SECTION E

ELECTRICAL WORK

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

1. CONTRACTOR'S INSTALLATION DRAWINGS

a. In addition to the drawings called for in the "MECHANICAL-ELECTRICAL REQUIREMENTS" provide riser diagrams or plans showing conduits and wiring and routing of same for the Fire Alarm System.

2. GENERAL

a. Conduit and circuiting installed as indicated unless prior approval obtained for changes.

b. Outlet, pull, junction boxes and equipment required to be accessible not installed in locations where access is impossible or difficult.

c. Verify exact electrical service requirements of each piece of equipment receiving electrical connections. Provide proper service to each. Include all items required by the N,E.C. for the proper connection of each item.

d. Check architectural drawings before installation of room switches. Locate all switches at lock-side of doors.

e. Provide gaskets to seal all box and cabinet covers in damp locations.

f. Provide cable supports, "OZ" or approval equal in risers as required by the NEC.

g. Provide galvanized fish wires in all empty conduit systems.

h. Conduits passing closer than 3" to a steam pipe or an accumulation of hot water pipes - insulated with a 2" thick covering of fiberglas at that point.

i. Entire electrical installation in accordance with the NEC(NFPA 70)

3. CONDUIT

a. Install all wiring within the building except in cellular or under-floor ducts, in conduit.

b. Use rigid thick wall conduit throughout except where underground duct is called for and where flexible metal conduit is permitted.

c. Flexible metal conduit may be used for motor and recessed lighting fixture connections.

d. Conduit - hot dipped galvanized or sheradized steel - A.S.A. STD. C-80.1. Each length shall bear Underwriters Label of approval.

e. Flexible metal conduit in damp or wet locations shall be "Sealtite" as manufactured by American Brass or approved equal-U.L. approved.

f. Conduit sized in accordance with NEC none smaller than 3/4" except for signal and communications, 1/2" may be used.

g. All conduits shall be run concealed unless otherwise noted.

h. Conduit installed underground or beneath concrete slabs on grade encased in a minimum of 3" of concrete on all sides.

4. UNDERGROUND CONDUITS AND MANHOLES

a. Conduit run underground - fiber-duct encased in concrete envelope.

b. Fiber-duct as manufactured by Bermico or Orangeburg.

c. Conduit in duct bank enclosed in concrete not less than 3" beyond any surface of the conduit. Separators shall be used to secure a uniform spacing between conduits of not less than 2". Stagger conduit joints by rows and layers.

d. Concrete as previously specified with reinforcing (one 3/4" bar on each corner of duct bank), in loose or filled ground and when ducts pass under buildings through foundations or into buildings.

e. Excavation and backfill as previously specified.

f. Mandrel each fiber duct with iron shod Mandrel 10" long 1/4" smaller than bore of duct. Mandrel with leather or rubber gasket slightly larger than duct bore.

g. In general, top duct a minimum 18" below basement slab for telephone and 480 volt circuits and 30" below grade for circuits above 600 volts. Where possible, duct bank run on undisturbed earth. Duct shall pitch to drain as shown. At the low point of the duct bank tees shall be installed in the duct with nipples to drain to a dry well. Dry well shall be located below the low point and shall consist of not less than 2 cubic yards of #5 crushed stone.

5. UNDERFLOOR DUCT SYSTEM

a. Provide an underfloor duct system in the 3" fill on the first floor slab.

b. Ducts shall be Walker #2 or #4 or equal as indicated on the plans. Ducts, except where called for to be blank ducts, shall be fitted with 2" IPS diecast inserts 7/8" high on 2' centers.

c. Ducts shall be suitably supported on Walker #S224,S1-222 or #S3244 supports or equal as required by the number of ducts in the run.

d. Junction boxes requiring three (3) duct entrances on one or more faces shall be #3244S with unused openings blanked off. Junction boxes requiring a maximum of two (2) duct openings per face shall be Walker #224S with unused openings blanked off. Provide #275 adapters to reduce a No. 4 duct opening to a No. 2 duct opening where required. Provide stainless steel tile holders at depth to suite tile for all boxes.

e. Dead ends of all ducts shall be suitably blanked.

