

LEVEL *III*

12



ADA084624

DESIGN CONCEPT FOR FUEL FIRE FACILITY
SCALE-DOWN

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Warminster, Pennsylvania 18974

20 AUGUST 1979

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Prepared for
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Washington, DC 20361

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Fuel Fire Test Facility Thermal Hazard of Fire Contact Personal Protection From Flame Contact (of this study)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objective is to provide an all-weather, self-sustaining, indoor fuel-fire facility for the generation of data for the evaluation of burn-protective capacity of personal gear for naval aircrewmembers and flight deck personnel in full-scale fuel fire exposures. A scaled-down indoor version of the existing fuel-fire facility will provide realistic data for protective-capacity analysis. Construction of an automated enclosed facility will allow experiments to be conducted efficiently indoors in a closely controlled environment with minimal risk to personnel and surroundings and with more timely and consis-		

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20. Tent results in the analysis of data for burn protection of naval aircrewmen.

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O B J E C T I V E

A full-scale fuel fire facility with associated equipment and instrumentation exists for the purpose of predicting the protective capacity of personal gear of naval aircrewmembers and flight deck personnel exposed to the thermal hazard of fuel fires in aircraft crashes such as may occur on a carrier deck (reference 1). It is the aim of this investigation to conduct a feasibility study for construction of a scaled-down version of the fuel facility so that experiments can be conducted efficiently indoors in a closely controlled environment with minimal risk to personnel and surroundings.

P R O C E D U R E

With the existing facility, a full-scale fuel fire test normally employs seven skilled personnel. Four operate the pit and instrumentation and three document the procedures in motion picture and still photographic coverage. In addition to these personnel, specific limitations are imposed by the wind velocity, direction of the wind, precipitation conditions, ambient temperature, etc. A scaled-down indoor facility will permit all-weather operation, reduce the number of personnel required for operational testing and improve logistics by limiting the transporting of manikins, clothing, instrumentation, fuel, water and photographic, operational and fire department personnel. An indoor facility will also improve maintainability and reliability and increase productivity by reducing the number of test exposures needed for valid assessments of protectivity and the costs of material assembly.

R E S U L T S A N D D I S C U S S I O N

In the design of a new fuel fire facility, the foremost considerations must include reduction in size, containment, and automation. In the present plans, utilization of existing proven designs with improvements are incorporated in the fuel ignition system, fuel dispersion and grating system, power, timing and control circuitry, data collection and recording system, and the fuel and water pit holding system. New design considerations for the scaled-down version include protective and retaining walls, a ventilation and exhaust system, a traversing system and a fire extinguishing system. To this end the following plans with identification drawing numbers have been developed for consideration and incorporation in the design of the new facility and are shown in this report as appendix A, B, C, and D.

NAVFAC DRAWING NUMBER

2002346	Install Fuel Distribution And Ignition System
2002347	Install Fuel Distribution And Ignition System
2002348	Install Fuel Distribution And Ignition System

ENGINEERING RESOURCES INC. DRAWING NUMBER

D 00041	Fuel Ignition System
D 00042	Fuel Ignition System
D 00044	Fuel Dispersion System
SKC 00043	Piping And Nozzle Details
J 00041	Fuel Pumping System

W. N. BEST COMBUSTION EQUIPMENT CO., INC. DRAWING NUMBER

11273	Orifice Assembly Ignitor Gas Line
22524	Piping Schematic
22525-1	Fuel Ignition System - Ignitor, Heat Shield And Mounting Arrangement
30162	Fuel Gas Ignitor Wiring
11124	Ignitor

ENVIRONMENTAL PHYSIOLOGY DRAWING NUMBER

001	Fuel Fire Facility Scale Down
002	Fuel Fire Facility Scale Down
003	Fuel Fire Facility Scale Down

The design concept for each phase of development of the scaled-down version of the fuel fire facility follows:

Fuel Dispersion and Grating System - Aside from the architectural design of the fuel dispersion and grating system which is diagrammed in Environmental Physiology Drawing No. 1, 2, and 3 of appendix D. This system must be improved to prevent existing problems which occur because of corrosion and expansion. The fuel dispersion system is currently constructed of galvanized steel which is continually immersed in water causing the orifice assemblies to become contaminated with rust preventing an even distribution of fuel in each containment cell. It is therefore recommended that stainless steel or copper piping be used throughout to correct the problem. In addition, during a full scale fuel fire the grating system expands considerably and in some instances buckles because of the extreme heat and a lack of clearance at the ends. For a temperature differential of 650°C, aluminum elongates 4.7 inches for each 20 foot length. Stainless steel is recommended as a replacement for the aluminum because it has a lower coefficient of expansion and improved corrosive properties.

Ignition, Power, Timing and Control System - Currently the ignition, power, timing and control systems are functional but their proximity to the fuel fire creates a hazard to the operating personnel manning the three control stations

during exposures. An automated system with one control console at a remote site will improve test coordination and reduce risk to operational personnel.

Pit with Protective and Retaining Walls - The pit will be constructed of reinforced concrete with overall inside dimensions of 16 feet by 6 feet by 8 inches deep. The protective walls will be constructed of fire brick inside with a solid block exterior.

Ventilation and Exhaust System - The roof of the enclosed structure will be opened to the atmosphere during the fuel fire. Therefore, it will be constructed as a heavy gage steel louvered system operated electromechanically for ease of operation in opening and closing. Two 36 inch exhaust fans will provide sufficient air flow to adequately ventilate the fuel fire pit enclosure (1920 cubic feet) after each exposure.

Fire Extinguishing System - A carbon dioxide fire extinguisher system, for emergency use only, will be required in the event that the manikin is delayed in the fire because of a mechanical malfunction of the traversing system or in order to quickly abort an existing fire for some unforeseen reason.

Data Collection and Recording System - The telemetry data acquisition and display system, (reference 2) will be used for recording and analysis of data in the scaled-down version of the facility. The commutator, oscillator, transmitter, and antenna will be housed in the manikin. The antenna for the receiver will be located in the fuel fire pit area. The magnetic tape recorder, receiver, oscillograph, oscilloscope, and associated equipment will be located in the control room adjacent to the fuel fire pit. Provisions will be made for future development to include permanent heat flux sensors located throughout the pit enclosure so that at specified locations of the manikin in the fire, comparative measurements can be made of the temperature rise of the manikin surface beneath protective clothing, and the corresponding heat flux energy at specific intervals during exposure. A development of this nature eliminates the need for extensive photographic coverage of each test.

Traversing System - The complexities encountered in the design of the traversing system illustrated in Environmental Physiology Drawing No. 1, 2, and 3 of appendix D, warrant consultation with potential contractors for recommendations and development of this system. Overall design considerations include maintaining a specific velocity for passages of the manikin through the flames at 10 feet per second for 3 seconds so that proper convection currents can be simulated for the prescribed distance and time. The traversing system must be able to withstand a temperature of 1200°C for 5 minutes without deterioration of the structure or malfunction of the system. Additional considerations include a variable speed drive to adjust exposure velocity and time, and provisions to allow for more than one pass through the fire. The traversing system includes the use of synchronized doors for opening before the manikin enters and closing after it leaves the fire pit containment area, simulating a square wave pulse of energy for the fuel fire pit exposure, a crucial condition of the exposures, (reference 1).

Functional Operating System - The epoxy coating inside the fuel tanks and the rust from the galvanized piping have caused numerous delays by clogging the orifices in the fuel distribution system. Fiberglass tanks and copper or stainless piping will prevent such occurrences in the scaled-down version of the

facility. An automatic, controlled metering system for delivery of the gasoline is required with settings in one gallon increments from 0 to 30 gallons pumping at a minimum rate of one gallon per second. An electronic interlock system with automatic sequencing of controls with manual overrides are necessary for the following functions:

1. Opening ventilation system louvers,
2. filling the containment pit with water,
3. pressurizing the propane gas and compressed air manifolds,
4. pumping gasoline into the fuel fire pit,
5. ignition of the gasoline,
6. starting the recording and photographic data collection systems,
7. operating the doors that separate the pit from the dressing area,
8. operating the traversing system, and
9. abort with provisions for emergency execution of the fire extinguishing system.

C O N C L U S I O N

The data discussed herein, together with the drawings in the enclosures, provide the necessary basis for construction of a scaled-down version of the fuel fire facility. Each of the primary operating systems is presented independently for simplification of the total system development cycle. To this end a work breakdown structure can be formulated for the construction phase of development assigning each of the required systems to a specific discipline. This will provide tracking of the funding, scheduling, and construction performed by the individual contractors.

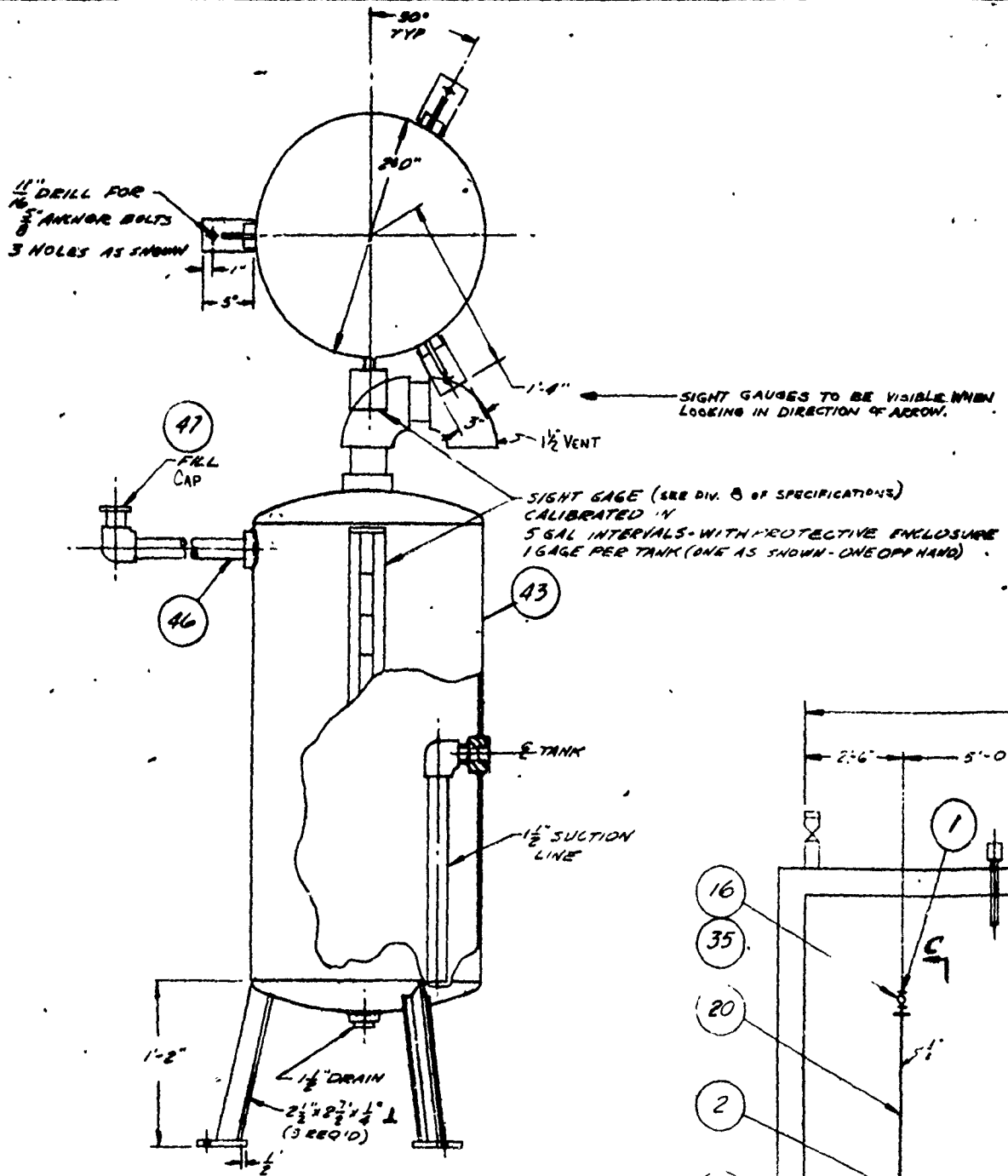
R E F E R E N C E S

1. Stoll, A.M., Munroe, L.R., Chianta, M.A., Piergallini, J.R., and Zaccaria, D.E. A Facility and Method for Evaluation of Thermal Protection. Report No. NADC-75286-40 of 1 Dec 1975.
2. Piergallini, J.R. and Stoll, A.M., Telemetry System for Evaluation of Burn Protection in Full-Scale Fuel Fire Manikin Exposures. Aerospace Medical Association Preprint of 1976 Scientific Program 63-64, May 1976.

NADC-79227-60

A P P E N D I X A

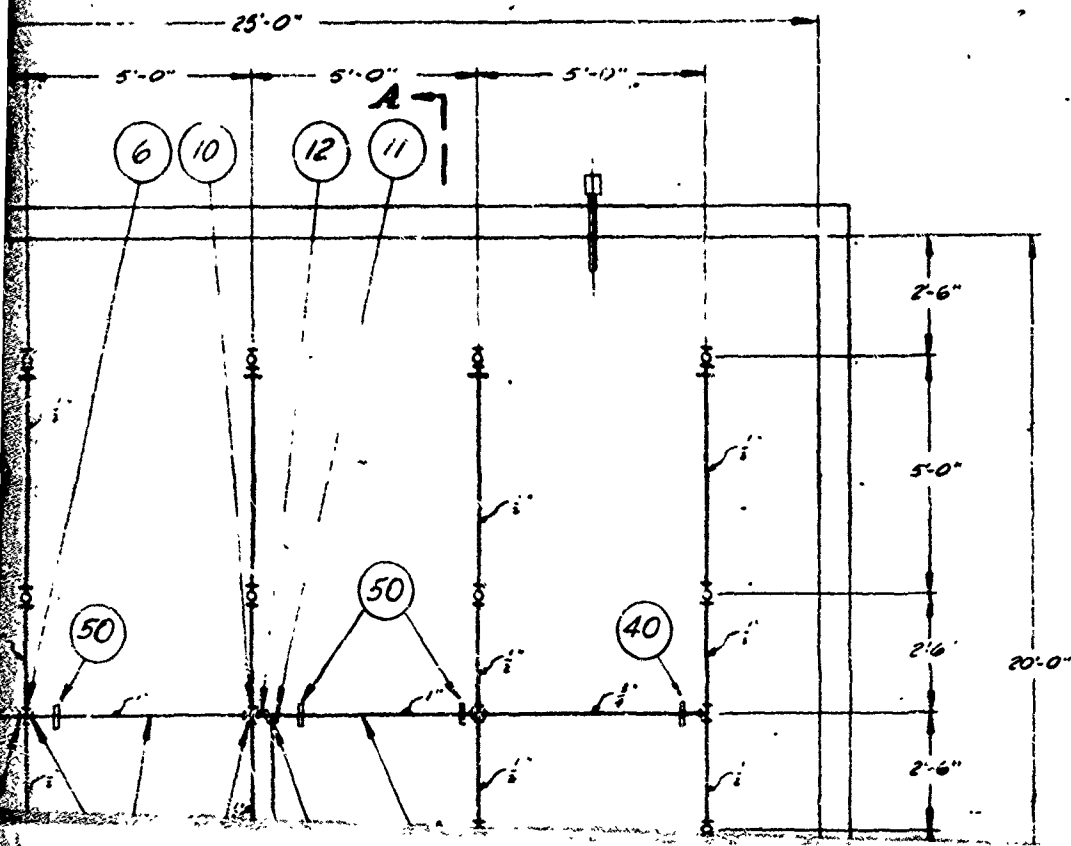
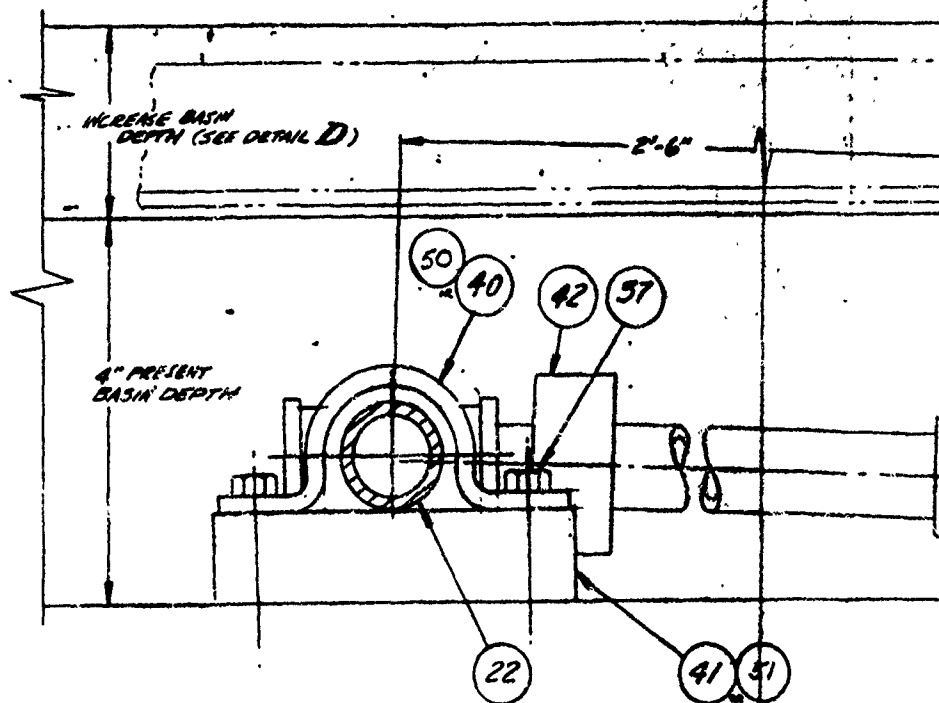
NAVFAC DRAWINGS



