55-60°F | 85-90% RH |
| FREEZER | (-10°F) | |
| CHILLED DOCK AND MAXI-MART AISLE | 45°F | |

IN GENERAL, REFRIGERATED STORAGE ROOMS FOR SMALL AND MEDIUM SIZE FACILITIES SHALL BE BASED ON PACKAGED SPLIT COMMERCIAL REFRIGERATION SYSTEMS UTILIZING AIR COOLED CONDENSING UNITS WITH HERMETIC COMPRESSORS AND FAN COIL EVAPORATORS. DEPENDING UPON THE OUTCOME OF LIFE CYCLE COST ANALYSIS AND LOCAL CONDITIONS, A LARGE SIZE FACILITY MAY BE DESIGNED WITH A CENTRAL STATION INDUSTRIAL SYSTEM UTILIZING LARGE OPEN-TYPE COMPRESSORS, EVAPORATIVE CONDENSERS OR COOLING TOWERS AND AIR UNITS.

AS A GENERAL GUIDELINE, DESIGN FOR PACKAGED SPLIT SYSTEMS SHALL INCLUDE THE FOLLOWING ITEMS:

1. A MINIMUM OF TWO INDEPENDENT SYSTEMS SHALL BE INSTALLED TO SERVE EACH ROOM. IF ONLY TWO SYSTEMS ARE INSTALLED, EACH SHALL HAVE A CAPACITY EQUAL TO 70% OF THE TOTAL LOAD.
2. REFRIGERANT FOR SYSTEMS WITH ROOM TEMPERATURE OF 25°F AND LOWER SHOULD BE R-502. REFRIGERATION FOR ROOM TEMPERATURE OF 26°F OR HIGHER SHOULD BE R-22.
3. ALL ROOMS WITH AIR TEMPERATURE LOWER THAN 38°F MUST HAVE AUTOMATIC DEFROST. ELECTRIC DEFROST SHOULD BE FAVORABLY CONSIDERED FOR REASONS OF SIMPLICITY AND WIDE AVAILIBILITY WITH AUTOMATIC DEFROST. SYSTEMS SHOULD BE SELECTED FOR 20 HOUR OPERATION.
4. ROOMS HELD AT 38°F TO 44°F CAN UTILZE ROOM AIR DEFROST, BUT A TIMER MUST BE PROVIDED TO FORCE THE DEFROST. SYSTEM SHOULD BE SELECTED FOR 16 HOUR OPERATION.
5. FOR ROOM TEMPERATURES OF 45°F AND HIGHER, CONTROL TEMPERATURE SHOULD BE HELD ABOVE 30°F TO PREVENT COIL FROSTING.
6. AIR UNIT EVAPORATORS FOR VEGETABLE COOLERS WHERE HIGH HUMIDITY IS DESIRED SHOULD BE SELECTED WITH A 10°F TEMPERATURE DIFFERENCE BETWEEN THE RETURN AIR AND COIL TEMPERATURES.
7. AIR UNITS FOR FREEZER STORAGE SHOULD HAVE NO MORE THAN 4 FINS/INCH. AIR UNITS FOR COOLERS SHOULD HAVE NO MORE THAN 6 FINS/INCH AND 4 FINS/INCH IS MORE DESIRABLE FOR HIGH MOISTURE LOADS WHEN UNIT TEMPERATURE IS BELOW 28°F.
8. ALL JOINTS IN THE PIPING SYSTEM SHOULD BE BRAZED.
9. SYSTEM SHOULD BE COMPLETE WITH SUCTION-LIQUID HEAT EXCHANGERS, SUCTION TRAP ACCUMULATORS FOR COMPRESSOR PROTECTION, DEHYDRATORS AND LIQUID BULLSEYE.
10. ALL SYSTEMS SHOULD CONFORM WITH THE REQUIREMENTS OF THE ANSI-ASHRAE 15-28 SAFETY CODE FOR MECHANICAL REFRIGERATION PIPING.

