DRAWING INDEX

SHT.REF. NO.	HND FILE NO	REVISIONS REV.NO.	REVISIONS AM/CO	
				COVER SHEET
1				DRAWING INDEX
2				PLAN & PAN LAYOUT (2,500 BARREL TANK)
3				SECTIONS, DETAILS, & ROOF PLAN (2,500 BARREL TANK)
4				PLAN & PAN LAYOUT (5,000 BARREL TANK)
5				SECTIONS, DETAILS, & ROOF PLAN (5,000 BARREL TANK)
6				PLAN & PAN LAYOUT (10,000 BARREL TANK)
7				SECTIONS, DETAILS, & ROOF PLAN (10,000 BARREL TANK)
8				PLAN & PAN LAYOUT (25,000 BARREL TANK)
9				SECTIONS, DETAILS, & ROOF PLAN (25,000 BARREL TANK)
10				PLAN & PAN LAYOUT (55,000 BARREL TANK)
11				SECTIONS, DETAILS, & ROOF PLAN (55,000 BARREL TANK)
12				PLAN & PAN LAYOUT (80,000 BARREL TANK)
13				SECTIONS, DETAILS, & ROOF PLAN (80,000 BARREL TANK)
14				PLAN & PAN LAYOUT (100,000 BARREL TANK)
15				SECTIONS, DETAILS, & ROOF PLAN (100,000 BARREL TANK)
16				SECTIONS & DETAILS
17				ROOF TRUSSES (55K, 80K, & 100K BARREL TANK)
18				TANK FOUNDATIONS
19				TANK STAIRS
20				APPURTENANCES & FITTINGS
21				APPURTENANCES & FITTINGS
22				APPURTENANCES & FITTINGS
23				FLOATING PAN AND AFFF SYSTEM DETAILS
24				WATER DRAW-OFF & MISCELLANEOUS DETAILS

LEGEND

HHLA	HIGH HIGH LEVEL ALARM
HLA	HIGH LEVEL ALARM
O.P.	OVERFLOW PORT/VENT
UG	UNDERGROUND
LLA	LOW LEVEL ALARM
F.C.	FOAM CHAMBER
GC	GROUNDING CABLE
RAD	RADIUS
DIA	DIAMETER
N.T.S.	NOT TO SCALE
FML	FLEXIBLE MEMBRANE LINER
AFFF	AQUEOUS FILM FORMING FOAM
℄	CENTER LINE
▱	PLATE
SYMM	SYMMETRICAL
T.B.E.	THREAD BOTH ENDS

AFFF STORAGE TANK PROTECTION SCHEDULE

TANK CAPACITY (BBLS.)	TANK DIA. (FT.)	NO. OF APPLICATION POINTS	TOTAL SOLUTION APPLICATION RATE (GPM)	DURATION OF DISCHARGE (MINS.)	SUPPLY OF AGENT REQ'D. FOR TANK(GALS.)	SUPPLEMENTARY HOSES/APPL. TIME (No./Mins.)	SUPPLY OF AGENT REQ'D. FOR HOSE	TOTAL AGENT SUPPLY/TANK (GALS.)
2,500	27	1*	57.3	55	94.5	1/55	82.5	177
5,000	31	1*	75.5	↓	124.8	↓	↓	207.1
10,000	43.5	1*	148.6	↓	245.2	↓	↓	327.7
25,000	63	1*	311.7	↓	514.3	↓	↓	596.8
55,000	93	8	129.4	↓	213.4	2/55	165	378.4
80,000	112	9	156.2	↓	257.8	↓	165	422.8
100,000	125	10	174.8	↓	288.1	3/55	247.5	535.6

* THE FLOATING PAN WILL NOT HAVE A FOAM DAM.

SYSTEM DESIGN

DESIGN PARAMETERS

THIS STANDARD DESIGN COVERS VERTICAL STEEL FUEL TANKS SURROUNDED BY EARTHEN DIKES HAVING FLOATING PANS AND CONTAINING JP-4 OR OTHER FUEL WITH A TRUE VAPOR PRESSURE OF 0.75 PSIA OR MORE (AS DEFINED IN 40 CFR PART 60, SUBPART K8, DATED 1 JULY 1987).