DETAIL E FUEL TANK

SCALE NONE
WELDED CONSTRUCTION - 100 GALLON CAP.
(2 REQ'D)

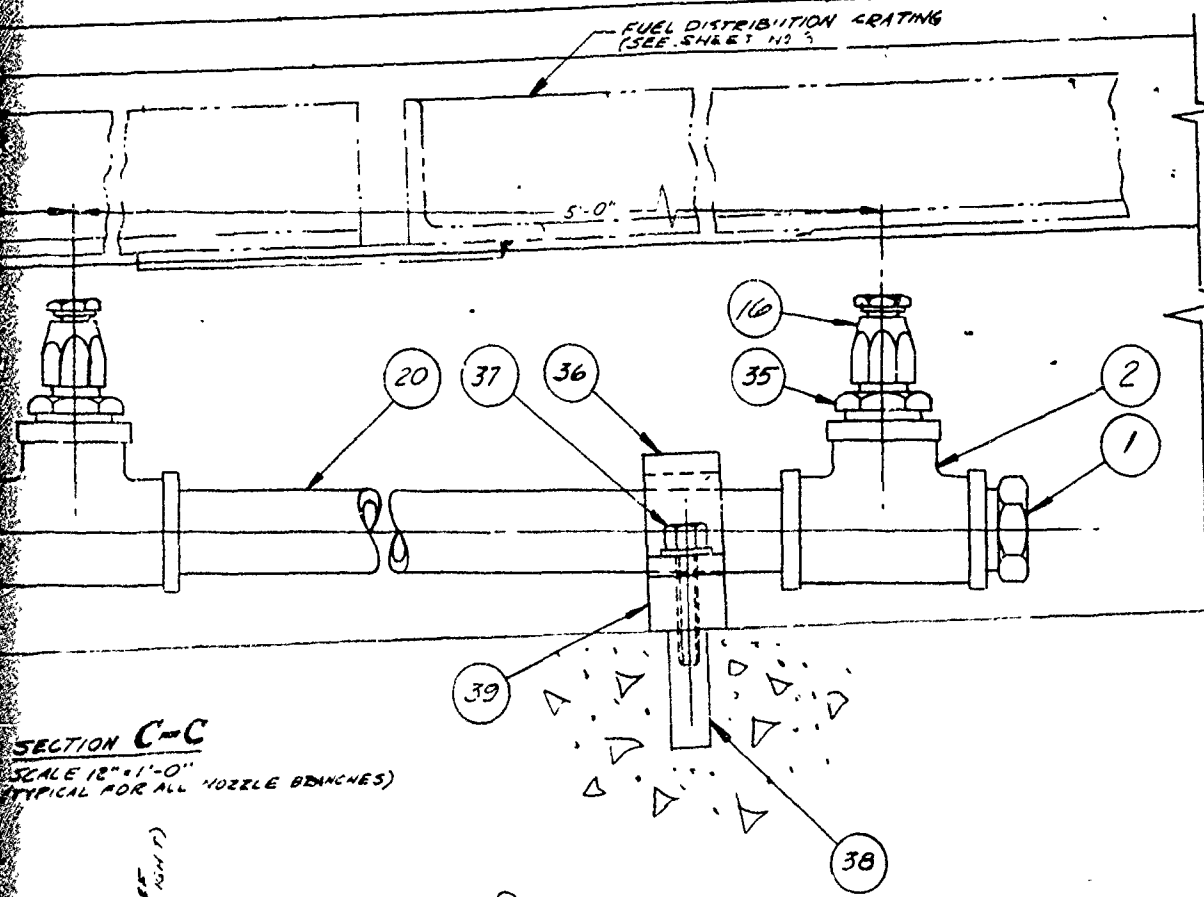
2



INCR.
OF WA
3 1/2"

SEE DET.

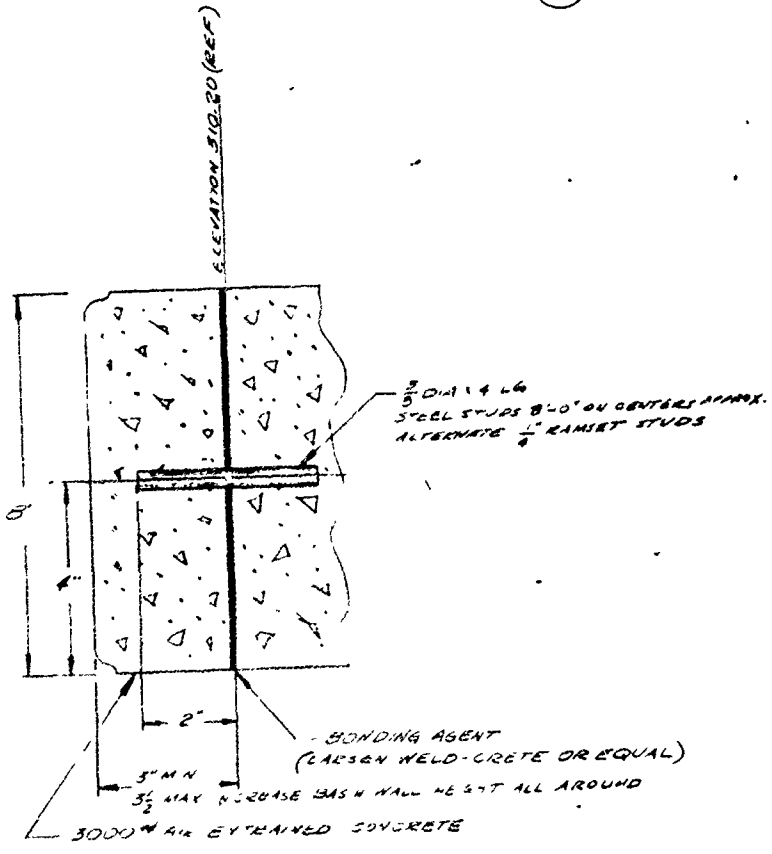
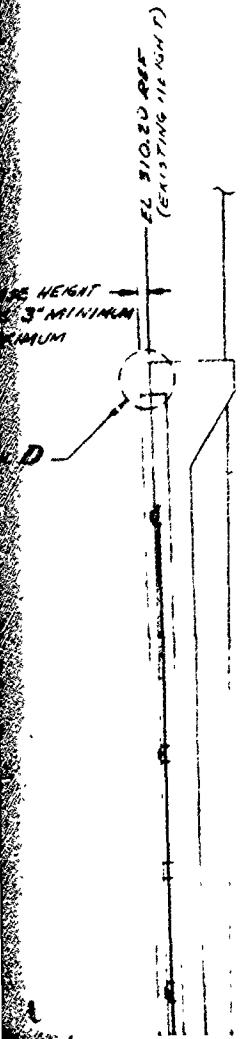
3



REV.	DATE	BY
A	6/21/71	SECTION C-C DIM. 00, C-01 MATERIAL
B	4/21/71	REVISION
C	1/11/71	REVISION
D	5/30/73	AS BUILT

ELEVATION
310.20
(REF)

SECTION C-C
SCALE 18"=1'-0"
(TYPICAL FOR ALL NOZZLE BRANCHES)

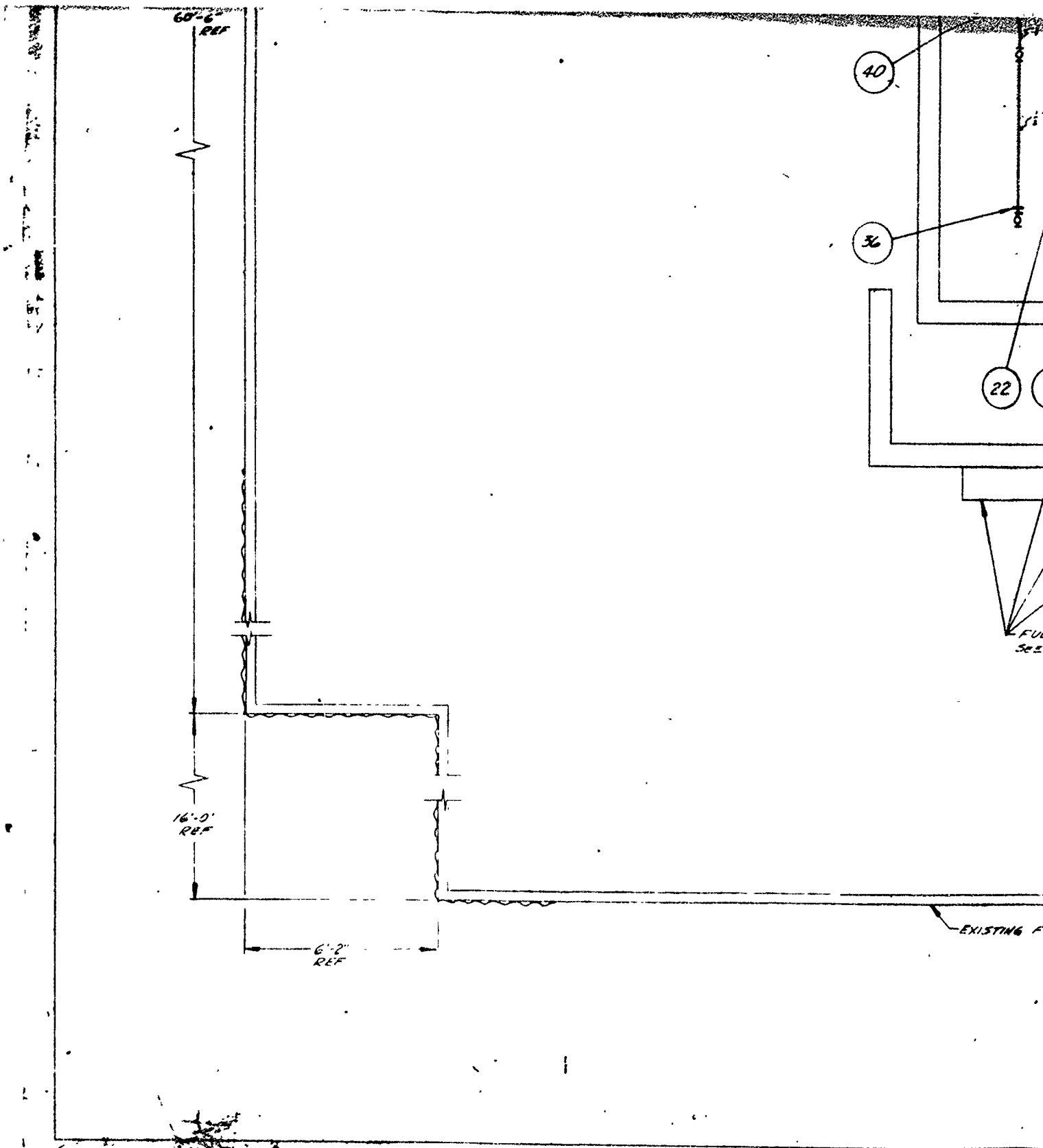


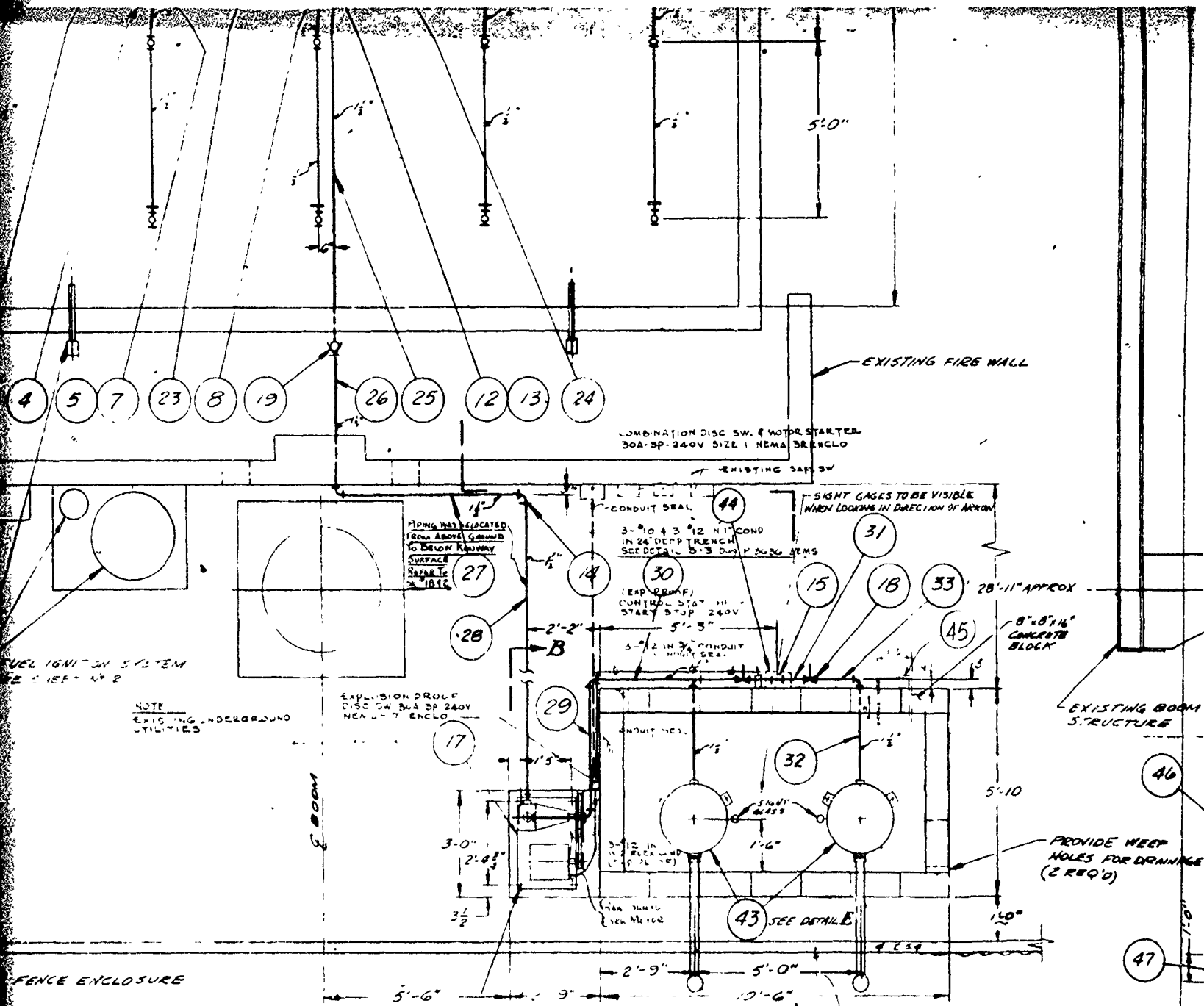
DETAIL D
SCALE 6"=1'-0"

51	3/4" x 1" x 1/4" L6 STEEL SPAC
50	1" PIPE STRAP, SHORT, WROUN
49	1/2" GA (120) STEEL GROUND
48	3"-150" ELBOW, GALV
47	FILL & VENT CAP
46	8" GALVANIZED STEEL
45	ROOT RUNGS - BEND FOR 2" GROUT IN PLACE
44	MANUAL MOTOR CONTRA A-C, 208-240V, 7.5 H.P. R TYPE TO HAZARDOU
43	100 GAL FUEL TANK - 2" GAUGE CALIBRATED IN 3 5" VENT CAP, 3/4" SPACED M. 1/4" BOTTLE AND 1/4" H. H. H. H.
42	1/2" SPLIT CLAMP CONDUIT
41	3/4" x 1" x 4" L6 STEEL SPAC
40	3/4" PIPE STRAP, SHORT, WA
39	3/8" DIA x 2" WRO K3 1/2" L6. S
38	PHILLIPS #10 CONCRE.
37	1/2" HEX HD OR SO. N
36	1/2" PIPE STRAP (SHOR
35	1/2" TO 3/4" HEX BUSHING,
34	2" TO 1 1/2" HEX. BUB
33	1 1/2" SCHED 40 PIPE
32	1 1/2" SCHED 40 PIPE
31	" " " "
30	" " " "
29	" " " "
28	" " " "
27	1 1/2" SCHED 40 PIP
26	1 1/2" SCHED 40 PIP
25	1 1/2" SCHED 40 PIPE
24	1" SCHED 40 PIPE
23	1" SCHED 40 PIPE
22	3/4" SCHED 40 PIPE

PIPE LENGTHS ARE
APPROXIMATE.
CONTRACTOR SHALL
BE RESPONSIBLE FOR
CUTTING & FITTING

[illegible]





PLAN

(4) 1/2" x 9' LG ANCHOR BOLTS SPACED TO MATCH HOLES IN PUMP & MOTOR BASE. TOP OF BOLTS TO BE APPROX 1" ABOVE TOP OF BASE. TACK WELD 2" x 1/2" THK WISHERS TO BOTTOM OF BOLTS, SUPPLY NUTS & LOCKWASHERS TO SUIT

6

EL TO SH

DETAIL D
SCALE 6"=1'-0"