f. Where ducts turn up into closets they shall be fitted with #332 or #H332 elbow as required by duct size. When #2 ducts enter panel or wire trough enclosures they shall terminate with #334-0 terminal bushing.

g. Tee junction boxes shall be Walker #348T or equal with stainless steel tile holder of suitable depth.

h. Provide marker screws in duct inserts closest to all junction boxes and at ends of duct runs and on the office side of all permanent partitions. Telephone markers shall be Walker #415N and electric duct markers #415PN or equal with nickel escutcheons #414N.

i. Duplex 120 volt floor receptacles shall be Walker #513 AL-DPS-G or equal, with necessary locking nipple and adapter to fit in the inserts of the duct hereinbefore specified.

j. Telephone outlets shall be Walker #508 AL or #509 AL as indicated with necessary locking nipple and adapter as required.

k. Outlets shall be identical to and interchangeable with outlets hereinafter specified under "Cellular Concrete Floor System".

6. CELLULAR CONCRETE FLOOR SYSTEM

a. Underfloor raceways above the first floor shall be cellular concrete floor raceways consisting of 6" diameter cells in the pre-cast floor system. Precast slabs will be 8" x 24" with 3-6" cores per slab.

b. It is the intent of this system to provide a complete system of Trench Header Ducts and accessories specifically designed to utilize the cellular floor raceways.

c. The trench header duct, accessories. outlets etc., shall be listed by U.L. Labs., Inc.

d. The Trench Header Duct shall be so designed that it shall be fully adjustable between 2½" and 3½" to provide adequate adjustment for the 3" fill over the precast slabs.

e. Trench header duct shall be equipped with double tile stops of stainless steel. Covers shall be not less than 1/4" steel plate, equipped with dust stops and properly gasketed to prevent entrance of moisture. Covers over 18" wide shall be provided with intermediate supports which are adjustable without removing the cover before the tile is laid.

f. The trench header ducts shall be factory punched for the proper size grommets on the correct centers to coincide with the concrete slab cores as indicated on the drawings and determined from the erection drawings of the structural planks.

g. All concrete holes required for grommets, after-set drive inserts, etc., shall be accomplished by drilling with either carbide tipped or diamond drills. Care shall be exercised that all rubble, dust and debris be removed from the cores after drilling by use of an industrial vacuum cleaner.

h. Provide #6 ground continuity ties between feeder ducts and header duct runs.

i. Provide suitable panel flanges, riser ducts, panel connection units, duct end closures, etc., as required for a complete installation. All duct connection units shall have an area equal to or greater than that of the duct to which they connect.

j. After-set inserts for mounting the outlets shall be a nominal 2½" diameter with 2" thread for connection of the outlets. They shall be not less than 3-3/4" no more than 4-1/4" in length.

k. For type of outlets see "Underfloor Duct System".

l. Components of this system shall be Flexiflor or approved equal.

m. Provide sleeves to joint adjacent planks to make cells continuous as indicated on the plans. Sleeves shall be 6" OD x 1/16" minimum wall waxed tubes as manufactured by Loroco Industries, Inc., Cincinnati Ohio. Sleeves shall be 12" larger than the gap between planks so as to have 6" extending in each core on either side of the gap. Before the concrete is poured seal the joint where the sleeve enters the core with asbestos roofing cement to prevent entrance of concrete. The Contractor shall supervise the concrete pour so as to make certain that no damage results to the sleeves during the pour. If sleeves are damaged they shall be immediately replaced. Ends of all activated cores shall be suitably plugged to prevent the entrance of concrete.

n. Provide "Flexiflor" after-set marker assemblies for power and telephone cells where indicated on the drawings. Telephone assemblies shall be #P2271 and power assemblies shall be #P2272.

7. OUTLET BOXES

a. Boxes for concrete or concealed work pressed steel not less than #14 gauge galvanized, sized to suit conditions and NEC.

b. Concealed boxes for switches and receptacles sectional switch boxes.

c. Boxes in face block or tile walls located at the course line fitted with square tile covers, Raco series 782, 792 or equal.

d. Switches, receptacles, etc., indicated in close proximity one to another shall be installed in one box with single plate, with only one device per gang.

e. Surface mounted switch and receptacle outlet boxes - cast type. Crouse-Hinds "FS" or approved equal with appropriate "DS" cover.

f. Provide 3/8" malleable iron fixture studs in outlet boxes requiring same for fixture support.

g. Receptacle and switch boxes shall not be through-wall type or mounted back-to-back unless specifically designated. Where they are designated back-to-back the nipple joining them shall be filled with duct seal to limit passage of sound.

h. Switch boxes in narrow partitions "Raco" one or two-gang #426 series as required.