SPACE FOR MECHANICAL EQUIPMENT HAS BEEN PROVIDED IN EQUIPMENT MEZZANINES. MECHANICAL ROOMS SHALL BE PROPERLY VENTILATED TO PREVENT EXCESSIVE TEMPERATURES. VIBRATION AND NOISE CONTROL CONSIDERATIONS SHALL BE PROVIDED IN THE MECHANICAL ROOMS. THE ULTIMATE LOCATION OF THE MECHANICAL EQUIPMENT IS OPTIONAL.

PROVISIONS MUST BE MADE TO PROVIDE CONTINUOUS HEAT UNDER THE FREEZER FLOOR THROUGH AN UNDERFLOOR WARMING SYSTEM. ANY HEAT SOURCE INCLUDING WASTE HEAT FROM OTHER SYSTEMS TRANSMITTED BY CIRCULATED GLYCOL OR FORCED AIR IS ACCEPTABLE. FORCED AMBIENT AIR SHOULD NOT BE USED EXCEPT WITH AN AUXILIARY HEAT SOURCE EXCEPT IN THE TROPICAL AREAS. GRAVITY INDUCED AIR CIRCULATION SHOULD NOT BE USED IN ANY CIRCUMSTANCES.

A MONITORING SYSTEM INCLUDING A MAIN CONTROL PANEL SHALL BE PROVIDED TO MONITOR THE TEMPERATURE IN EACH REFRIGERATED STORAGE ROOM. THE SYSTEM SHALL BE CAPABLE OF PROVIDING VISUAL AND AUDIBLE ALARMS FOR ABNORMAL CONDITIONS AND SHALL BE CAPABLE OF SENDING ALARM MESSAGES, VIA TELEPHONE LINES, TO A PREDETERMINED LOCATION. THE USE OF A TWO-CHANNEL TELEPHONE DIALER SHOULD BE CONSIDERED. RECORDING THERMOMETERS (24 HOUR LARGE DIAL TYPE) SHALL BE PROVIDED NEAR THE FRONT DOOR ON THE EXTERIOR OF EACH REFRIGERATED STORAGE ROOM. PROVISIONS SHALL BE MADE FOR TIE-IN OF THE MONITORING SYSTEM TO EXISTING (OR FUTURE) POST WIDE ENERGY MONITORING AND CONTROL SYSTEM (EMCS) IN ADDITION TO THE ALARM FUNCTIONS AS INDICATED. THE REFRIGERATION SYSTEMS AND AREAS SERVED BY THOSE SYSTEMS, WHEN CONNECTED TO POST WIDE EMCS, SHALL HAVE PROVISIONS FOR MONITORING FUNCTIONS ONLY (NO OVERRIDING CONTROL FUNCTIONS). IF A FUTURE POST WIDE EMCS IS NOT PROGRAMMED WITHIN 5 YEARS OF PROJECT DESIGN, NO PROVISIONS (i.e. BUILDING PREPARATION FOR EMCS) SHALL BE PROVIDED.

## PLUMBING SYSTEMS

DETERMINATION OF PLUMBING FIXTURES SHALL BE BASED ON THE NUMBER OF BUILDING OCCUPANTS STATED ON THE DATA FORM, ASSUMING A RATIO OF 50% MALE AND 50% FEMALE, IN ACCORDANCE WITH THE ARCHITECTURAL AND ENGINEERING INSTRUCTIONS (AEI) DESIGN CRITERIA, DATED MARCH 13, 1987, CHAPTER 15. SANITARY WASTE AND VENT, DOMESTIC COLD AND HOT WATER PIPING SHALL BE PROVIDED TO SERVE THE TOILET ROOMS, JANITOR ROOM, BREAK ROOM, VETERINARIAN INSPECTION ROOM, BATTERY CHARGING AREA, AND WASHDOWN STATIONS LOCATED THROUGHOUT THE FACILITY. WATER SUPPLY AND DRAINS SHALL BE PROVIDED IN THE VENDING MACHINE AREA IF SO REQUIRED. STORM DRAIN PIPING SHALL BE PROVIDED FROM ROOF DRAINS, IF UTILIZED, TO A POINT OF DISPOSAL OUTSIDE THE BUILDING.