PIPE LENGTHS ARE APPROXIMATE.
CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING & FITTING

SEE DIVISION 7 OF SPECIFICATIONS FOR DETAILED REQUIREMENTS

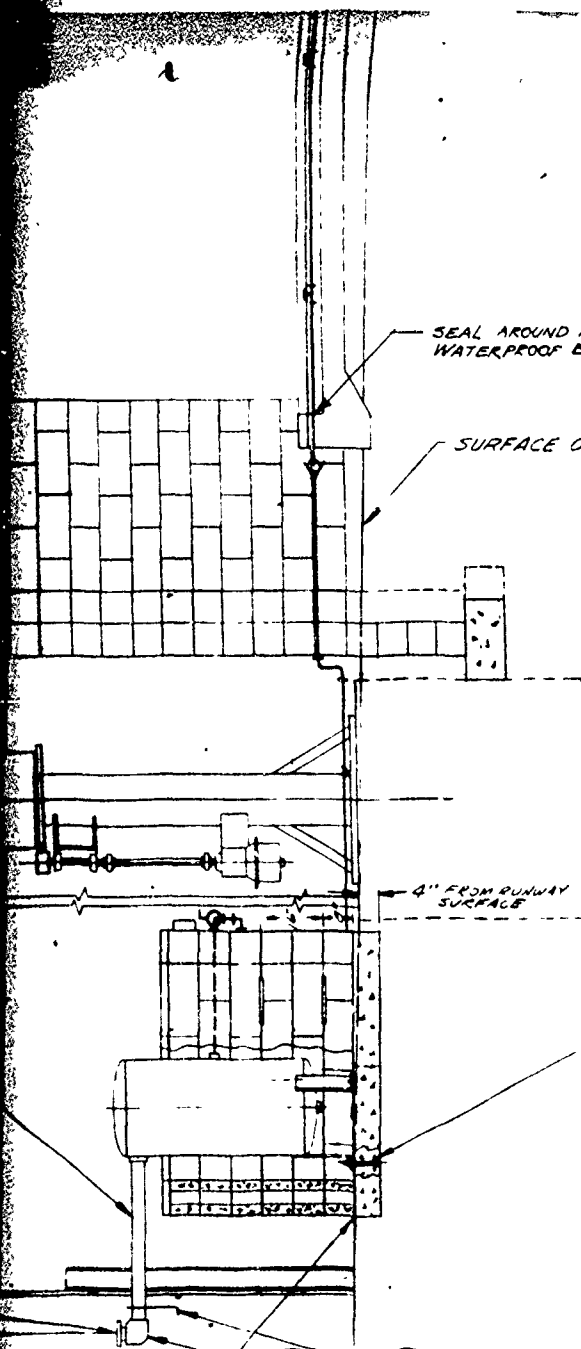
ITEM NO.	ITEM DESCRIPTION
34	1" SCHED
23	1" SCHED
22	3/4" SCHED
21	1/2" SCHED
20	1/2" SCHED
19	1 1/2" SWING
18	1 1/2" BALL
17	3/4" SCHED
16	1/2" SCHED
15	1 1/2" 150
14	1 1/2" 90
13	1 1/2" TO 1"
12	1" PIPE
11	1" 150
10	1" TO 3/4"
9	3/4" PIPE
8	1" 150
7	3/4" PIPE
6	3/4" TO 1/2"
5	1" TO 3/4"
4	3/4" 150
3	3/4" TO 1/2"
2	1/2" 150
1	1/2" HEX A

NOTES:

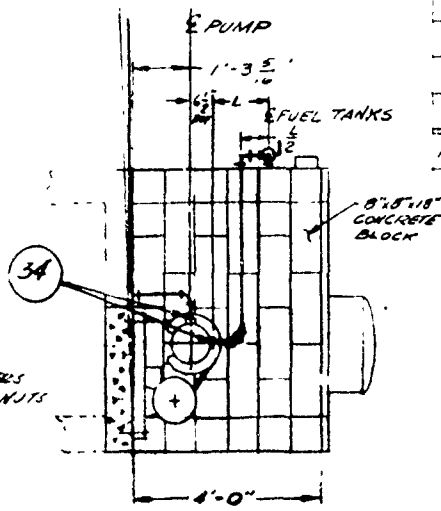
- 1-FOR DETAILS TO NAVFAC
- 2-FOR MODIFICATION
- 3-ALL PUMP ELECTRICAL PANEL ON EXTERIOR
- 4-ALL "K" KEWED

PWD DWG NO. 194

DATE DESIGNED: 1-2-64
BY: [Signature]
CHECKED: [Signature]
OFFICE: [Signature]
SATISFACTORY: [Signature]

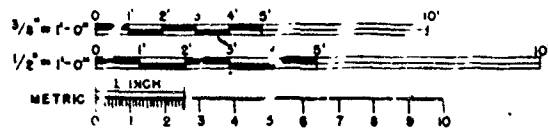


ELEVATION A-A



ELEVATION B-B

16) 5/8" x 4" x 4" NUTS BOLTS
DRIVEN TO MATCH HOLES
IN FUEL TANKS TOP OF BOLT
TO BE APPROX 1" ABOVE
TOP OF FUEL TANK WITH PADS
TACK WELD 2" x 2" x 1/4" TYP WAINERS
TO BOTTOM OF BOLT, SUPPLY NUTS
TO 3/4"



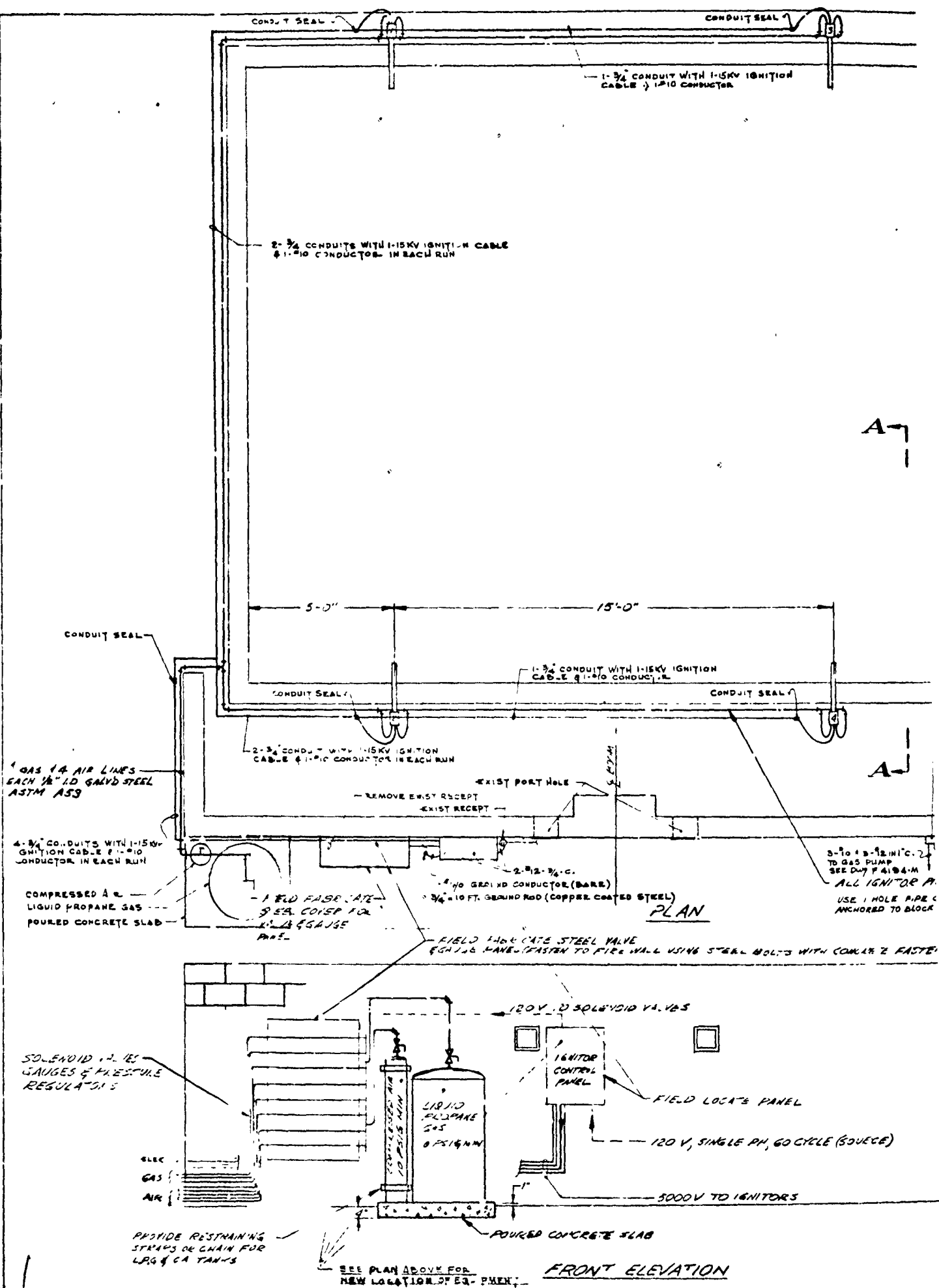
1" 40 PIPE 11'-0" LG	"	1
1" 40 PIPE 4'-9" LG	"	1
1" 40 PIPE 5'-0" LG	"	1
1" 40 PIPE 5'-0" LG	"	2
1" 40 PIPE 2'-6" LG	"	10
1" 40 PIPE 5'-0" LG	"	10
SWING CHECK VALVE		1
BALL VALVE		1
GASOLINE PUMP		1
SPRAY NOZZLE		20
150# TEE GALVANIZED		1
90° ELBOW (150#)		1
TO 1" 150# REDUCER		1
PIPE NIPPLE		2
150# TEE		1
1/2" HEX BUSHING		2
PIPE NIPPLE		2
150# CROSS		2
PIPE NIPPLE		1
1/2" HEX BUSHING		4
1/2" REDUCER		2
150# CROSS		2
1/2" 150# REDUCER		2
150# TEE		22
HEX HD PIPE PLUG		10
DESCRIPTION		MAJOR

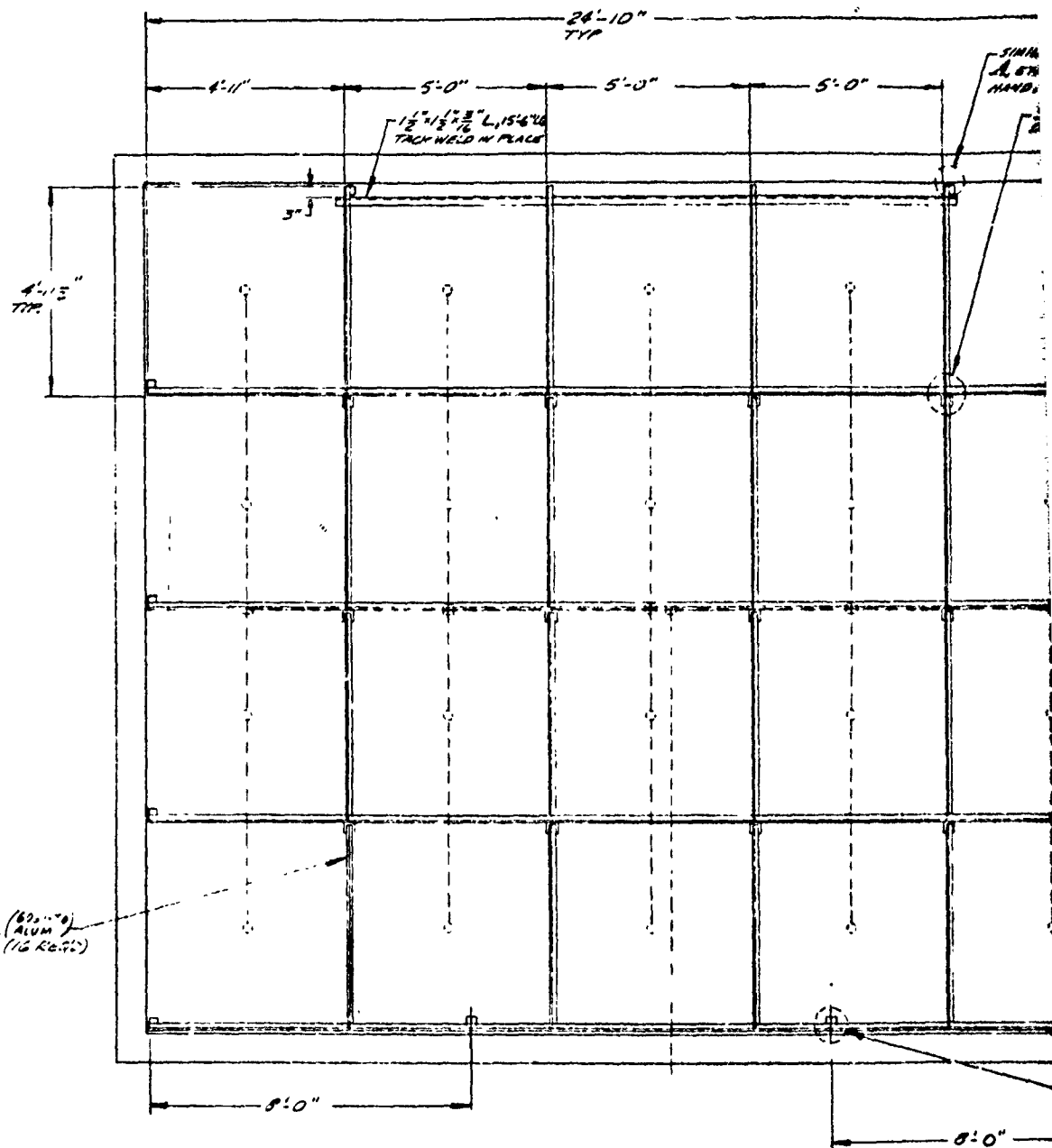
TAILS OF EXISTING FACILITY REFER
 FAC DWG NO. 1308710
 MODIFICATIONS THE FOLLOWING DWGS:
 PUMPING SYSTEM - SHEET NO. 1
 IGNITION SYSTEM - SHEET NO. 2
 DISTRIBUTION GRATING - SHEET NO. 3
 ELEC. WIRING BY CONTRACTOR TO POWER
 EXISTING FIRE WALL (SEE NAWFAC DWG. NO. 1308710)
 WELDED JOINTS TO BE MADE WITH TIG.

94-M	DEPARTMENT OF THE NAVY	NAVAL FAC	NAVY AIR DEVELOPMENT CENTER
	NAVAL AIR DEVELOPMENT CENTER		
	INSTALL FUEL DISTRIBUTION AND IGNITION SYSTEM		
	FUEL FIRE TEST FACILITY		
	AIR FIELD		
	80091	NAVFAC DESIG NO	2-46
	PREP	DESIGN	8-1-46
	AS NOTED	472	3

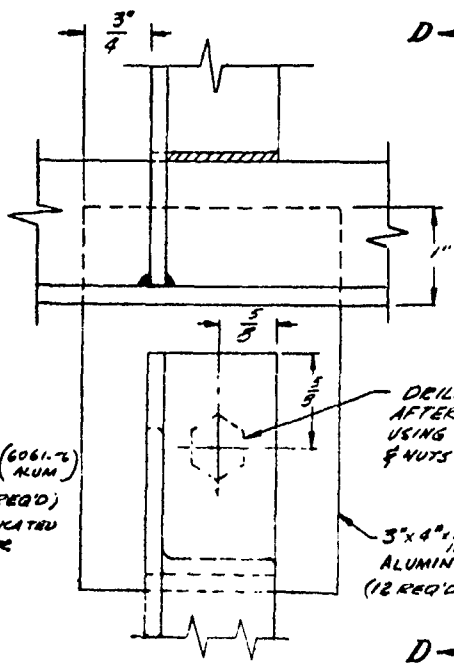
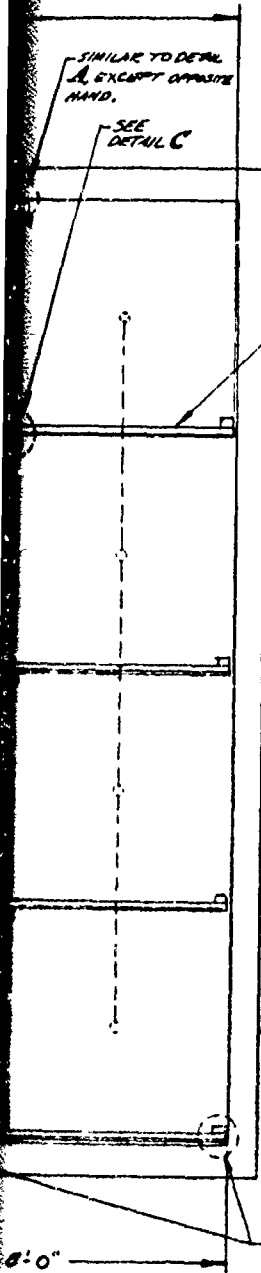
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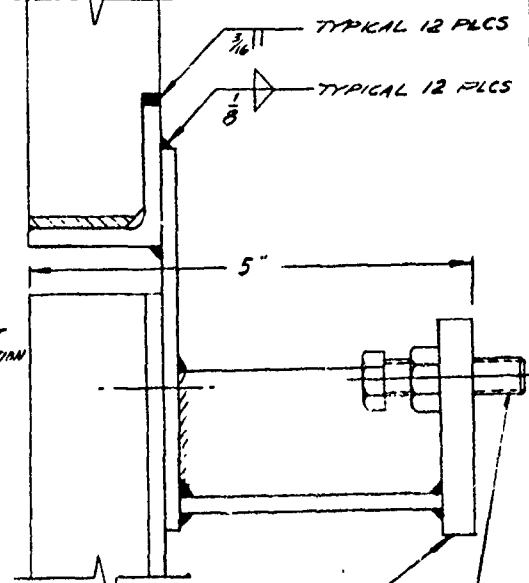




