(10) One approved copy of each shop drawing and Contractor's drawings.
(11) One copy of each wiring diagram.

b. Contractor must place this manual in the Engineer's hands at least 30 days prior to date it is expected system will be turned over to Owner.

c. After manual is approved by Engineer, supply three copies to Owner and one to Engineer.

32. FIELD INSTRUCTION

a. Upon completion of work, furnish services of a competent representative to instruct Owner's representative in the proper operation and maintenance of the mechanical and electrical systems.

b. Spend not loss than three eight hour days in such formal instruction.

SECTION M-2

PIPING

The requirements of Section ME-1 apply to all work hereunder.

1. GENERAL:

a. Workmanship

(1) Cut pipes accurately to measurements established at structure.
(2) Install without springing or forcing.
(3) Clear windows, doors and other openings.
(4) Permit expansion and contraction without misalignment or damage.
(5) During construction all openings in piping and equipment shall be closed with caps or plugs to keep out all foreign matter and to prevent leakage.
(6) Piping shall be concealed, unless otherwise indicated.

b. Drainage

(1) Grade to low points.
(2) Provide drain valve at bottom of riser and low point.

c. Threads - remove burrs and ream to full inside diameter.

d. Welding

(1) Make changes in direction and size with welding fittings.
(2) Use welding tees or welding outlet fittings in joining a branch to a larger size main.
(3) Finish exposed galvanized welds with Galv-Weld.

e. Reducers - Use reducing fittings, eccentric where required to prevent pocketing of air and water or both, to make changes in pipe sizes.

f. Unions

(1) Install at each piece of equipment, in bypasses, and long piping runs to permit disassembly for alteration and repairs.

(2) Unions shall be accessible.

(3) In domestic water piping systems where pipes of dissimilar metals are joined, dialectric (insulating) unions suitable for the intended service shall be provided.

g. Equipment Connections - Piping shall conform to indicated sizes, details, approved shop drawings, and printed installation instructions furnished by manufacturer.

h. Bracing - Underground pressure piping shall be braced with clamps and concrete buttresses to prevent movement at joints.

2. PIPE, FITTINGS AND JOINTS:

a. General - items are referred to by type and shall conform to standards listed below.

b. Materials

(1) Pipe

TYPE	REFERENCE
A	Cast Iron Soil Pipe and Fittings, extra heavy, Commercial Standar CS188-59, 10 ft.lengths where possible.
B	Standard Strength Clay Sewer Pipe, ASTM C13.
E	Black steel pipe, ASTM A120, sizes through 8" ASA Schedule 40, 10" and larger ASA Schedule 30.
F	Galvanized steel pipe, same reference as "E".
K	Seamless Copper Water Tube, ASTM B88, Type K, soft temper.
L	Seamless Copper Water Tube, ASTM B88, Type L,hard temper.
N	Cast Iron Pipe for Water, ASA 21.6 or ASA 21.8.
Q	Porous concrete foundation drain pipe, manufactured by Walker Poroswall Pipe Company.

(2) Fittings

TYPE	REFERENCE
AA	Cast Iron Pressure Fittings, AWWA, Class "D".
BB	Wrought Copper Solder Joint Fittings,ASABl6.22
DD	Black Malleable Iron Screwed Fittings, 150 lb., ASA Bl6.3.
EE	Galvanized Malleable Iron Screwed Fittings, 150 lb., ASA Bl6.3.
FF	Black Cast Iron Screwed Fittings, 125 lb. steam, 175 lb. water, ASA Bl6.4.
LL	Galvanized Cast Iron Screwed Drainage Fittings, ASA Bl6.12.
MM	Steel Butt-Welding Fittings ASA Bl6.9.

(3) Joints

TYPE	REFERENCE
1	Threaded - American Standard for Pipe Threads,ASA B2.1
2	Welded - Engineering Standards of the Mechanical Contractor Association of America, Inc., Part VII, Standard Procedure Specification Nos.1 and 2.
3	Caulked -National Plumbing Code ASA A40.8.
4	Precast - Multiple seal, polyvinyl chloride gaskets, ASTM C425 for type III joints equal to Uniloc by Universal Sewer Pipe Corporation.
6	Mechanical - Specification for Mechanical joint for Cast Iron Pressure Pipe and Fittings ASA A21.11.
7	Soldered - ASTM B32, tin-lead or tin-antimony 95-5.