THIS STANDARD DESIGN SHOULD BE ALSO BE IMPLEMENTED FOR TANKS DESIGNED FOR LOW VOLATILITY FUELS (JP-5, JP-7, AND JP-8) IF FUTURE CONSIDERATIONS INCLUDE STORING JP-4 OR OTHER HIGH VOLATILE FUELS.

SITE ADAPTING DESIGN TEAM (SADT)

SITE LIMITATIONS ARE ADDRESSED IN THIS DESIGN IN VERBAL FORM ONLY AND MUST BE INCLUDED BY THE SITE ADAPTING DESIGN TEAM (SADT).

SADT SITE VERIFICATION

EACH SADT MUST EVALUATE THE NEEDS OF THEIR SPECIFIC APPLICATION AGAINST THE INFORMATION IN THESE DRAWINGS.

THE SADT MUST THEN MODIFY THE DRAWINGS, AS NECESSARY BASED ON SITE SPECIFIC INVESTIGATION AND DESIGN. NO INFORMATION FROM THESE DRAWINGS SHOULD BE APPLIED TO A CONSTRUCTION PACKAGE WITHOUT THIS INVESTIGATION AND DESIGN.

DESIGN CRITERIA FOR SEISMIC INVESTIGATION AND DESIGN SHALL BE IN ACCORDANCE WITH API-650, TM 5-809-10/NAVFAC P-355/AFM 88-3, CHAPTER 13.

API-650 SHALL BE THE GOVERNING DOCUMENT IN ALL PHASES OF TANK DESIGN. MODIFY THE TANK SIZE WHERE THE SITE IS NEAR A FLIGHT LINE AND THE HEIGHT CONFLICTS WITH AVIATION FLIGHT LINE GUIDELINES AND REQUIREMENTS.

DESIGN LIMITS USED

THE FOLLOWING DESIGN LIMITS WERE USED IN THIS PACKAGE:

WIND SPEED	95	MPH (EXPOSURE C)
MAXIMUM SNOW LOAD	40	PSF
MAXIMUM SEISMIC ZONE	2	
SPECIFIC GRAVITY OF FUEL	0.80	
MINIMUM TANK SIZE	2,500	BARREL
MAXIMUM TANK SIZE	100,000	BARREL
FUEL TYPE	JP-4	

RECOMMENDED GUIDANCE FOR:

A. AQUEOUS FILM FORMING FOAM (AFFF) SEMI-FIXED SYSTEM:
THE SADT WILL PROVIDE ADDITIONAL PROJECT DRAWINGS AS NECESSARY TO REQUIRE A COMPLETE SEMI-FIXED AFFF FIRE PROTECTION SYSTEM INCLUDING FOAM MANIFOLD WITH FIRE DEPARTMENT CONNECTIONS, ADEQUATE WATER SUPPLY, AND FOAM SOLUTION PIPING FROM THE MANIFOLD TO EACH FUEL STORAGE TANK. THE LAYOUT OF THE AFFF SYSTEM WILL BE IN ACCORDANCE WITH NFPA 11 AND THE AFFF STORAGE TANK PROTECTION SCHEDULE SHOWN BELOW. EACH STORAGE TANK WILL BE PROVIDED WITH A SUPPLY CONNECTION LOCATED DIRECTLY OUTSIDE THE DIKED AREA. ALL AFFF SUPPLY PIPING AND MANIFOLDING SHALL BE ROUTED ENTIRELY ABOVEGROUND. THE SITE DESIGN SHOULD INCLUDE A FIRE ACCESS AND MAINTENANCE ROAD TO EACH TANK IN ACCORDANCE WITH NFPA 30. SADT SHALL USE THE AFFF SCHEDULE TO SIZE THE AFFF PIPING AND FOR GENERAL INFORMATION. THE SCHEDULE WILL BE DELETED FROM A SET OF CONTRACT DRAWINGS.