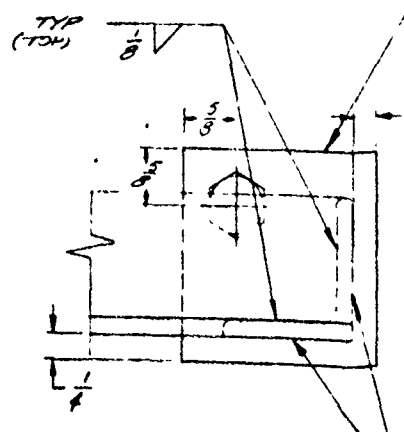
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B	4/15/71	AS BUILT		



DETAIL C
SCALE 12"=1'-0"
12 REQUIRED

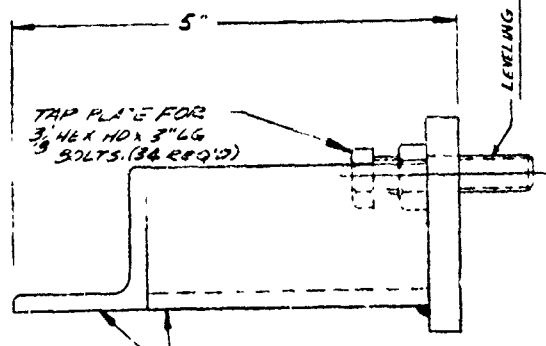


VIEW D-D
TYP 12 PLACES



DETAIL A
SCALE 12"=1'-0"
12 REQUIRED

2 1/2" x 2 1/2" x 3/8" PLK (6061-T6 ALUM)
(34 REQ'D)



VIEW B-B
SCALE 12"=1'-0"

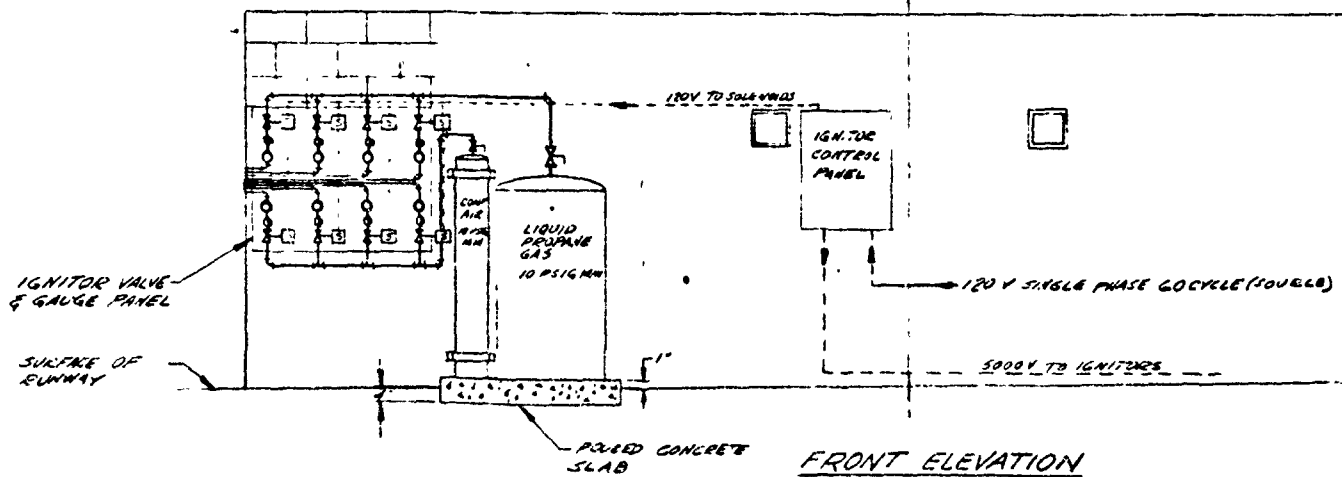
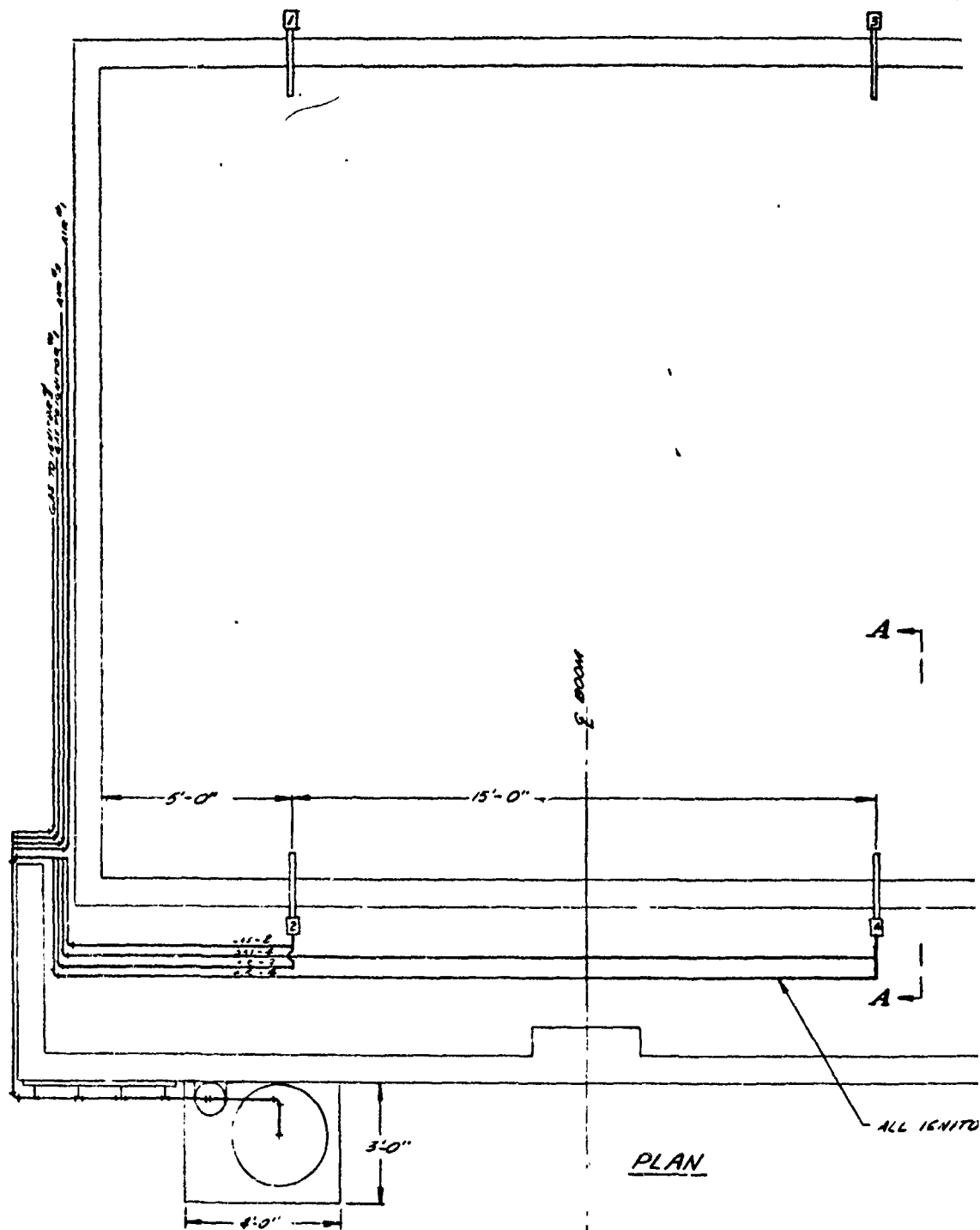
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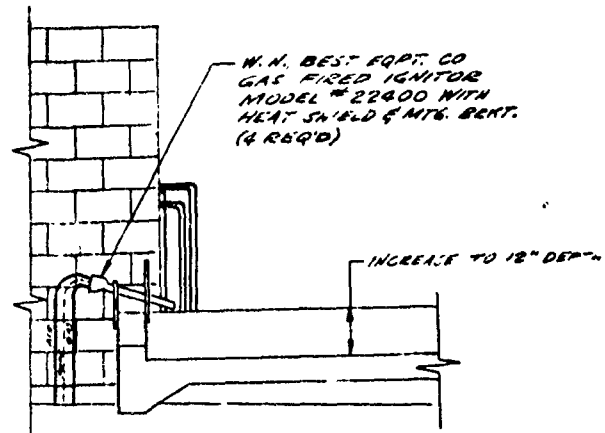
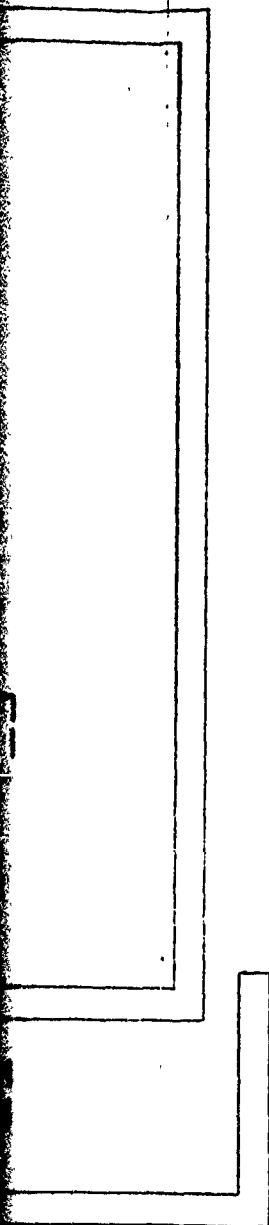
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CREATOR J.C.H. ARCH		NAVAL AIR DEVELOPMENT CENTER			
CHECKER		WILMINGTON, PA 19374			
SWITCH		INSTALL FUEL DISTRIBUTION AND IGNITION SYSTEM			
DATE 4/24/71		FUEL FIRE TEST FACILITY			
BY J.C.H.		AIRFIELD			
DATE 4/24/71		SIZE F		CODE IDENT NO. 80091	
DATE 4/24/71		PWP NO.		NAVFAC DRAWING NO. 2002348	
DATE 4/24/71		SCALE AS NOTED		CONSTR. CONTR. NO. 2472-72 B-4703	
DATE 4/24/71		SHEET 3 OF 3		SHEET 3 OF 3	

A-4 2

NADC-79227-60

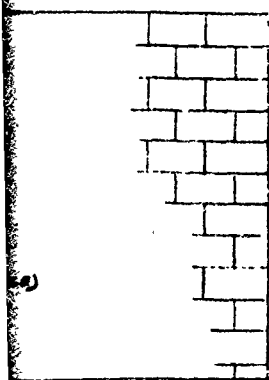
A P P E N D I X B
ENGINEERING RESOURCES INC. DRAWINGS





IGNITOR PIPING TO BE $\frac{1}{2}$ " STD GALVANIZED STEEL

ELEVATION A-A

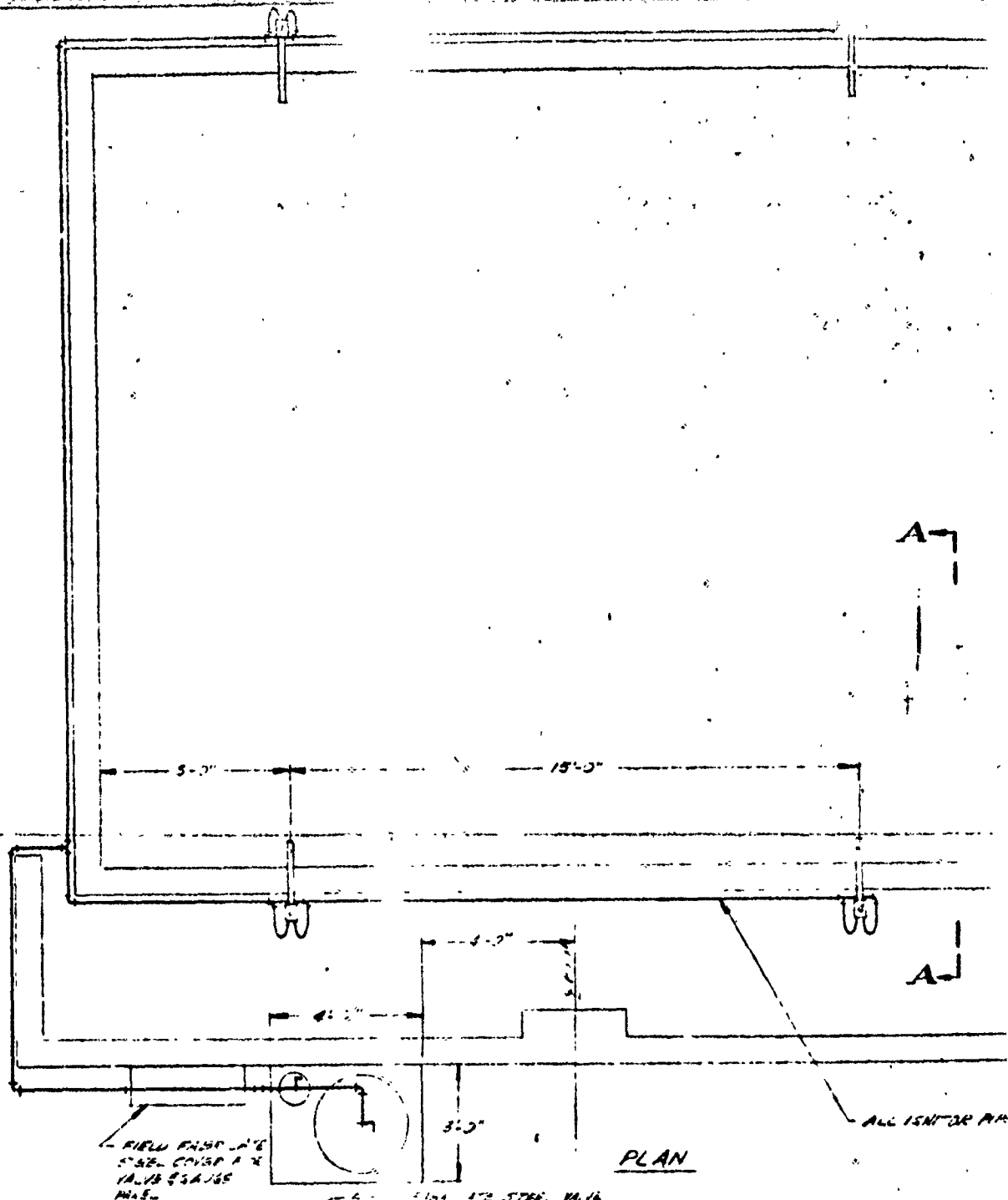


**PRELIMINARY
UNCHECKED**

JUN 16 1971

ENGINEERING RESOURCES INC.			
MUNICIPAL AIRPORT		MORRISTOWN, N.J. 07960	
TITLE: FUEL IGNITION SYSTEM FIRE TEST FACILITY (AMRD)			
DATE 5/14/71	BY JHE	DRAWING NO. D-00041	RI
SCALE $\frac{1}{2}$ " = 1'-0"		SHEET OF	

22 2

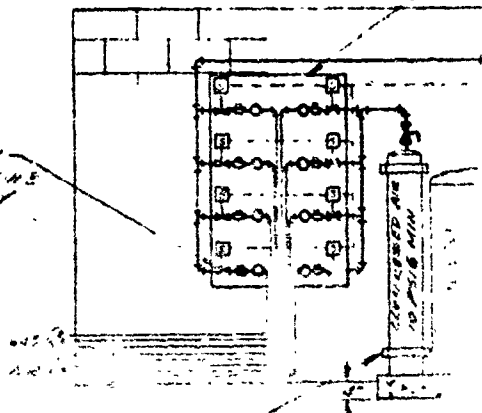


PLAN

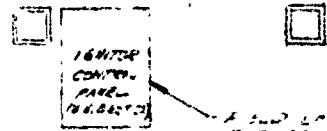
FIELD PUMP JET
5" DIA. COVER & 4
VALVE GAUGES
W.A.S.