c. Installation

		Pipe	Fittings	Joints
(1)	Sanitary Drainage			
	(a) Underground,10 ft. outside foundation walls.	B	B	4
	(b) Underground,within bldg. and to 10 ft.outside foundation wall.	A	A	3
	(c) Aboveground, within bldg.	F	LL	1
	(d) Vent piping.	F	LL	1
(2)	Storm Drainage			
	(a) Underground,within bldg. and to 10 ft. outside foundation walls.	A	A	3
	(b) Aboveground within bldg.	F	LL	1
	(c) Foundation Drains	Q	-	-
(3)	Cold Water			
	(a) Underground - 3" & over	N	AA	6
	(b) Underground - 2½" & under	K	BB	7
	(c) Aboveground - 2½" & over	F	EE	1
	(d) Aboveground - 2" & under	L	BB	7
(4)	Domestic Hot Water			
	(a) Aboveground	L	BB	7
(5)	Fire Protection			
	(a) Aboveground	E	FF	1
	(b) Underground	N	AA	6
(6)	Air Conditioning Condensate	F	LL	1
(7)	Condenser Water	E	MM	2
(8)	Chilled Water			
	(a) 2½" and over	E	MM	2
	(b) 2" and under	E	DD	1
(9)	Hot Water Heating			
	(a) 2½" and over	E	MM	2
	(b) 2" and under	L	BB	7

3. VALVES:

a. General

(1) Install in accessible locations.

(2) Adjust for smooth and easy operation.

(3) Valves for equipment and controls shall be installed full size of pipe line before reducing size to make connections.

b. Application

(1) Throttling - globe valves with plug type discs and seats.

(2) Cutoff or stop service - gate type.

(3) Balancing -

(a) Non-lubricated plug valves with adjustable stop rings and levers, and high temperature snythetic faced plugs; (suitable for 250°F. continuous duty). Approved manufacturer - DeZurik (Series 100).

(b) Balancing cocks - Sarco Co., Inc. Type "IBW". Set for 5 ft. H.D. on wall-in system.

(4) Contractor's Option

(a) Series 100 DeZurik valves as specified under balancing valves may be used in condenser, chilled and hot water heating systems in lieu of gate or globe valves.

(5) Drain Valves - hose end with cap and chain.

(6) Silent Check Valves - In pump discharge lines provide Miller Valve Co. Fig. 162 or silent check valves as manufactured by Williams-Hager or Valve and Primer Co.

(7) Underground

(a) Provide a Baltimore County standard adjustable roadway valve box.

(b) Identify by name of service cast in cover.

(c) Furnish tee handle wrench of proper size.

c. Approved Manufacturers - Unless otherwise indicated, Crane, Fairbanks, Jenkins, Kennedy, Lunkenheimer, Nibco, Powell, R.P.C., Stockham or Walworth equal to Jenkins Figure Numbers listed in schedule below.

d. Schedule of Services - Unless otherwise indicated, valves are for aboveground service.

(1) Hot and Cold Water

Gate - 3" and over - underground-IBBM,AWWA,HE	Fig.327
Gate - 2½" and over - IBBM, NRS, FLG	Fig.326
Gate - 2½" and over - solder end	NIBCO S-136
Gate - 2" and under - solder end	Fig.1240
Check- 2½" and over - IBBM, FLG	Fig.624
Check- 2" and under - solder end	Fig.1222

(2) Fire Protection

Gate - 2½" and over - 175 psi, NSS	Fig.825A
Gate - 2" and under - 175 psi, NSS	Fig.275U
Gate - Quick opening, 2½" and over	Fig.334A
Gate - Quick opening, 2" and under	Fig.302
Check- all sizes - 175 psi, NSS	Fig.629
Drain Valves	Fig.206A
Automatic Ball Drip	Elkhart Fig.702

(3) Condenser Water & Chilled Water

Gate - 2½" and over - IBBM, NRS, FLG	Fig.326
Gate - 2" and under	Fig.47U
Globe- 2½" and over - IBBM, OS&Y, FLG	Fig.613
Globe- 2" and under	Fig.106A
Check- 2½" and over - IBBM, FLG	Fig.624
Check- 2" and under	Fig.92A

(4) Hot Water Heating

2½" and over

Gate - IBBM, NRS, FLG	Fig.326
Globe- IBBM, OS&Y, FLG	Fig.613
Check- IBBM, FLG	Fig.624

2" and under

Gate - solder end - Fig. 1240; screwed end - Fig.47U
Globe- solder end - Fig. 1200; screwed end - Fig.106A
Check- solder end - Fig. 1222; screwed end - Fig. 92A

4. CLEANOUTS:

a. General

(1) Provide cleanouts at ends of runs; at changes in direction; near the base of vertical soil, waste and drain stacks; every 50 feet in horizontal runs; and where indicated.

(2) Cleanouts shall be full size of pipe up to 4" and shall be 4" for larger sizes.

b. Application

(1) Vertical pipes - in tees near floor.

(2) Horizontal pipes - in wyes or long sweep quarter bends.

(3) Exposed steel pipe - cleanouts, galvanized square head plugs.