B. FUEL RESISTANT JOINT COMPOUND:
THE JOINT COMPOUND USED TO SEAL CONCRETE PAVEMENT MUST CONFORMING TO FEDERAL SPECIFICATION SS-S-200E, TYPE M OR H, COLD APPLIED FUEL RESISTANT SEALANT.

NEEDED STORAGE CAPACITY

IN EVALUATING THE AMOUNT OF AVAILABLE STORAGE CAPACITY THAT WILL BE NEEDED, THE SADT MUST TAKE THE FOLLOWING FACTORS INTO ACCOUNT:

A. AN ORDER OF MAGNITUDE OF CURRENT FUEL STORAGE/USAGE REQUIREMENTS.

B. ANTICIPATED FUTURE EXPANSIONS.

C. AVAILABLE CRITERIA CONCERNING FUEL STORAGE CAPACITIES.

D. 100 PERCENT OF THE NOMINAL CAPACITY OF A TANK IS AVAILABLE FOR USE.

NEEDED NUMBER OF TANKS

IN EVALUATING THE NUMBER OF TANKS THAT ARE NEEDED, THE SADT MUST TAKE THE FOLLOWING FACTORS INTO ACCOUNT:

A. THE AMOUNT OF FUEL NEEDED.

B. SITE LIMITATIONS.

GENERAL ARRANGEMENT OF DRAWINGS

THESE DRAWINGS ARE ARRANGED IN FOUR GROUPS (SYSTEM DESIGN, TANK DESIGN, ROOF TRUSS SCHEDULES, AND SUPPORTING DETAILS).

A. SYSTEM DESIGN (SHEET 1)

ALL SYSTEM DESIGN NOTES ARE INCLUDED ON THE INDEX SHEET (SHEET 1) AND ARE INTENDED TO PROVIDE ENOUGH INFORMATION TO ALLOW THE SADT TO ESTABLISH A SET OF DESIGN DRAWINGS. THE SYSTEM DESIGN NOTES SHOULD BE USED ONLY AS GUIDENCE AND SHOULD BE DELETED FROM THE DESIGN/CONSTRUCTION PACKAGE.

B. TANK DESIGN (SHEET 2 THRU SHEET 16)

IN THIS GROUP, EACH TANK SIZE INCLUDES THREE DRAWINGS:

1. ONE DRAWING TO DEFINE THE TANK LAYOUT, ALL NECESSARY APPURTENANCES, AND THE LOCATION AND ARRANGEMENT OF ALL APPURTENANCES.
2. ONE DRAWING TO DEFINE SPECIFIC STRUCTURAL DETAILS.
3. ONE DRAWING (SHEET 16) WHICH INCLUDES SPECIFIC SECTIONS AND DETAILS.

THERE ARE THREE WAYS THESE DRAWINGS CAN BE USED IN A DESIGN/CONSTRUCTION PACKAGE.

1. FOR ANY GIVEN TANK SIZE, THE TANK LAYOUT SHEET CAN BE USED IN CONJUNCTION WITH THE SPECIAL NOTE SHOWN. THE DETAIL SHEETS WILL BE DELETED.
2. FOR ANY GIVEN TANK SIZE, IF THE SPECIAL NOTE IS DELETED, THEN THE DETAIL SHEETS WILL BE INCLUDED.
3. FOR ANY GIVEN TANK SIZE, DETAIL SHEETS CAN BE USED IN CONJUNTION WITH THE SPECIAL NOTE IF THE NOTE IS ALTERED TO ALLOW THE CONTRACTOR AN OPTION TO DESIGN THE SYSTEM.

C. ROOF TRUSS SCHEDULES (SHEET 17)

THIS DRAWING IS INTENDED TO BE USED IN CONJUNCTION WITH 55,000 BARREL, 80,000 BARREL, AND 100,000 BARREL TANKS IN ORDER TO DEFINE THE ROOF TRUSSES. DELETE THIS DRAWING IF THE SPECIFIC NOTE IS USED WITHOUT INCLUDING THE DETAIL SHEETS.