FIELD 170 STEEL WALL
HANGERS 170 STEEL WALL HANGING STEEL BOLTS WITH CONCRETE FILLING

SOLENOID VALVE
GAUGES & PRESSURE
REGULATOR
W.A.S. 170



120V 170 SOLENOID VALVE



2 1/2" DIA. 2 1/2" DIA.
BETWEEN PUMP & VALVE

120 V, SINGLE PH, 60 CYCLES (50/60 Hz)

120V 170 SOLENOID VALVE

CONCRETE SEAL

REV	DATE	REVISIONS	BY	APPD.
A	6/2/71	L.P.G., COMPRESSED AIRTANKS & ASSOCIATED PIPING & GAUGE PANEL RELOCATED.	MM	MM
B	6/1/71	RELEASE FOR FABRICATION	JSC	MM

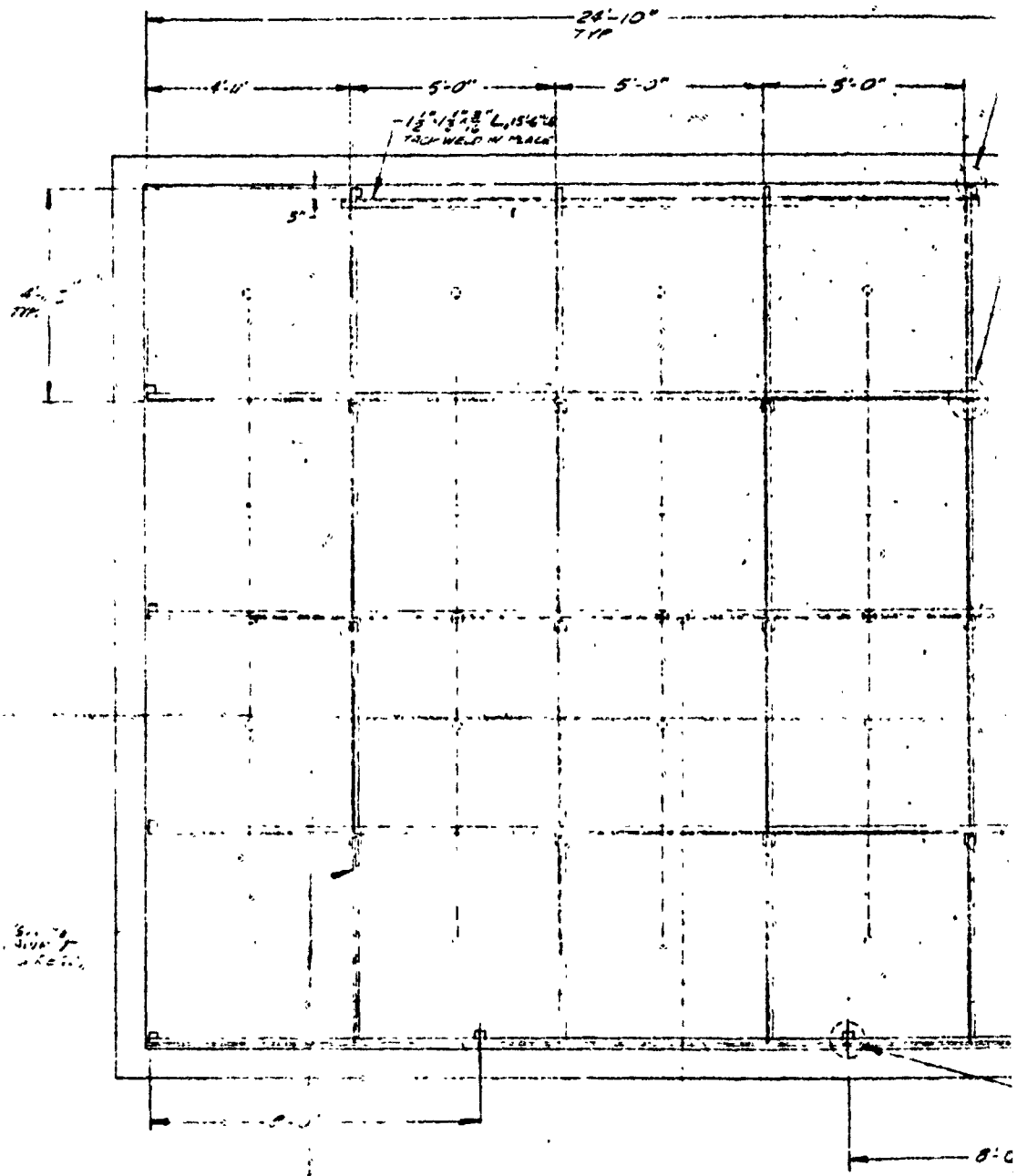
ATLANTIC COMPRESSOR
METAL FLEXIBLE HOSE (1/2")
WITH 1/2" HEAT PROOF
WALL COMPRESSOR & 1/2"
ENDS. (MANSON & POORE CO.
ROSELAND, N.J.)

14" H. BEST 400" LG
GAS FIRED IGNITOR
MODEL # 22400 WITH
HEAT SHIELD & 1/2" SRT
(S. R. CO.)

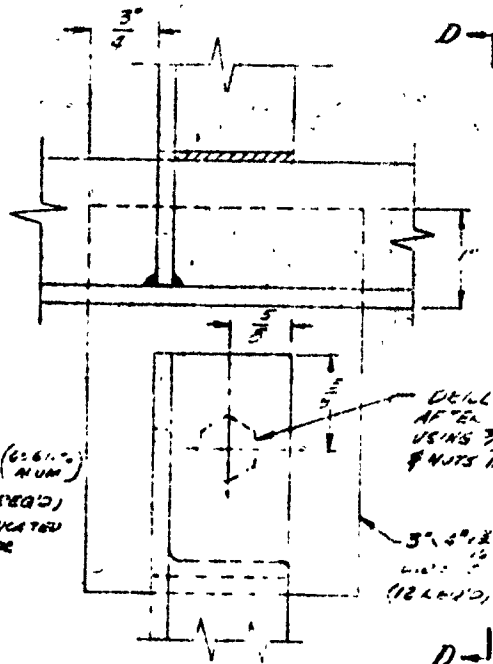
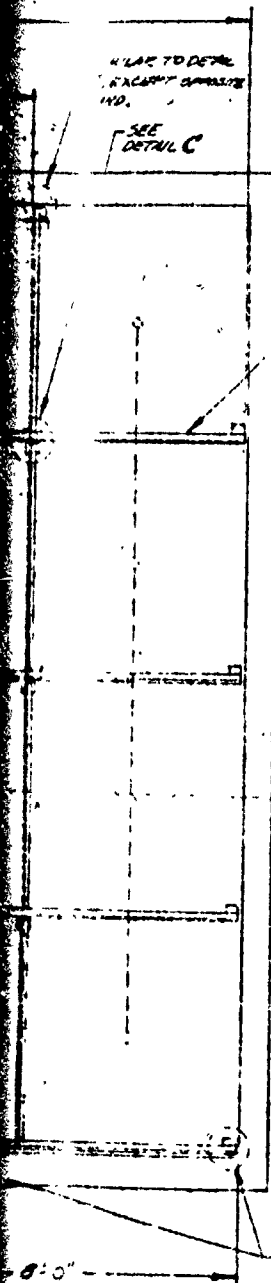
ELEVATION A-A

ENGINEERING RESOURCE
MUNICIPAL AIRPORT MORRISTOWN

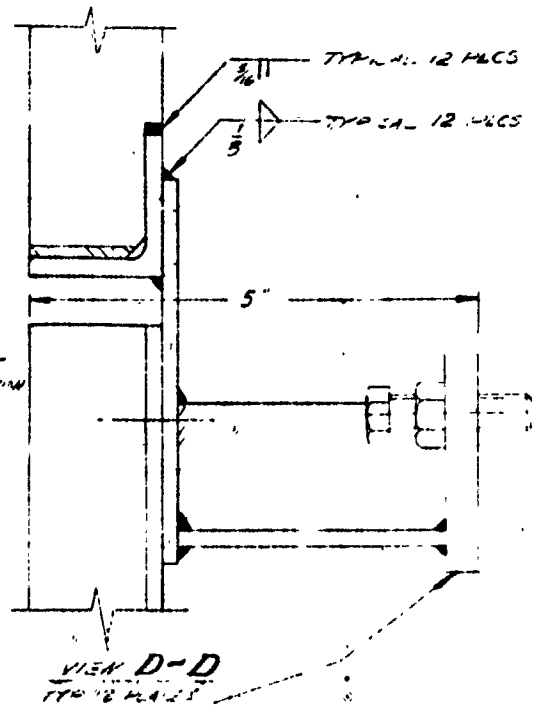
FUEL IGNITION SYSTEM
RELOCATED



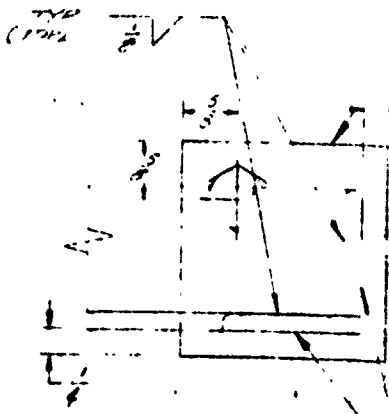
REV	LET	DATE	REVISIONS	BY	APP.
A		6/13/71	RELEASE FOR FABRICATION		



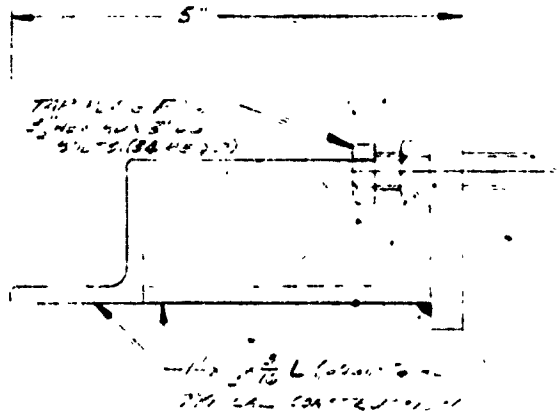
DETAIL C
SCALE 12"=1'-0"



VIEW D-D
SCALE 12"=1'-0"



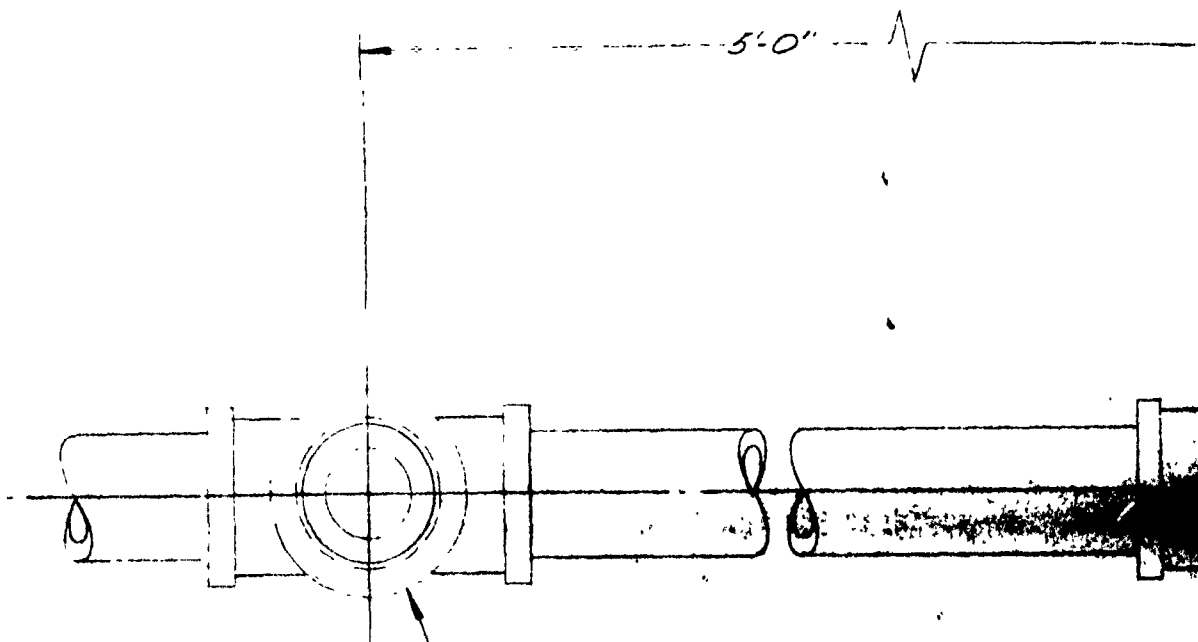
DETAIL A
SCALE 12"=1'-0"



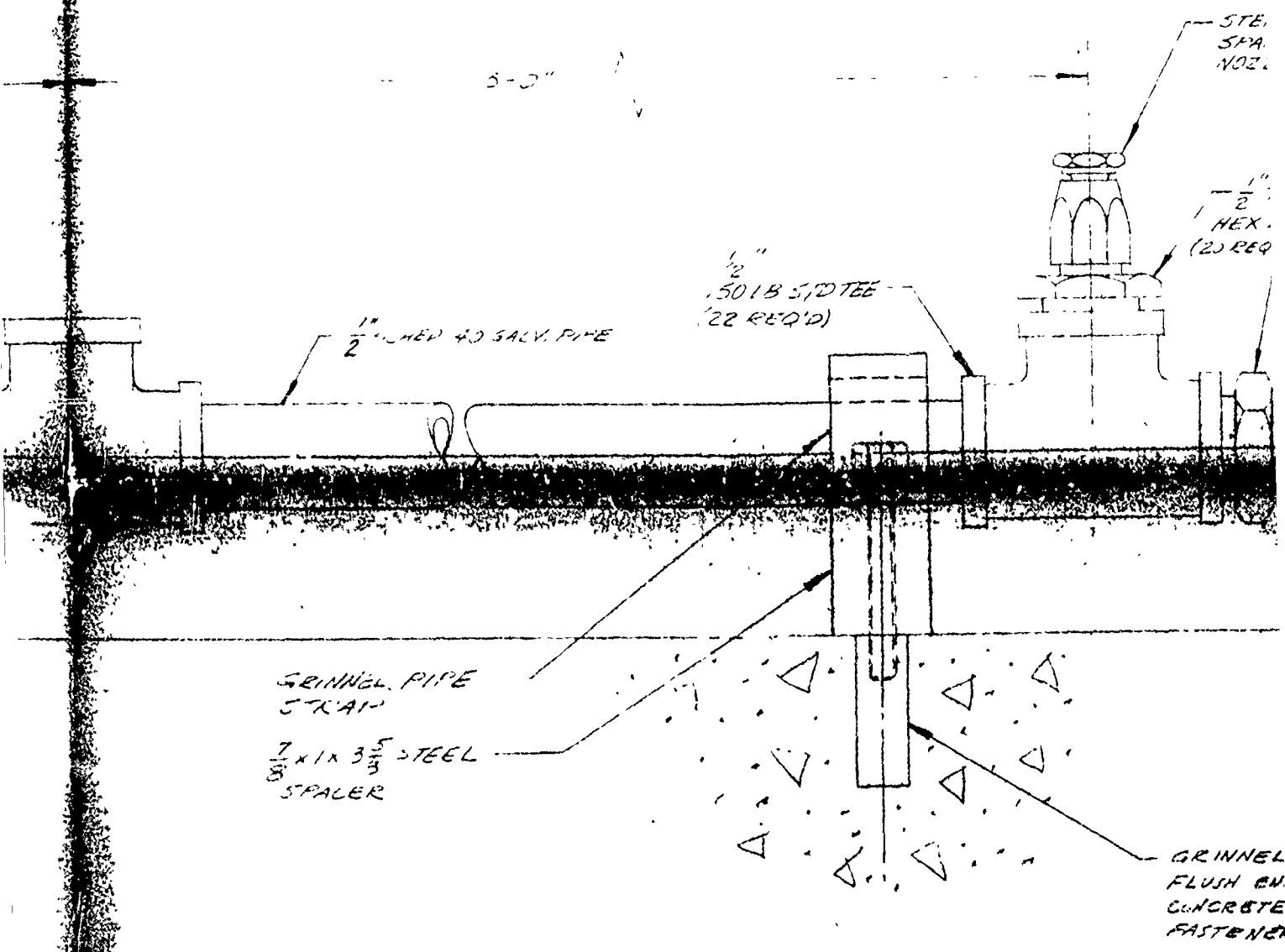
VIEW B-B
SCALE 12"=1'-0"

ENGINEERING RESOURCES INC.	
MUNICIPAL AIRPORT	MORRISTOWN, N.J. 07960
TITLE: FUEL DISTRIBUTION GP. FIRE TEST FACILITY	
DRAWING NO. D-0004	2

B-4.