## ELECTRICAL SYSTEMS

LIGHTING AND REFRIGERATION EQUIPMENT LOADS WILL COMPRISE THE MAJORITY OF THE BUILDING'S ELECTRICAL LOAD. RECEPTACLES AND VENTILATION EQUIPMENT WILL MAKE UP THE REMAINING ELECTRICAL LOADS.

A BUDGET OF 8 WATTS PER SQUARE FOOT FOR LIGHTING AND 120 VOLT RECEPTACLES AND 5 WATTS PER SQUARE FOOT FOR MECHANICAL SYSTEMS IN OFFICE AREAS WILL SUFFICE. BUDGETS FOR DRY STORAGE WILL BE 1 WATT FOR LIGHTING, RECEPTACLES AND VENTILATION WHILE THE BUDGETS FOR COOLERS AND FREEZERS WILL BE 9 WATTS PER SQUARE FOOT.

LIGHTING IN COOLERS, FREEZER, DRY STORAGE AND LOADING DOCK AREAS WILL BE ACCOMPLISHED WITH THE USE OF HIGH PRESSURE SODIUM LIGHTING FIXTURES. THIRTY PERCENT (30%) OF THE HIGH PRESSURE SODIUM LIGHTING FIXTURE SHALL BE INSTALLED WITH AN INTEGRAL QUARTZ LAMP AND SPACED TO PROVIDE AN EVEN LIGHTING DISTRIBUTION, ESPECIALLY IN EGRESS PASSAGEWAYS. FLUORESCENT LIGHTING FIXTURES WILL BE USED IN THE REMAINING AREAS OF THE BUILDING PARTICULARLY OFFICES, TOILETS, CONFERENCE ROOMS, ETC. BALLASTS IN COOLERS AND FREEZERS SHALL BE RATED FOR -20°F OPERATION. METAL HALIDE, MERCURY VAPOR OR FLUORESCENT LAMPS SHALL BE CONSIDERED IN LIEU OF HIGH PRESSURE SODIUM IN AREAS WHERE COLOR RENDITION IS A FACTOR.

EXTERIOR LIGHTING WILL BE OF THE HIGH PRESSURE SODIUM TYPE, CONTROLLED BY A SERIES CONNECTED PHOTOCELL-TIME CLOCK CIRCUIT. ILLUMINATION LEVELS SHALL BE AS SET FORTH BY THE ARCHITECTURAL AND ENGINEERING INSTRUCTIONS (AEI), DESIGN CRITERIA AND THE ILLUMINATING ENGINEERING SOCIETY.

THE ELECTRICAL DESIGN SHALL PROVIDE MEANS OF CONNECTING A PORTABLE EMERGENCY GENERATOR TO POWER THE BUILDING ESSENTIAL ELECTRICAL SYSTEMS INCLUDING ALL EXIT AND EGRESS LIGHTING, FIRE ALARM AND SECURITY SYSTEMS, REFRIGERATION EQUIPMENT, ESSENTIAL COMMUNICATION SYSTEMS AND SELECTED LIGHTING AND RECEPTACLES TO CONDUCT ESSENTIAL OPERATIONS AS AUTHORIZED BY THE A.E.I. DESIGN CRITERIA. AS AN OPTION, AN ON-SITE EMERGENCY GENERATOR SHALL POWER ALL LOADS PREVIOUSLY DESCRIBED AS WELL AS ALL LIGHTING AND RECEPTACLES AROUND THE EMERGENCY GENERATOR LOCATION. CATHODIC PROTECTION SHALL BE PROVIDED TO ALL UNDERGROUND STEEL FUEL TANKS AND LINES.

A CENTRAL, ELECTRICALLY SUPERVISED FIRE ALARM AND SMOKE DETECTION SYSTEM, MEETING ALL LOCAL CODES AND NFPA REQUIREMENTS, WILL BE INSTALLED AS PART OF THE BUILDING SYSTEMS.

A COMPLETE SECURITY SYSTEM WILL BE INSTALLED TO MONITOR ALL OPENINGS AROUND BUILDING, DESIGN AND PROCUREMENT OF THE SECURITY SYSTEMS SHALL BE COORDINATED WITH AND REVIEWED BY THE INTRUSION DETECTION SYSTEMS MANDATORY CENTER OF EXPERTISE (IDS-MCX), U.S. ARMY ENGINEER DIVISION, HUNTSVILLE, CEHND-ED-ME. A COMPLETE INTERCOM SYSTEM SHALL BE INSTALLED TO SERVE THE OFFICE AND OPERATING AREAS.

