All high voltage service cable, terminations, and off-property ducts for incoming cable shall be supplied and installed by the Power Company.

(2) The Contractor shall provide and install all high voltage wiring and equipment, except that provided by the Power Company on the remainder of the property as indicated on the drawings and specified herein. This shall include all ducts raceways, cables, switchgear, transformers, etc., as indicated. The Contractor shall provide containment for the Power Company's revenue metering wiring which will be installed by the Power Company.

(3) All work in connection with the service and service entrance switchgear shall be subject to the requirements of the Power Company and shall be approved by them prior to commencement of the work.

b. High Voltage Switchgear

(1) The high voltage switchgear shall consist of three (3) bays of free standing self supporting outdoor metal enclosed switchgear comprising one incoming cable load interrupter switch unit, one metering unit and one outgoing fuse unit, as shown on drawing.

(2) The switchgear shall be rated as follows:

Voltage	Nominal	13.8 KV
	Max. Design	14.5 KV
	BIL	95 KV
Phase	Three (Four wire)	
Continuous Current	Main Bus	600A
	Bus Taps	600A
	Load Interrupter Switch	600A
	Fuse Holders	200A (Max.)

Load Interrupting Current Load Interrupter Switch - 600A

Short Circuit Interrupting (Fuses)
300 MVA, 3Ø symmetrical at 13.8 KV

Fault Closing (Load Interrupter)
40000 Amperes RMS Asymmetrical

Short Time - Momentary - 40000 Amps RMS Asymmetrical

(3) The three bays of switchgear shall be bolted together in the field to form a complete unit that provides mechanical and electrical protection to the outgoing cable. The bays shall be bolted to the concrete pad using anchor bold recommendations outlined by the switchgear manufacturer. All bays shall be arranged so that all work in the cubicles and all connections can be made from the front.

(4) To insure completely coordinated design, the metal enclosed switchgear assembly shall be integrally designed and produced by the manufacturer of the basic switching components. Furthermore, it shall be constructed in accordance with the minimum construction specifications of the fuse manufacturer to provide adequate space for fuse handling, and adequate space and venting--plus sufficient rigidity and holding strength of enclosure, doors, windows, etc. for fuse exhaust.

(5) In compliance with Article 710-21(c) of the 1965 National Electrical Code, the integrated assembly--load interrupter, power fuses and enclosure--shall safely withstand the effects of closing against a three phase bolted fault equal to the specified fault closing rating. A certified report of tests of load interrupters in enclosures, with and without power fuses, substantiating this capability shall be furnished upon request. These tests shall take place within the enclosure with all doors and panels closed, and shall consist of closing the load interrupter against the fault, and interruption of the fault by the power fuses (where furnished for short circuit protection), whereupon the fuse exhaust must in no way be permitted to blow open or warp the doors, panels, or enclosure, nor blow out the inspection windows.

(6) The incoming load interrupter shall meet the requirements of the Power Company for load interrupter switches used on 13.2 KV installations and shall be rated 600A, 3-pole, 13.8 KV, S & C Cat. #34012 R4 or approved equal. It shall be group operated, of the no-external ARC type. Interrupting action which liberates appreciable quantities of ionized gas into the enclosure or produces a significant amount of arcing, will not be permitted. Arcing contacts of the interrupting units shall be porcelain enclosed, and shall be silver tungsten tipped. The main and hinge contacts of the switch blades shall be silver to silver surfaces.

(7) The load interrupter shall contain a built-in quick-make quick-break device to insure high speed closing and opening of the load interrupter independent of the speed of the operating handle. The quick-make quick-break device shall employ bearings of the anti-friction type only, and shall be assembled as an integral part of the load interrupter by the load interrupter manufacturer, to avoid possible introduction of friction from misalignment during or after installation of the load interrupter and its operating mechanism in the enclosure. Should the quick-make quick-break device fail to develop or maintain its necessary stored energy (spring failure), positive opening or closing of the load interrupter shall nevertheless be assured through an integral follow-up, direct-drive arrangement.

(8) Load interrupter operating handle shall be externally mounted and non-removable, and shall provide latching, plus accommodations for padlocking, in either open or closed position.

(9) The metering cubicle shall contain provisions for mounting the Power Company's high voltage current transformers, potential transformers, and P.T. fuses on a draw-out carriage. The unit shall be constructed in accordance with Baltimore Gas and Electric Company "specification for Meter Compartments of 13,200 volt, metal enclosed switchgear," latest issue. The unit shall contain provisions for mounting two 15 KV current transformers and two 15 KV phase to ground potential transformers to be supplied by the Power Company. All low voltage internal meter wiring shall be furnished from the transformers to a centrally located terminal block for remote extension of these circuits by the Power Company. A two inch rigid steel conduit shall be extended from the metering unit to a point designated on the drawings for the installation of the Power Company's meters.