$\frac{3}{4}$ " TO $\frac{1}{2}$ " REDUCER
(2 REQ'D)



**PRELIMINARY
UNCHECKED**

JUN 16 1971

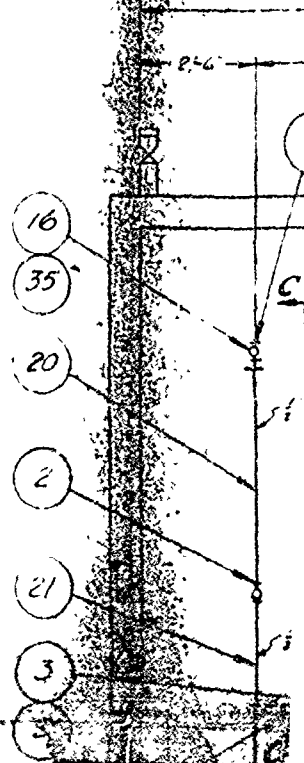
ENGINEERING RESOURCE
MUNICIPAL AIRPORT - NORFOLK, VA

PIPING & STRUCTURE DEPT.
1000 15TH ST. N. #100
NORFOLK, VA 23502

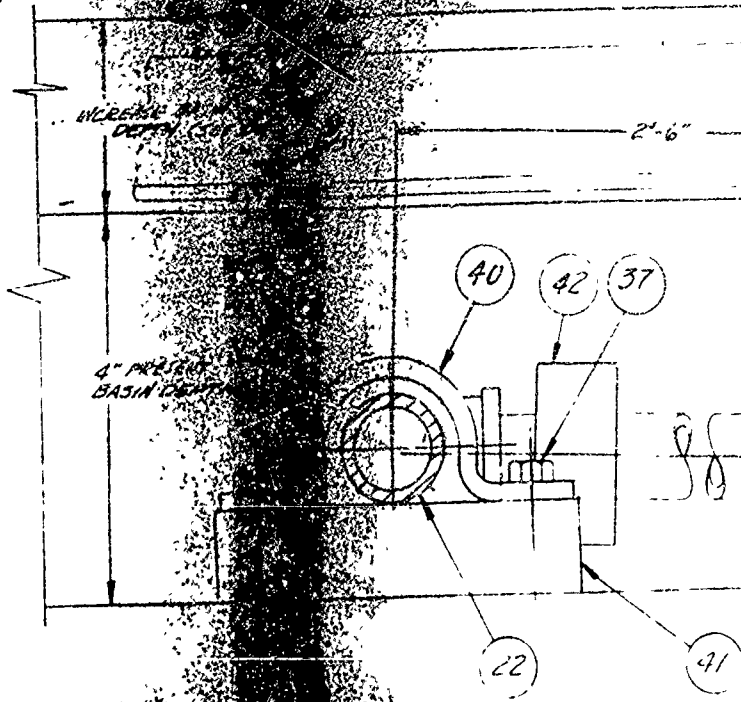
STEINEN P302
FAN JET
NOZZLE (20R90)

1" 1"
2 TO 4
EX BUSHING
2590) 1" HEX
PIPE PLUG
(10R500)

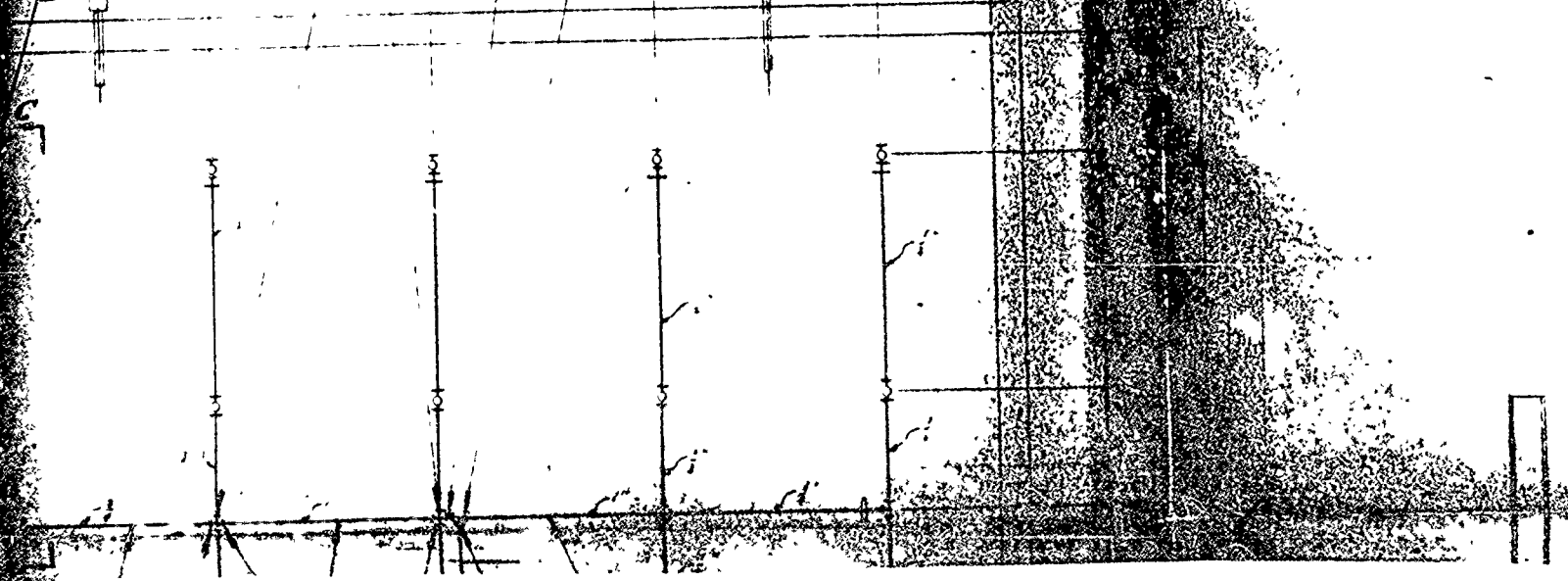
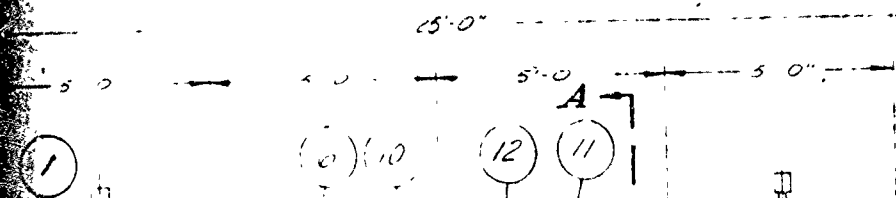
NEL
END
ETE
VER



DETAIL E FUEL TANK
SEAL: NONE
WELDED CONSTRUCTION - 1/4" WALL THK CAP.
(P. REDD)



USUALLY
(P)



FUEL DISTRIBUTION GRATING
(SEE ENGINEERING RESOURCES DWG D-00044)

ELEVATION
310.20
(REF)

SECTION C-C
SCALE 12"=1'-0"
(TYPICAL FOR ALL VERTICAL BRANCHES)

INCREASE HEIGHT
OF H46 3" MINIMUM
3 1/2" MAXIMUM

SEE DETAIL D

ELEVATION 310.20 (REF)

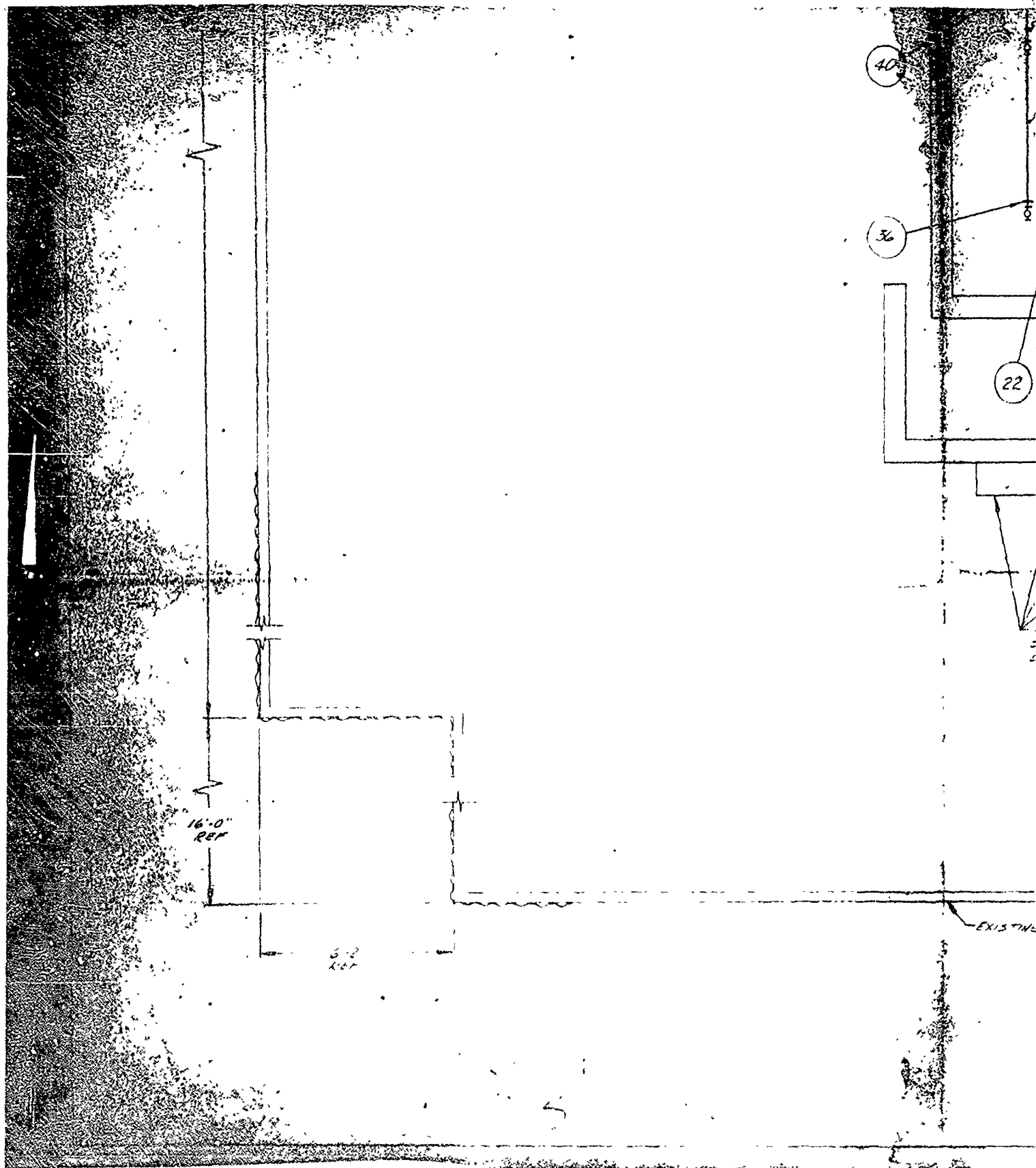
2" DIA X 4' L6
STEEL STUDS 8'-5" ON C NTERS APPROX
ALTERNATE 1/2" RIMSET STUDS

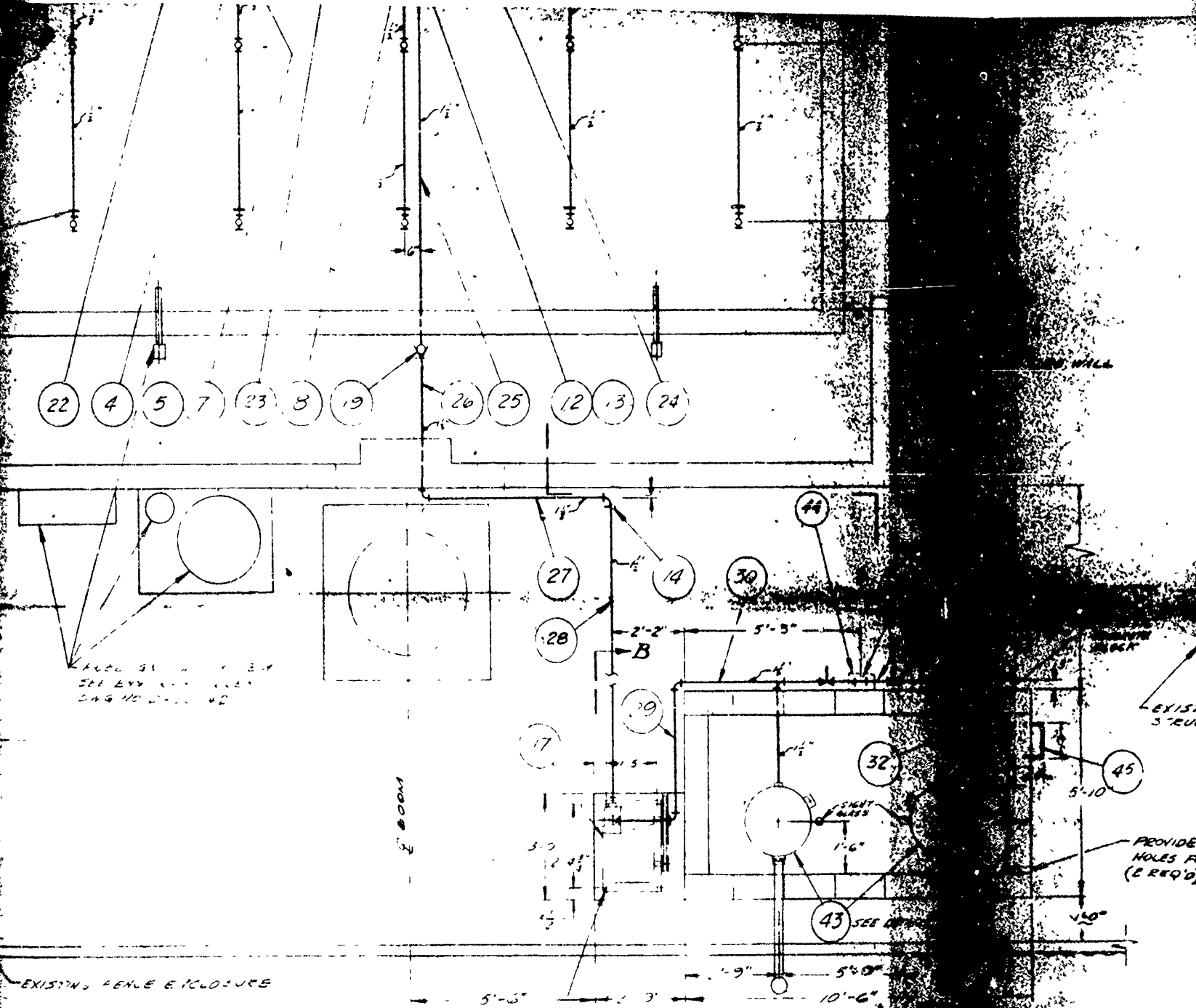
BONDING AGENT
(LARGE WELD-CRETE UN EQUAL)

3" MAX. INCREASE BARS TO HEAT ALL AROUND

3000 PSI AIR ENTRAINED

49	11
48	3
47	F
46	3"
45	20
44	AC TY (HE
43	00 GUL 1/2"
42	2"
41	2"
40	3"
39	10"
38	1
37	
36	
35	
34	
33	1/2
32	1
31	
30	
29	
28	
27	1/2
26	1/2
25	1/2





PLAN

(4) 2" x 9" LG ANCHOR BOLTS SPACED TO MARK HOLES IN PUMP & MOTOR BASE. 2" x 9" LG BOLTS TO BE APPROX 1" ABOVE TOP OF BASE, TACK WELD 2" x 2" x 1/4" WISHERS TO BOTTOM OF BOLTS, SUPPLY NUTS & LOCK WASHERS

DETAIL D
SCALE 6"=1'

APPROXIMATE.
CONTRACTOR SHALL
BE RESPONSIBLE FOR
CUTTING & FITTING

24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
ITEM

SURFACE OF RUNWAY

4" FROM RUNWAY
SURFACE

EXISTING BOOM
STRUCTURE

WIDE WECP
FOR DRAINAGE
(SEE 9'D)

EDGE OF 12" IS
TO BE LEVEL WITH
SURFACE OF RUNWAY

1) 3" x 6" x 6" ANCHOR
BOLTS TO BE WELDED
IN FUEL TANKS
TO BE APPROX 1"
TOP OF FUEL TANK
TACK WELD 2" x 2"
TO BOTTOM OF B
TO SUIT

FUEL TANKS

8" x 8" x 18"
GLASS BLOCK

ELEVATION B-B

ELEVATION A-A

7

24	1" SCHED 40 PIPE 5'-0" LG
23	1" SCHED 40 PIPE 5'-0" LG
22	3/4" SCHED 40 PIPE 5'-0" LG
21	3/4" SCHED 40 PIPE 2'-6" LG
20	3/4" SCHED 40 PIPE 5'-0" LG
19	1 1/2" SWING CHECK VALVE
18	JAMESBURY TYPE A-22 (1 1/2" PORTS)
17	BLACKHILL 24-V PUMP (1 1/2" PORTS)
16	180° SPRAY NOZZLE-STEVEN JANNET
15	1 1/2" 150° TEE
14	1 1/2" 90° ELBOW (150°)
13	1 1/2" TO 1" 150° REDUCER
12	1" PIPE NIPPLE
11	1" 150° TEE
10	1" TO 1/2" HEX BUSHING
9	1/2" PIPE NIPPLE
8	1" 150° CROSS
7	1/2" PIPE NIPPLE
6	1" TO 1/2" HEX BUSHING
5	1" TO 1/2" REDUCER
4	1/2" 150° CROSS
1	1" HEX HD FIRE PLUG

ITEM NO DESCRIPTION

NOTES

- FOR LAYOUT OF PUMP AND NO. 1 LITTY REAR TO NAVFAC LUG NO. 378710
- FOR MODIFICATIONS THE FOLLOWING ENGINE RESOURCES AND DRAWINGS APPLY:
- FUEL PUMPING SYSTEM J-00041
- FUEL IGNITION SYSTEM D-00042
- EL DISTR TO 10Y GRATING D-00043
- ALL PUMP ELEC WIRING BY CONTRACTOR TO PUMP AND ON EXISTING FIRE MAIN (SEE NAVFAC DOW 13)

ENGINEERING RECORD

GENERAL REPORT

TITLE

FUEL PUMPING
FIRE TEST

FITTING 848F—
BRASS-IMPERIAL
OR EQUIVALENT

$\frac{9}{16}$ -18 THD.