DEPENDING ON THE GEOGRAPHICAL LOCATION OF THE FACILITY, THE INSTALLATION OF A COMPLETE LIGHTNING PROTECTION SYSTEM SHALL BE EVALUATED.

INFORMATION MANAGEMENT SYSTEM PROVISIONS WILL CONSIST OF TERMINAL/CONCENTRATOR CABINETS, RACEWAYS, OUTLET BOXES, AND DEVICE PLATES , AND UNDERGROUND ACCESS TO THE EXTERIOR INSTALLATIONS INFORMATION MANAGEMENT SYSTEM. INFORMATION MANAGEMENT SYSTEM OUTLETS WILL BE PROVIDED FOR ADMINISTRATIVE WORK STATIONS AND OTHER LOCATIONS DESIGNATED BY THE USING ACTIVITY. THE LOCATION OF CABINET AND OUTLETS FOR THE INFORMATION MANAGEMENT SYSTEM WILL BE COORDINATED WITH THE LOCAL DIRECTOR OF INFORMATION MANAGEMENT.

| REV | DATE | DESCRIPTION | BY | APP |
|---|---|---|---|---|

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

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

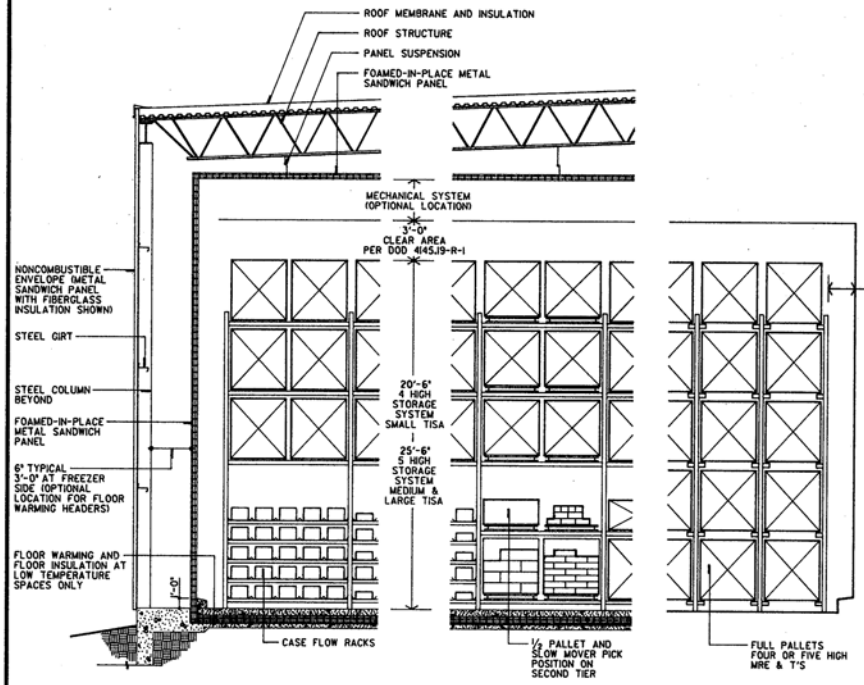
DESIGNED: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