8. PULL AND JUNCTION BOXES AND WIRE TROUGHS

a. Provide as shown, specified or required to facilitate pulling wires or cables.

b. Install in approved accessible locations.

c. Sizes in accordance with NEC requirements unless shown larger.

d. Boxes 50 cubic inches and smaller as specified for outlet boxes. Provide blank covers where exposed and appropriate raised covers and blank plates where concealed.

e. Boxes over 50 cubic inches - galvanized sheet steel with flat galvanized sheet steel covers attached with brass machine screws. Covers on flush boxes approximately 3/4" overlap all around.

f. Metal gauges for boxes, troughs and cabinets as follows: dimensions being that of largest surface:

Max.Dim(Inches)	Max. Area(Sq.Inch)	Box Gauge	Front Gauge
40	1000	14	12
60	1500	12	12
over 60	over 1500	10	10

9. CABINETS

a. Back boxes code gauge galvanized cold rolled steel.

b. Fronts cold rolled steel with rust inhibitor and one coat manufacturer's standard color lacquer.

c. Fronts fitted with side-hinged door, chrome plated pin type cylinder lock and catch. Key all doors alike. Fronts shall have adjustable concealed trim clamps. Door hinges concealed. Doors greater than 48" in length equipped with 3-point catches and keyed "T" handle.

10. LIGHTING AND POWER PANELBOARDS

a. Shall be Square D NYlB-4L for 480/277 volt service and Square D NQO-4L for 208/120 volt or approved equal with or without main breakers as indicated in the schedule on the drawings. Main ratings, branch breakers, spaces, etc., shall be as indicated.

11. MAIN SWITCHBOARD

a. Shall be a Square "D" QMB Motor starter switchboard or equal by Westinghouse with circuit breaker combination starters and circuit breaker feeder units as scheduled on the drawings. Unit shall be free-standing and have main ratings as indicated.

b. Starters, combination circuit breaker type sized in accordance with the schedule on the drawings.

c. Switchboard bus braced for a fault current of 50,000 RMS symmetrical amperes. Voltage and current rating shown on plans.

d. Interrupting capacities of circuit breakers shall be normal for the minimum frame size accommodating the trip settings shown unless otherwise noted.

e. All starters single speed of NEMA size with auxiliary contacts, selector switch, push button station, pilot lamp (green) all as schedule on the drawings. Each starter with 120 volt coils and individual fused 480/120 volt fused control power transformer and with three (3) manual reset thermal overload units.

f. Feeder unit disconnect and overcurrent devices same as for combination starters specified above.

12. DISTRIBUTION PANELBOARD (208/120 VOLTS)

a. Provide a distribution panel for 208/120 volts as indicated on the plans. Panel shall be Square "D" "ML" or approved equal by Westinghouse or General Electric. Main and breaker ratings shall be as indicated on the plans.

13. WIRING DEVICES

a. Provide Pass and Seymour, Hubbell, Arrow-Hart or Bryant. Catalog numbers given designate type devices required.

b. Tumbler switches 120/277 volts, A.C. type brown lever handles, Hubbell 1221 series.

c. Weatherproof switches as above - *Hubbell #7349 adapter plate & #7420 cover plate.*

d. Door switches 6 amperes 125 volt Hubbell 2355, on when door is open (#2356, off when door is open).

e. Receptacles brown or black bakelite, polarized grounding type as follows. Catalogue numbers given are Hubbell:

Type A - 20 A, 125 V, 2-pole, 3-wire, single NEMA configuration 5-20R, Cat. #5361.

Type B - 20A, 125 V, 2-pole, 3-wire, duplex NEMA configuration 5-20R, Cat. #5362.

f. Weatherproof receptacles as above For duplex receptacles provide Hubbell #5205 plate.

g. Switch and receptacle plates:

(1) General use, flush installation - satin finish stainless steel.

(2) Weatherproof - as specified above.