(4) Extend cleanouts on concealed piping to finished walls, floors and grade.

(5) Waterproofing - cleanouts puncturing waterproofing membrane shall have flashing clamps.

c. Materials and Approved Manufacturers - Jay R. Smith or Zurn equal to Zurn "Supremo" numbers given below:

	C.I.Pipe	Steel
Unfinished Areas		
Floors	ZB-1326	ZB-1325
Walls	ZB-1320	ZB-1300-2
Finished Areas - Floors		
Terrazzo	ZN-1324	ZN-1323
Composition Tile	ZN-1324-5	ZN-1323-5
Ceramic Tile	ZN-1324-1	ZN-1323-1
Finished Areas - Walls		
Plaster	ZN-1320	ZN-1370-2
Tile	ZN-1320	ZN-1375-1 *
Exterior, Flush with Grade		
Walkways	ZN-1326-10	

* 9"x9" frame

5. STRAINERS:

a. General - Where piping connections are smaller than lines connecting to a particular item, place strainers in section of line before line is reduced in size to make these connections.

b. Material

(1) Perforations: Diameter of perforations, water service 1/4" through 4" - 0.057", 5" and up - 0.125"; (double diameter for condenser water service).

(2) Galvanizing: Strainers used in galvanized lines shall be galvanized.

c. Approved Manufacturers

(1) Basket Type: Boylston, McAlear or Mueller equal to Meuller No.165 with closed bottom brass baskets.

(2) "Y" Type: Boylston, McAlear or Meuller equal to Mueller No.251-FC with open bottom monel screen.

d. Application

(1) Sizes 2" and under - - "Y" type
(2) Sizes 2½" and over - - Basket type

6. PIPE SUPPORTS:

a. General

(1) Provide supports to maintain required slope and alignment.

(2) Secure directly to structural framing of floors or roof or to their supporting members.

(3) Use inserts in reinforced concrete construction.

(4) Make allowance for expansion and contraction.

(5) Pipes may not be supported from other pipes.

(6) Trapeze hangers may be used for parallel runs of pipe with same slope.

(7) Provide bracing to prevent lateral motion of horizontal or vertical piping.

(8) Provide supports at or near all changes in direction.

(9) Hanger rods may not pierce ducts.

(10) Strength and rigidity shall be suitable for loads imposed.

(11) Support piping so there is no strain on the connection to pumps and other equipment.

(12) In existing concrete construction use Phillips "Red Head" self-drilling concrete anchors.

b. Application and Materials:

(1) Horizontal

(a) Adjustment: Supports for horizontal piping shall have vertical adjustment after installed.

(b) Maximum Support Spacing: Steel and copper lines 1/2" and smaller, 5 feet; 3/4" and 1". 8 feet; 1-1/4" and larger, 10 feet. Cast iron soil pipe one support at each hub.

(c) Overhead piping: Support with adjustable wrought steel clevis hangers, copper plated for copper tubing, galvanized for uninsulated galvanized steel pipe and black for all other piping.

(d) Floor Supports:

(i) Where no provision for expansion and contraction is required, provide adjustable cast iron saddle support with floor flange fastened to floor and pipe nipple of length to suit.

(ii) Where provision for expansion and contraction is required, provide adjustable pipe rollers and chairs. Provide concrete piers; fasten chairs to piers.

(e) Wall Supports

(i) Where no provision for expansion and contraction is required and pipe can be located close to wall, provide steel "J" hook suitable for pipe sizes through 3" above support with welded steel brackets, securing pipes to brackets with "U" bolts or clevis type hangers.

(ii) Where provision for expansion and contraction is required provide adjustable pipe rollers and chairs mounted on welded steel side brackets.

MICROFILMED

REVISIONS			
NO.	DATE	ITEM	REF.

FIRM H.A. INC.
DESIGNED BY —
DRAWN BY —
CHECKED BY A E W
APPROVED BY K V B

SEAL H.A. JOB NO. [illegible]

STRUCTURAL ENGINEERING
VAN RENSSELAER P. SAXE
1701 ST. PAUL ST. BALTO, MD, 21202

MECHANICAL-ELECTRICAL ENGINEERING
HENRY ADAMS, INC.
2315 ST. PAUL ST. BALTO, MD. 21218

CHRISTIE, NILES & ANDREWS
22 W. Pennsylvania Ave. Towson, Maryland 21204
1047 31st Street, N.W. Washington, D.C. 20007
(301) 823-7642 (202) 744-1947
ARCHITECTS

OFFICE BUILDING
FOR
NOTTINGHAM FARMS INC.
102 W. PENNSYLVANIA AVE.
TOWSON, MARYLAND 21204

SPECIFICATIONS

JOB NO.	6522
SCALE	—
DATE	SEPT. 27, 1966
LAST REV.	

ME 3