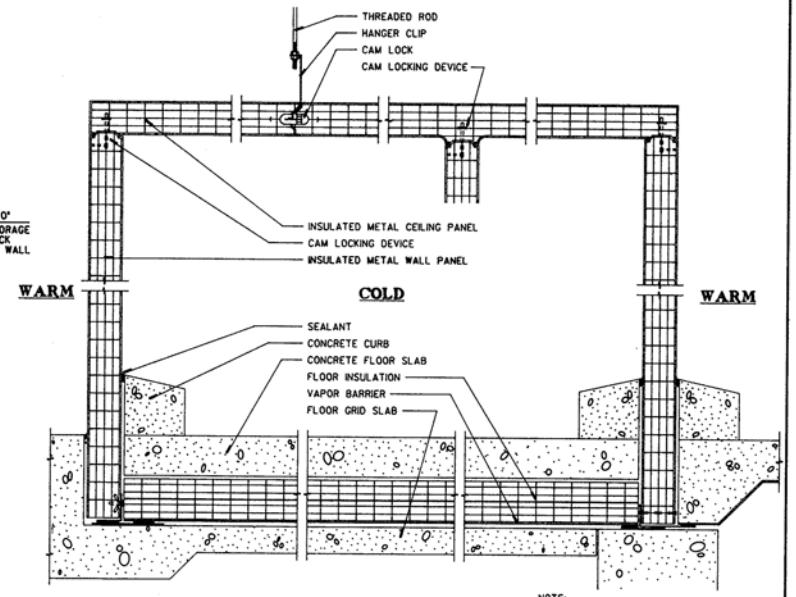
SCALE: AS SHOWN
DATE: OCTOBER 1988
TO ACCOMPANY SPECIFICATION NO.
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 7

NORFOLK DISTRICT FILE NO. FL 734-1.7




**TYPICAL SECTION**
WAREHOUSE

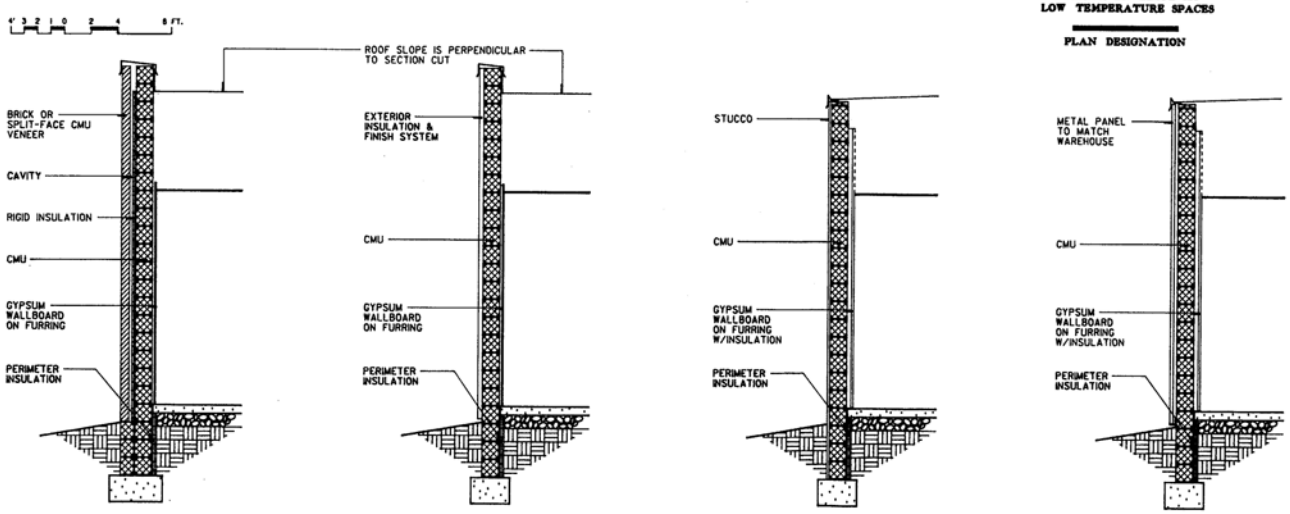
**TYPICAL ELEVATIONS**
STORAGE AIDS




NOTE:
FACTORY MANUFACTURED PARTITION JUNCTURES ARE SHOWN. FIELD ASSEMBLED ARE OPTIONAL.

**TYPICAL DETAILS**
INTERIOR ENVELOPE AT LOW TEMPERATURE SPACES

PLAN DESIGNATION




**WALL TYPE "A"**
LOAD BEARING
W/BRICK OR SPLIT-FACE CMU VENEER

**WALL TYPE "B"**
LOAD BEARING
W/EXTERIOR INSULATION & FINISH SYSTEM

**WALL TYPE "C"**
LOAD BEARING
W/STUCCO

**WALL TYPE "D"**
LOAD BEARING
W/METAL PANELS

# OPTIONAL WALL TYPES
ADMINISTRATION AND WAREHOUSE OFFICE AREAS

NOTES:
1. PARAPETS ARE OPTIONAL
2. MINIMUM ROOF SLOPE SHALL BE IN ACCORDANCE WITH THE ARCHITECTURAL AND ENGINEERING INSTRUCTIONS-DESIGN CRITERIA.
3. WALL TYPES "C" AND "D" INDICATE SECTION CUT IN DIRECTION OF ROOF SLOPE AND WITHOUT PARAPET.