(3) Exposed FS conduletes - appropriate DS plates.

(4) Switches on narrow partitions - stainless steel 1-11/16" wide, one or two gang.

14. WIRING (600 VOLTS)

a. All secondary wiring within the building soft drawn copper, 98% conductivity with NEC type THW insulation, except where wiring is run in cellular concrete raceways it shall be single conductor type UF.

b. Wiring at or above boilers, hot water generators, heating equipment, etc. type THHN.

c. Wires #8 and larger shall be stranded.

d. No wire smaller than #12 unless otherwise noted herein. Wiring for general branch circuit work unless otherwise noted:

Home Run Length and Wire Size	Circuit Length and Wire Size
0-60' - - #12	0-100' ----- #12
60-100' - #10	
over 100'- # 8	over 100' -- #10

Circuit length is the distance between the first and last outlet on a circuit.

e. Wire pulling lubricant "Y-Er-Eas" or equal. No soap, grease or similar substance permitted.

f. Provide wire manufactured by General Cable, Plastic Wire and Cable Corp., Anaconda, Simplex or approved equal.

15. WIRING - 15000 VOLTS

a. Cable from switchgear to primary of substation transformer shall be 15 KV cross linked polyethylene insulated copper equal in all respects to General Electric Vulkene #S1-58225 dimensionally and when tested in accordance with IPCEA Standard S-19-81. Cable shall be for ungrounded neutral service.

b. Cable termination shall be performed in accordance with the manufacturers recommendations.

16. SPLICING (600 VOLTS)

a. Splices in branch circuits and feeders - Use "Wirenuts" or equal sizes 14-10, mechanical connectors by "OZ", Burndy, T & B or equal for #8 and larger. All splices not self-insulating wrap with Scotch #33 or equal tape or enclose in canvas bakelite covers.

17. DRY TYPE TRANSFORMERS

a. Provide dry type transformers of sizes and voltage characteristics as indicated on the plans. Transformers by General Electric, Westinghouse, or Hevi-Duty. Each primary winding of each transformer having a rating not exceeding 30 KVA shall have a minimum of 2 - 5% full rated taps below rated primary voltage. Each primary winding of each transformer having a rating greater than 30 KVA provided with either four or six taps, two 2-1/2% full rated above rated primary voltage the remainder being fully rated 2-1/2% taps below rated primary voltage.

b. Transformers having a rating exceeding 25 KVA shall have class "H" insulation.

c. Sound ratings of transformers shall meet or exceed ASA Standard for the particular size. Sound levels shall be as measured in accordance with ASA-C89.1 - 1961.

d. Unless integrally provided, transformers mounted on approved vibration and noise isolating dampers. Conduit connections to transformers not having integral isolation by means of flexible metal conduit, 18" to 36" long.

18. UNIT CIRCUIT BREAKERS

a. All breakers quick-make, quick-break, thermal magnetic molded case breakers manufactured by Westinghouse, General Electric, Square D or ITE.

b. Breakers shall have general purpose NEMA 1A, enelosures. All breaker enclosures designed to permit breaker to be padlocked in the "open" position.

c. Ratings of breakers, poles, etc. as indicated on the drawings.

19. SAFETY SWITCHES

a. Provide all safety switches as indicated on the drawings and as required by the National Electrical Code whether shown on the drawings or not.

b. Switches with general purpose NEMA 1 enclosures: All enclosures designed to permit padlocking in the "open" position.

c. Switches fused or non-fused as indicated, heavy duty type as manufactured by Square D, Westinghouse or approved equal.

20. 13 KV SUBSTATION

a. High Voltage Electric Service

(1) Electric service will be supplied by the Baltimore Gas and Electric Co. (Power Co.) via a single underground circuit at 13,200 volts, three phase, four wire to a point designated at the high voltage switchgear as shown on the drawings.

MICROFILMED

REVISIONS

NO.	DATE	ITEM	REF.

FIRM H.A.INC.
DESIGNED BY —
DRAWN BY —
CHECKED BY RB
APPROVED BY RB

SEAL H.A. JOB NO. N-16
STATE OF MARYLAND — RICHARD BRADLEY II — No. 3072 — REGISTERED PROFESSIONAL ENGINEER

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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.	

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