$\frac{1}{4}$

$\frac{1}{8}$

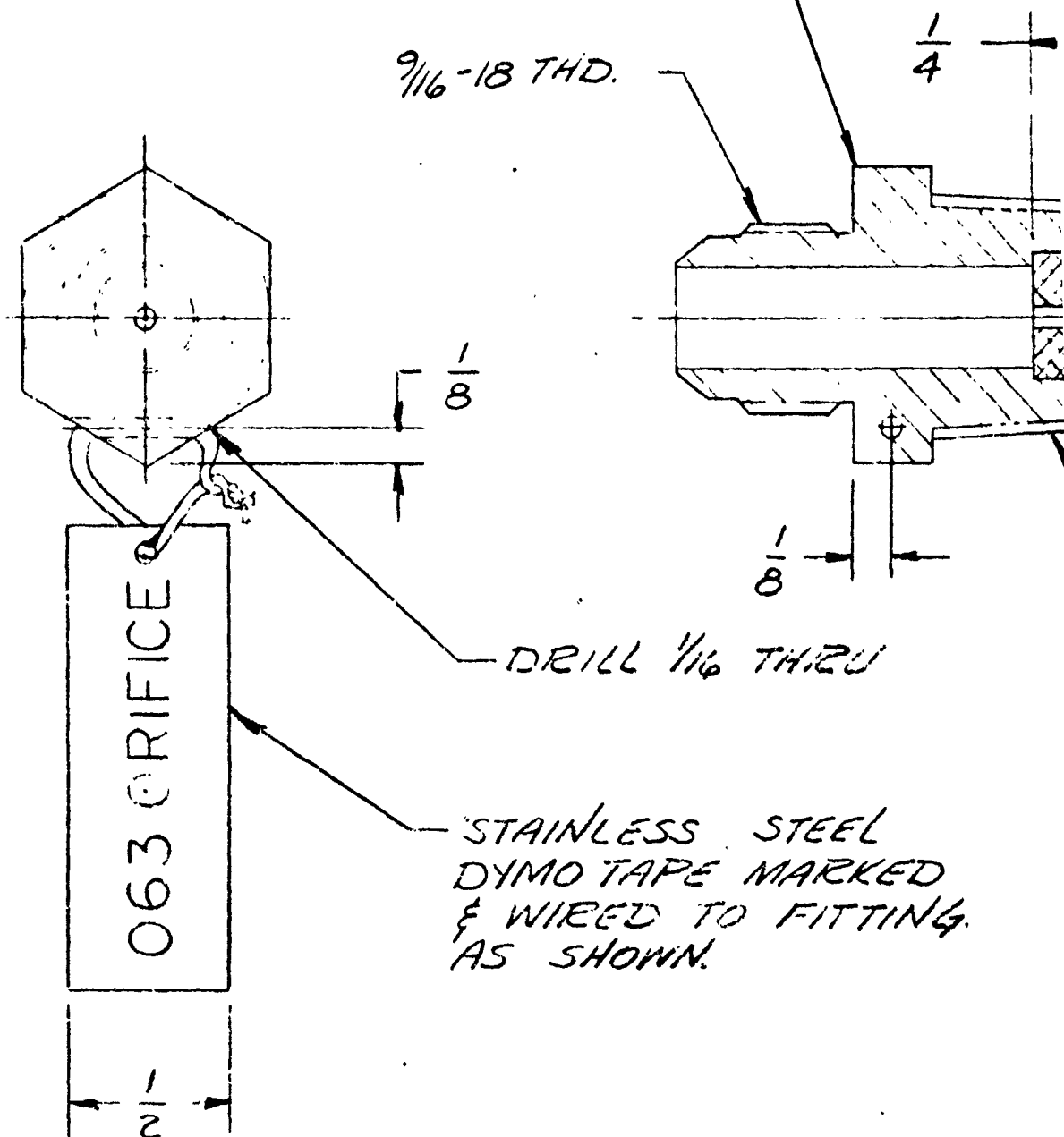
$\frac{1}{8}$

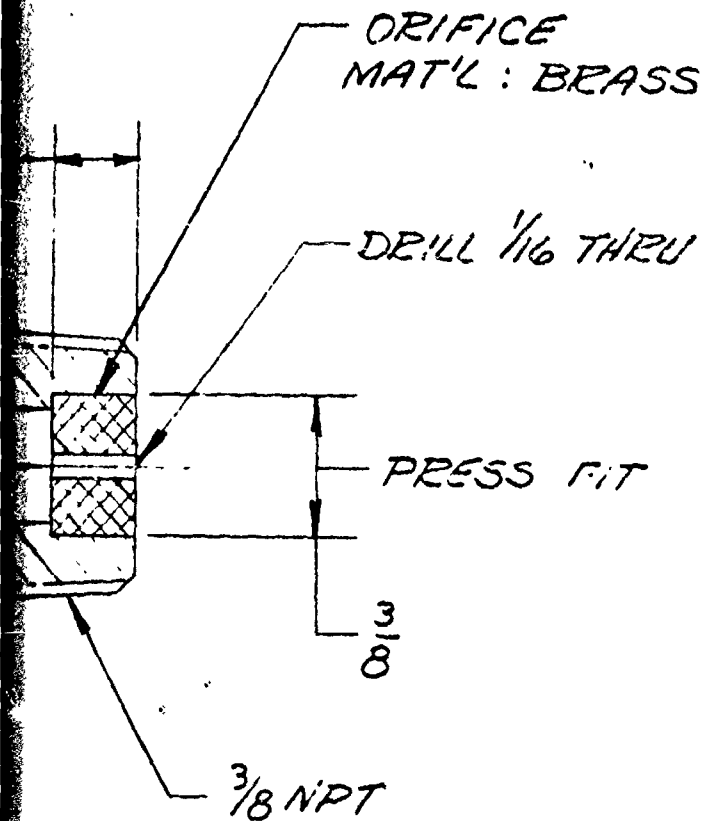
DRILL $\frac{1}{16}$ THRU

STAINLESS STEEL
DYMO TAPE MARKED
& WIRED TO FITTING
AS SHOWN.

063 ORIFICE

$\frac{1}{2}$





FLUIDICS, INC.
7319 RISING SUN AVE.
PHILA., PA. 19111
RA 5 - 0900

6/26/72 802

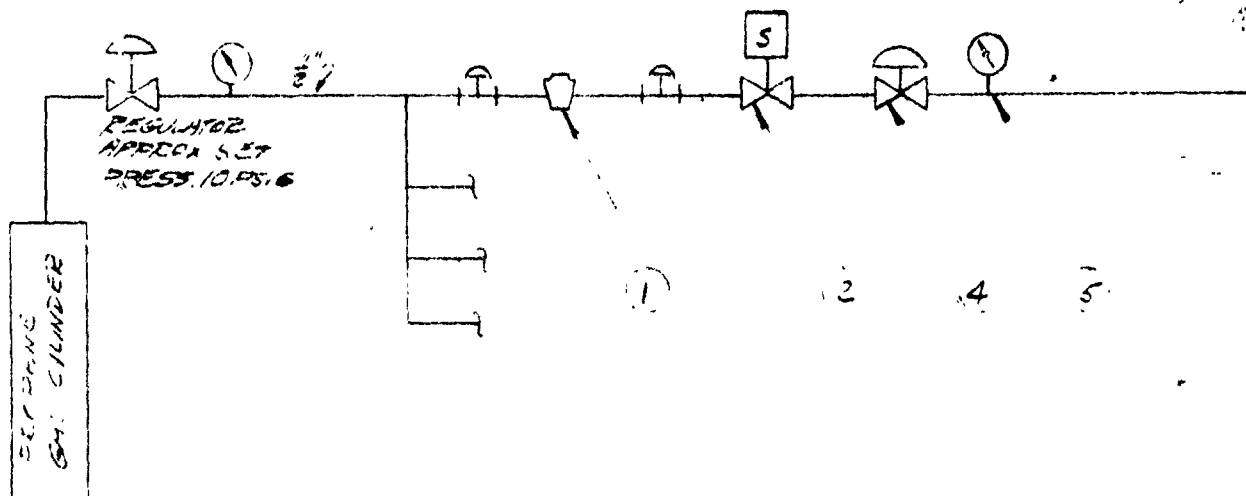
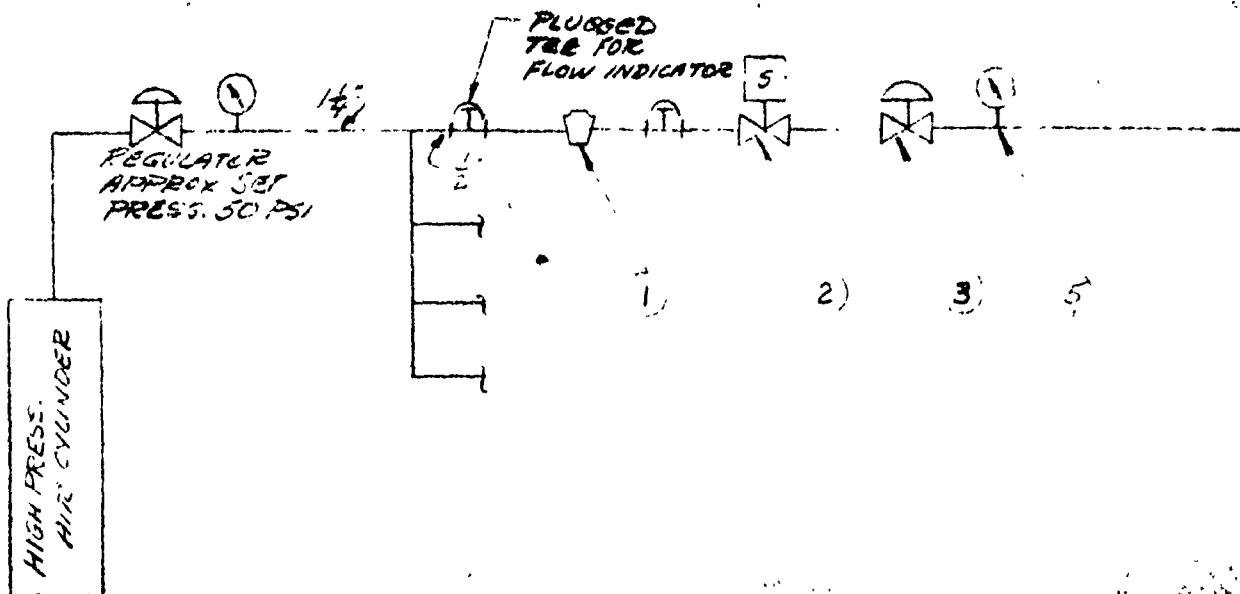
FLUIDICS SO 7859
(REF.) STEUART PETROL. SO 7570

W. N. BEST COMBUSTION
EQUIPMENT CO., INC.
LITTLE PERRY, NEW JERSEY

ORIFICE ASS'Y.
IGNITER GAS LINE

Drawn KERNEY	Date 12-23-71	Scale 2X	DRAWING NO. 11273
-----------------	------------------	-------------	----------------------

C-2



ITEM	QTY	NAME & DESCRIPTION
1	8	IRON PLUG COCK - $\frac{1}{2}$ "
2	8	AIR & GAS SOLENOID ASSC 8211C94 - $\frac{1}{2}$ "
3	4	AIR PRESSURE REGULATOR - FISHER
-	-	952-1' IRON BODY - 6" SPRING
4	4	GAS PRESSURE REGULATOR - F. 1002
-	-	922- $\frac{1}{2}$ " - 19' TO 1 $\frac{1}{2}$ " PSI SPRING
5	8	2" PRESSURE GAUGE - AIR - 0 TO 100 PSI
-	-	FIG 82 1/2 LM - 1/2" - 0 TO 100 PSI
6	4	GAS DETECTOR - # 11273
7	4	W. N. BEST THERMISTOR # 33400
-	-	DIMENSION - 17"
8	4	HEAT SHIELD & MFG HSEY #

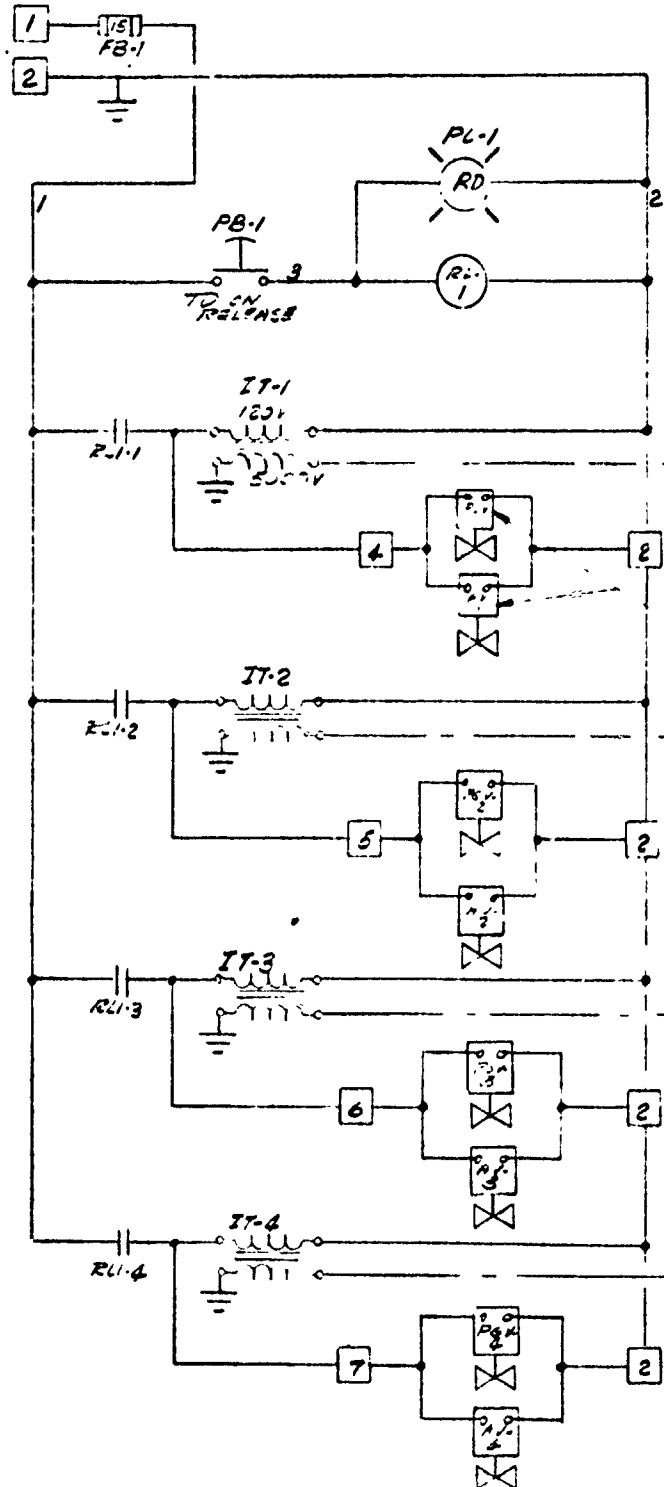
NOTES:

1. ONLY THOSE ITEMS SHOWN IN BOM SUPPLIED BY W. N. BEST.
2. ALL EQPT. SHOWN IS FOR MFG & ASSEMBLY OF OTHERS.

Best Phone No. 1-201-641-5234

			
W. N. BEST COMBUSTION EQUIPMENT CO., INC. LITTLE FERRY, NEW JERSEY			
Drawn		Date	
Scale		DRAUGHTSMAN	
		2	
		83524	

POWER SUPPLY
120 V 60 ~



5000 V IGNITION WIRE
TO IGNITORS BY OTHERS.

AIR & GAS SOLENOID
VALVES.