## ARCHITECTURAL SYSTEMS

THE INTERIOR AND EXTERIOR IMAGE OF THIS FACILITY HAVE BEEN DEVELOPED AS A SIMPLE FUNCTIONAL STATEMENT OF THE BUILDING TYPE. TECHNICAL CONSIDERATIONS, EASE OF EXPANSION AND THE PROBABLE LOCATION OF THE FACILITY WITHIN THE INDUSTRIAL ZONE FORMS THE BASIS FOR RECOMMENDING A METAL PANEL EXTERIOR. CAREFUL CONSIDERATIONS SHOULD BE GIVEN TO THE COLOR OF THE WAREHOUSE MASS AND THE WALL TYPE SELECTION FOR THE ADMINISTRATIVE AND WAREHOUSE AREAS. WALL TYPES RANGING FROM BRICK TO STUCCO AND MATCHING METAL PANELS ARE INCLUDED IN ORDER TO RELATE TO THE INSTALLATIONS ARCHITECTURAL THEME.

THE WAREHOUSE FACILITIES ARE DESIGNED AROUND THE "INTERIOR VAPOR BARRIER SYSTEM" CONCEPT. THE CONCEPT INVOLVES THE UTILIZATION OF A CONVENTIONAL NONCOMBUSTIBLE EXTERIOR ENVELOPE WITH AN INTERIOR INSULATION AND VAPOR BARRIER ENVELOPE WITHIN THE OVERALL BUILDING FOR ALL LOW TEMPERATURE SPACES. THE INTERIOR ENVELOPE UTILIZES FOAMED-IN-PLACE METAL SANDWICH PANELS FOR WALLS AND CEILINGS WITH FLOOR INSULATION AND A FLOOR WARMING SYSTEM BELOW THE CONCRETE FLOOR SLAB. QUALITY OF FACTORY ASSEMBLY OF THE METAL PANELS ALONG WITH PROPER DETAILING OF PENETRATIONS ARE CRITICAL ELEMENTS IN MAINTAINING CONTINUITY IN THE VAPOR BARRIER FOR THE LOW TEMPERATURE SPACES. THE ROOF OF THE EXTERIOR ENVELOPE SHALL BE DESIGNED IN ACCORDANCE WITH THE ARCHITECTURAL AND ENGINEERING INSTRUCTIONS-DESIGN CRITERIA WITH RESPECT TO ROOF SLOPE AND MATERIAL SELECTION.

THE INTERIOR CROSS SECTION OF THE FACILITY HOUSES THE STORAGE AID SYSTEM, CLEAR SPACE ABOVE PER DOD CRITERIA, UTILITIES ZONE AND THE DEPTH OF STRUCTURE. LOW TEMPERATURE SPACES REQUIRE ADDITIONAL HEIGHT IN THE OVERALL CROSS SECTION DUE TO THE INTERIOR ENVELOPE WITHIN THE BUILDING. OVERALL HEIGHT IS PRIMARILY DICTATED BY THE STORAGE CONFIGURATION WHICH IS A 4 HIGH RACK SYSTEM IN THE SMALL AND 5 HIGH IN THE MEDIUM AND LARGE FACILITIES. INTERIOR SPACE ABOVE THE ADMINISTRATIVE CORE IS DEDICATED TO MECHANICAL AND ELECTRICAL EQUIPMENT ACCESSED BY STAIRS DIRECTLY FROM THE EXTERIOR. ALTHOUGH THE FINAL LOCATION OF THE MECHANICAL AND ELECTRICAL ROOM IS OPTIONAL (SITE SPECIFIC) DIRECT ACCESS FROM THE EXTERIOR IS MANDATORY. ADDITIONAL DESIGN CONSIDERATIONS FOR THE EQUIPMENT MEZZANINE OPTION INCLUDE ADEQUATE CEILING STRUCTURE, VIBRATION ISOLATION, ACOUSTICS AND DOUBLE DOORS FROM THE MEZZANINE LEVEL TO THE INTERIOR WAREHOUSE TO ALLOW THE PLACEMENT & REMOVAL OF EQUIPMENT BY THE FACILITY'S MATERIAL HANDLING EQUIPMENT.