D. SUPPORTING DETAILS (SHEET 18 THRU SHEET 24)

THESE DRAWINGS DEFINE THE APPURTENANCES THAT WILL BE USED ON A FUEL STORAGE TANK. THE SADT MUST DELETED ALL DETAILS WHICH ARE NOT REFERENCED BY THE SITE ADAPTED PACKAGE.

SITE DRAWINGS

SITE DRAWINGS MUST BE ADDED TO EVERY PACKAGE TO MAKE IT COMPLETE. THERE ARE SEVERAL PLACES IN THESE DRAWINGS WHERE THE SADT MUST REFERENCE THE APPROPRIATE SITE DRAWINGS.

SHELL MANHOLES SHOULD BE ALIGNED WITH PREVAILING WINDS TO AID IN VAPOR FREEING TANK. STAIRWAYS SHOULD BE LOCATED TO MINIMIZE WALKING DISTANCES.

NUMBERING OF DRAWINGS

THE NUMBERING SCHEME USED IN A FINAL APPLICATION OF THESE DRAWINGS SHOULD BE CONSISTENT. CROSS REFERENCES BETWEEN DRAWINGS HAVE BEEN KEPT TO A MINIMUM, HOWEVER THE SADT WILL BE REQUIRED TO CHANGE THE REFERENCE NUMBERING TO SOME DEGREE.

SPECIFICATIONS

THE SPECIAL SPECIFICATION SECTION FOR THESE DRAWINGS AS WELL AS THE FOLLOWING GUIDE SPECIFICATIONS MAY BE NECESSARY TO COMPLETE A PACKAGE.

A.	CEGS-03100	STRUCTURAL CONCRETE FORMWORK
B.	CEGS-03200	CONCRETE REINFORCEMENT
C.	CEGS-03250	EXPANSION JOINTS, CONTRACTION JOINTS, AND WATER STOPS
D.	CEGS-03300	CONCRETE FOR BUILDING CONSTRUCTION (ARMY PROJECTS)
E.	NFGS-03300	CONCRETE FOR BUILDING CONSTRUCTION (NAVY PROJECTS)
F.	CEGS-05065	WELDING STRUCTURAL
G.	CEGS-05120	STRUCTURAL STEEL
H.	CEGS-05500	MISCELLANEOUS METAL
J.	CEGS-09900	PAINTING GENERAL
J.	CEGS-13080	SEISMIC PROTECTION FOR MECHANICAL, & ELECTRICAL EQUIPMENT
K.	CEGS-16640	CATHODIC PROTECTION SYSTEM
L.	CEGS-16665	STATIC ELECTRICITY PROTECTION SYSTEM
M.	NFGS-09872	INTERIOR COATING SYSTEM FOR WELDED STEEL TANKS USED IN PETROLEUM FUEL STORAGE (NAVY AND ARMY PROJECTS)
N.	NFGS-09875	INTERIOR COATING SYSTEM FOR WELDED STEEL TANKS USED IN PETROLEUM FUEL STORAGE (AIR FORCES PROJECTS)
O.	NFGS-09874	EXTERIOR COATING SYSTEM FOR WELDED STEEL TANKS USED IN PETROLEUM FUEL STORAGE (NAVY, ARMY, AND AIR FORCES PROJECTS)

APPROVED FUNCTIONAL ADEQUACY

TITLE: DATE:
PREPARED BY

PRINCIPAL, A/E FIRM DATE:
CONSTRUCTIBILITY REVIEW

CHIEF, CONSTRUCTION DIV. DATE:
REVIEWED BY:

CHIEF, VALUE ENGINEERING DATE:
REVIEWED BY:

CHIEF, CS BRANCH DATE:
REVIEWED BY:

CHIEF, ME BRANCH DATE:
APPROVED BY:

CHIEF, ENGINEERING DIVISION DATE:

Symbol	Description	Date	Approved
	Revisions		

U.S. ARMY ENGINEER DIVISION, HUNTSVILLE
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

Site adapt A/E:

US Army Corps of Engineers

STANDARD FUELING SYSTEMS
ABOVEGROUND VERTICAL STEEL TANKS
WITH FLOATING PANS & FIXED ROOFS

DRAWING INDEX

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Sheet 1 of 24