RANGE SIDE

PB-1

CONTROL BOX F

日	時	場所	内容
1	10	10	10
2	10	10	10
3	10	10	10
4	10	10	10
5	10	10	10
6	10	10	10
7	10	10	10
8	10	10	10
9	10	10	10
10	10	10	10
11	10	10	10
12	10	10	10
13	10	10	10
14	10	10	10
15	10	10	10
16	10	10	10
17	10	10	10
18	10	10	10
19	10	10	10
20	10	10	10
21	10	10	10
22	10	10	10
23	10	10	10
24	10	10	10
25	10	10	10
26	10	10	10
27	10	10	10
28	10	10	10
29	10	10	10
30	10	10	10
31	10	10	10

7319 BROADWAY AVE.
PHILADELPHIA, PA. 19111
PA. 8-6700
6/22: 12100

44-1954

(b)(7)(D)

V. H. Best Exhibition
Exhibition Co., Inc.
(the Best Way)

FILE 92-1414-11-1-212

REV	DATE	BY	REMARKS
			08/11/83 20/1/83

PILL OF MATERIAL

QTY	REF	DESCRIPTION
1		IGNITER PORCELAIN SUB HARDY BURN
1		IGNITER BODY CAST ALUMINUM OR STEEL
1		IGNITER SLIDING CONDUCTOR
1		AIR TUBE
1		GAS TUBE
1		IGNITER CONDUCTOR WIRE
1		COUPLING
1		IGNITER PORCELAIN SUB HARDY BURN
6		SPARK PLUGS
10		IGNITER ELECTRODE
1		IGNITER BURNER

NOTE: 1. SPECIFY QUANTITY (2. UNITS TOTAL)
WHEN SPECIFYING SHARE PART. SPECIFY WHICH BURNER
APPL. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

5. 2 6 7 8 9 1 10

Part 1

BRUCE JAMES R. 10010000

W.H. BOST CHRISTIAN C. 100

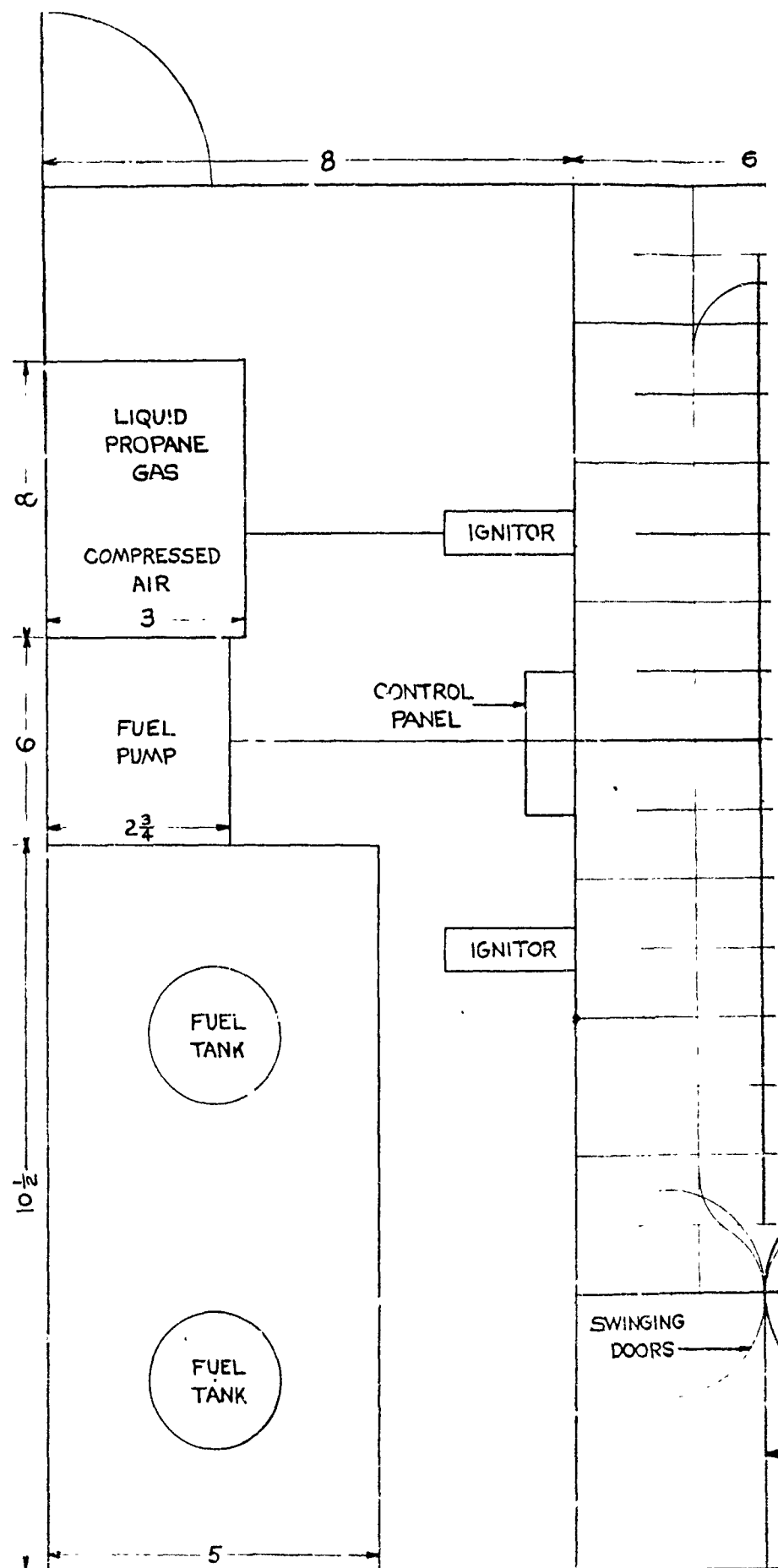
1-201-641-5234

New Address

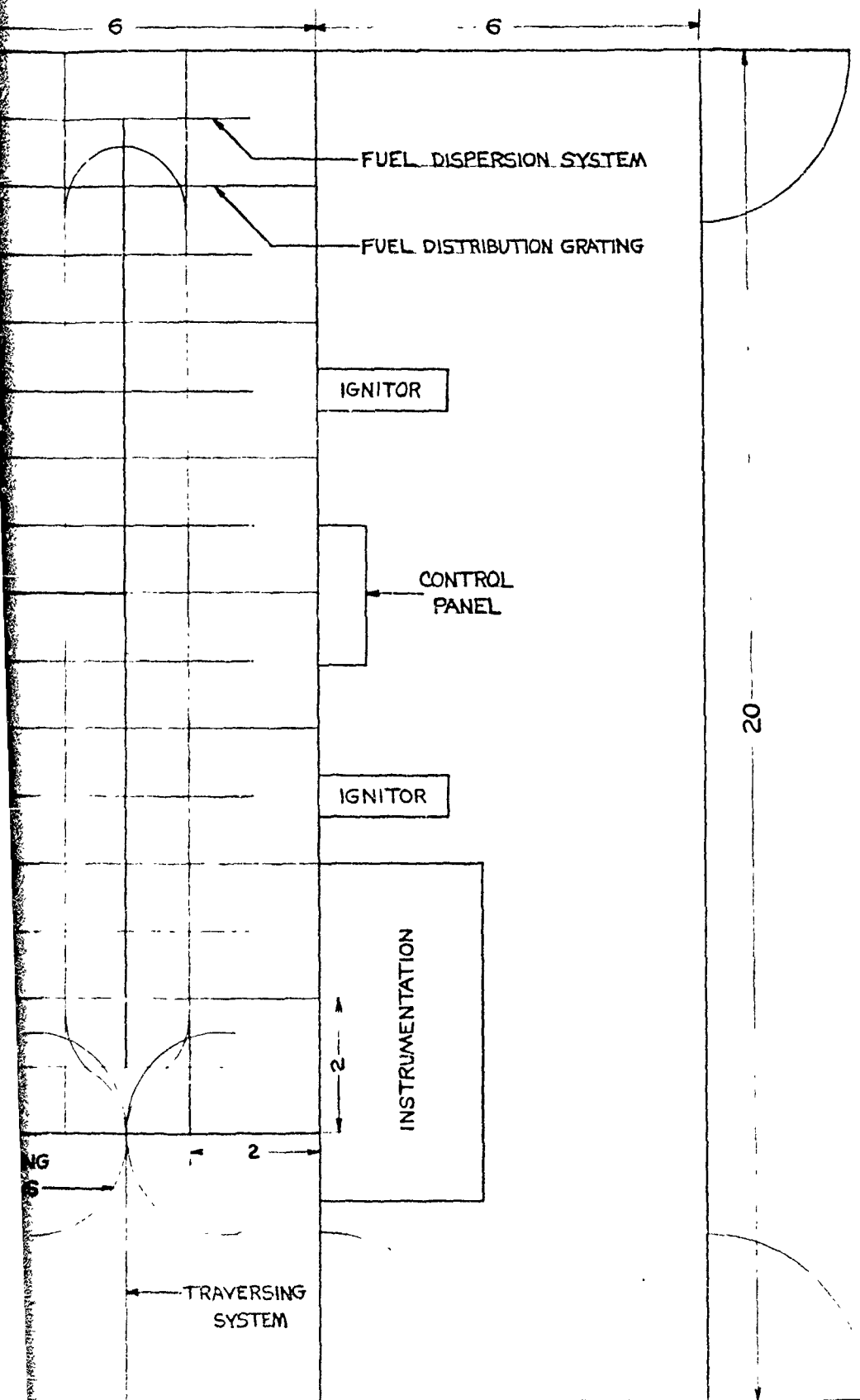
11 S. ST. Dan B. 221, COON. 06810

A P P E N D I X C

W. N. BEST COMBUSTION EQUIPMENT COMPANY, INC. DRAWINGS



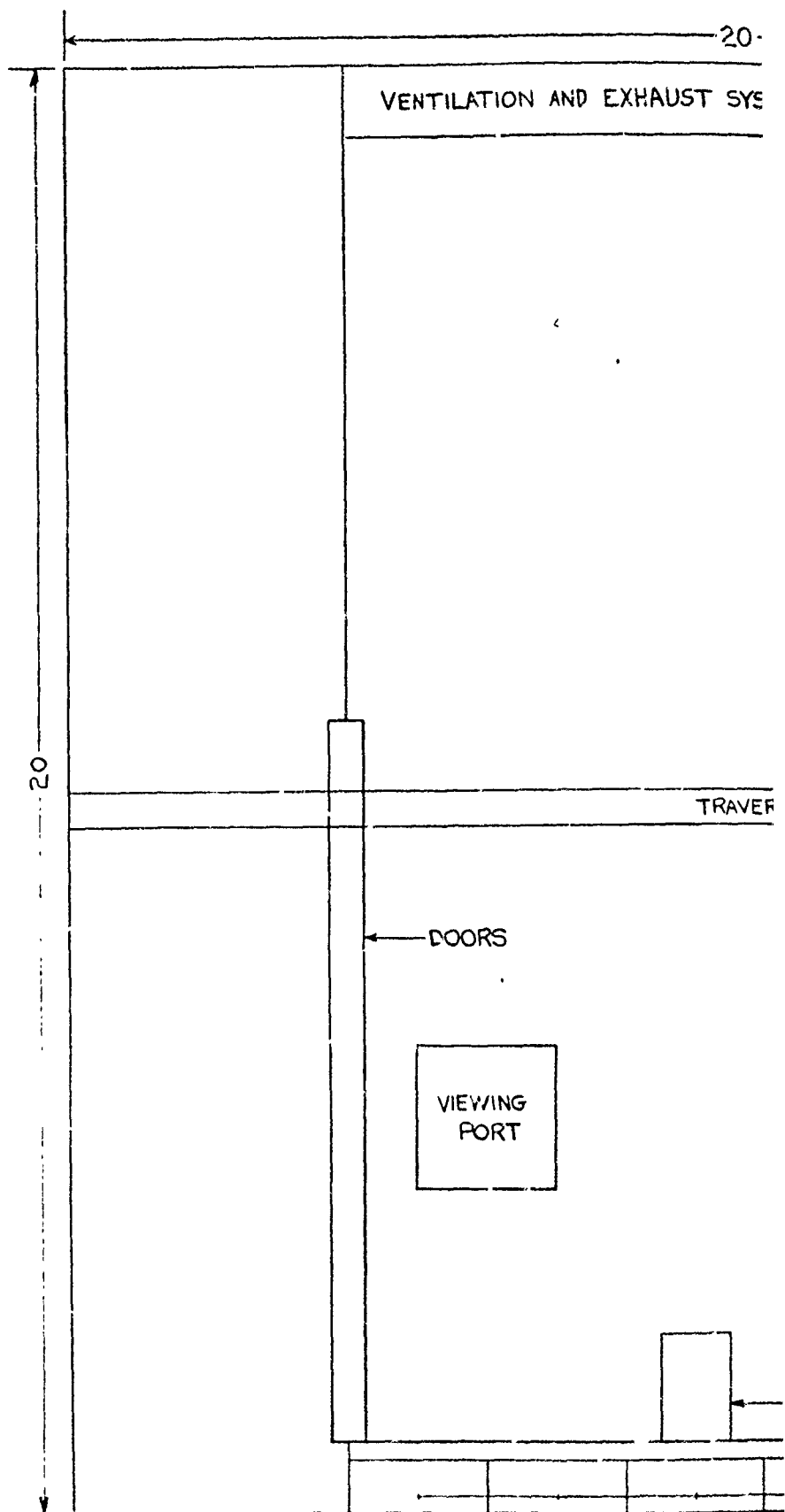
FUEL-FIRE FACILITY
ENVIRONMENTAL PHYSIOLOGY



CILITY SCALE-DOWN

YSIOLOGY, DRAWING NO. 001

D-2



FUEL-FIRE FACI

ENVIRONMENTAL PHY

20

TEST SYSTEM - FIRE EXTINGUISHING SYSTEMS

PROTECTIVE
WALLS

TRAVERSING SYSTEM

VIEWING
PORT

VIEWING
PORT

CONTROL
PANEL

IGNITORS

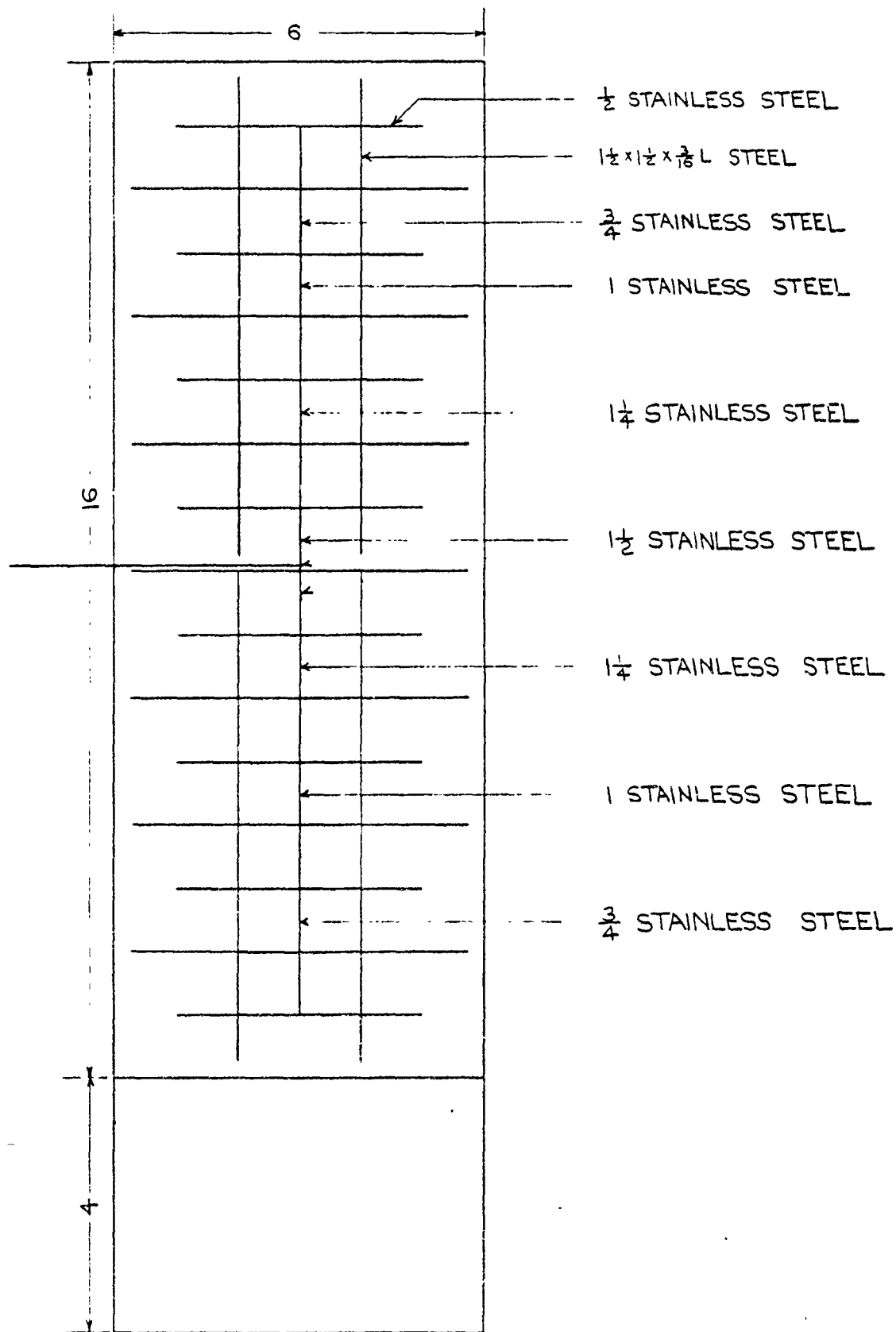
POOL FOR WATER
GRATING FOR FUEL DISTRIBUTION
FUEL DISPERSION SYSTEM

FACILITY SCALE - DOWN

PHYSIOLOGY DRAWING NO. 002

D-3

2



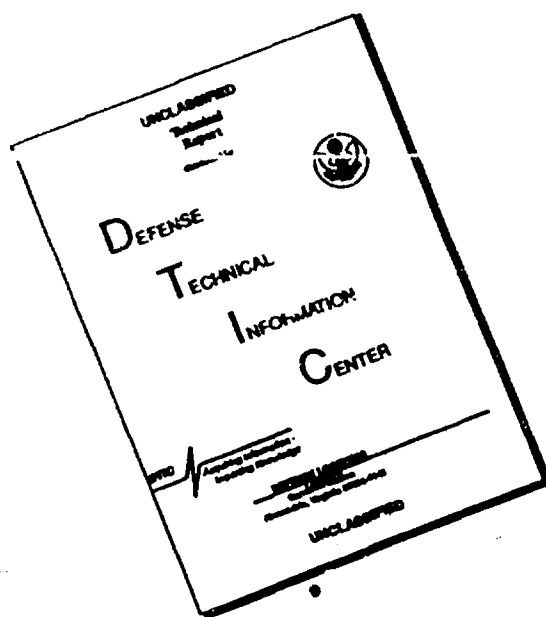
FUEL-FIRE FACILITY SCALE - DOWN

ENVIRONMENTAL PHYSIOLOGY DRAWING NO. 003

D-4

A P P E N D I X D
ENVIRONMENTAL PHYSIOLOGY DRAWINGS

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