OPERABLE WINDOWS SHALL BE PROVIDED IN ALL OCCUPIED SPACES OF THE ADMINISTRATIVE AND WAREHOUSE OFFICE AREAS. PROVISIONS FOR CLERESTORIES ARE INCLUDED TO OBTAIN NATURAL LIGHT IN THE DRY DOCK AREA.

## STRUCTURAL SYSTEMS

THE RECOMMENDED STRUCTURAL SYSTEM CONSISTS OF GALVANIZED METAL ROOF DECK SUPPORTED ON STEEL JOISTS, SPANNING BETWEEN STEEL FRAMES CONSISTING OF STEEL WIDE FLANGE BEAMS SUPPORTED ON STEEL COLUMNS. SPACING OF STEEL COLUMNS SHALL BE INTEGRATED WITH THE STORAGE AID SYSTEM AND AISLE WIDTH.

THE ROOF STRUCTURE SHALL BE DESIGNED TO SUPPORT THE LOADS IMPOSED BY ANY SUSPENDED CEILINGS INCLUDING BUT NOT LIMITED TO THE CEILING IN THE LOW TEMPERATURE SPACES.

THE RECOMMENDED WAREHOUSE EXTERIOR ENVELOPE WILL CONSIST OF METAL PANELS SPANNING BETWEEN STEEL GIRTS SUPPORTED BY EXTERIOR COLUMNS. IN THE ADMINISTRATIVE AND WAREHOUSE OFFICE AREAS THE WALLS SHALL CONSIST OF LOAD BEARING MASONRY WITH AN OPTION OF FOUR DIFFERENT EXTERIOR FINISHES.

SPREAD FOOTINGS AND CONCRETE SLAB ON GRADE ARE INDICATED AS THE BASIC FOUNDATION TYPE AND FLOOR SLAB SYSTEM. FOUNDATIONS AND FLOOR SLAB DESIGNS SHALL BE MADE FOR THE SITE SPECIFIC BUILDING BASED ON LOCAL CONDITIONS, SOILS REPORTS AND RECOMMENDATIONS.

THE SLAB ON GRADE SHALL BE DESIGNED TO ADEQUATELY SUPPORT THE RACK SYSTEM AND TO SUSTAIN TRAFFIC FROM THE MATERIAL HANDLING EQUIPMENT.

COMPLETE STRUCTURAL DESIGNS MUST FOLLOW RECOMMENDATIONS AND REQUIREMENTS AS SET FORTH IN TECHNICAL MANUALS TM5-809-1/AFM 88-3, CHAPTER 1, FOR LOAD ASSUMPTIONS FOR BUILDINGS, TM5-809-10/AFM 88-3, CHAPTER 13 FOR SEISMIC DESIGN AND TM5-809-3/AFM 88-3, CHAPTER 3 FOR MASONRY STRUCTURAL DESIGN FOR BUILDINGS.

| 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: W/A & A
DRAWN: CADD
CHECKED: PM
SUBMITTED: MK

DEPARTMENT OF THE ARMY
FACILITIES STANDARDIZATION PROGRAM
DEFINITIVE DESIGN

TISA
TROOP ISSUE SUBSISTENCE ACTIVITY
COLD/DRY STORAGE FACILITY

SCALE: AS SHOWN
DATE: OCTOBER 1986
TO ACCOMPANY SPECIFICATION NO.
PROJECT NO. DEF 432-11-01
DRAWING NO.
SHEET NO. 8

## 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 |
|---|---|---|---|---|
| 0 | | | | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

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
SHEET NO. 9
DATE: OCTOBER 1988
DRAWING NO.