(10) The outgoing fuse unit shall contain three (3) 13.8 KV, 200 A. max., 45° disconnecting type S & C "SM4B" Power fuses or equal complete with mufflers and fuse refill units. The ampere rating of the fuse refill units shall be as given by the Power Company. In a raintight padlockable metal box affixed to an adjacent wall provide three spare fuse holders with mufflers, six spare fuse refilles, one 1½" x 4'0" epoxy fibreglass double ended fuse handling pole complete with large fuse clamp and station prong.

(11) The enclosure shall be semi-monocoque and unitized construction, using 11 gauge cold rolled sheet steel. All structural joints shall be welded. All butt joints also shall be welded, with the external seams ground flush and smooth. Internal welds shall be cleaned to remove all scale. Side and rear sheets shall not be externally bolted. Each bay shall be a complete unit in itself, with full side sheets, to minimize the number of bolts required to join adjacent bays during field installation. Galvanized four-inch structural steel channel bases shall be furnished.

(12) Doors shall be full length, 11 gauge cold rolled sheet steel bulkhead type construction. Doors shall have 1-3/16 inch minimum, 90 deg. flanges formed from double-thickness folded edges approximately 3-5/16 inches wide, with the sheared edges folded back into the inside of the door. Doors shall have concealed hinges with stainless steel pins, and shall be provided with sturdy, foot-operated door holders. Door handles shall have provision for multiple padlocking. Each door shall be provided with a minimum of three latches, each latch to be of a design which places the latching member in shear, or the equivalent, so as to withstand both outward and lateral forces. Two inspection windows shall be provided in each door, so located that the open and closed positions of the load interrupter blades shall be readily discernible from the exterior of the enclosure. Such windows shall be of laminated safety plate glass, gasket mounted.

(13) Doors, hinged panels, and joints between bays shall be gasketed with suitable material to prevent moisture from entering the enclosure. Bus openings between bays shall be lined with neoprene channel gasketing.

(14) All inaccessible surfaces shall be phosphatized and primed with a conductive zinc coating before welding. All welds shall be ground and sanded to remove the scale formed during welding. All internal welds, seams, joints, and splices shall be wire-brushed. A conductive zince coating shall then be applied to the entire inside and outside surfaces of the enclosure. Next, all surfaces shall be coated with a primer of zinc chromate, iron oxide, or equal. Surfaces shall then be finish coated with an epoxy resin baking enamel, to an average thickness of 4 mils (after bake and including primers) applied by the airless hot spray process, and baked at 325 deg. F. Color shall be dark gray, No. 24, ASA Standard No. Z55.1-1950. A heavy coat of insulating "no-drip" compound shall be applied to the inside surface of the roof structure, to prevent condensation of moisture thereon.

(15) The high voltage main bus, bus taps, and ground bus in the switchgear shall be of continuously silver plated aluminum bar of not less than 1/4" x 2" cross section, and shall be constructed and braced as to withstand the short circuit stresses associated with the interrupting rating of the switchgear. Each bus bar connection inthe switchgear shall be made up of two bolts not less than 3/8" diameter and two Belleville spring washers with nuts. Minimum phase to phase clearance of energized busses shall be 7½". Minimum phase to ground clearance of energized busses shall be 6". All assembly hardware shall be hot dipped galvanized steel. Provisions shall be made in the construction of the outgoing circuit bay for future extension of the main bus to a future outgoing circuit compartment.

(16) The ground bus shall extend through the full length of the switchgear with a section at least 12" in length extended to the front of each compartment. This ground bus section shall have a clearance of not less than 3" to adjacent steel to permit connection of portable grounding equipment.

(17) The main bus, bus taps, switching and fusing components shall be mounted on full B.I.L. NEMA rated porcelain insulators and shall be free of organic insulating materials.

(18) Grounding bails for attachment of portable grounding equipment shall be provided on the line side of the incoming switch, both sides of the current transformer bus connections, the potential transformer bus connections, and the load side of the power fuses.

(19) Interphase and end barriers shall extend approximately 5" beyond the energized parts of the switch and fuse equipment.

(20) Key interlocks shall be provided to prevent opening the door of the fuse unit unless the incoming switch is open or closing of the switch if the fuse door is open.

(21) A protective hinged screen barrier, retained with captive thumb screws, shall be provided in front of the load interrupter switch to prevent inadvertent contact with the switch when the enclosure door is open.

(22) The incoming switch unit shall be equipped with provisions for installation of three (3) 12 KV distribution class lightning arresters by the Power Company.

(23) Louvers shall be provided at top and bottom, front and rear of each unit complete with inside screens to prevent entrance of insects.

(24) Strip heaters shall be provided in each bay to maintain air circulation inside the enclosures. Heaters shall be completely wired to one main fused safety switch located in a steel enclosed compartment located in the front stile of the switch unit. Access to the heater switch shall be via a bolted access cover so constructed as to allow entry to the switch while the high voltage switch gear is energized.

(25) The switchgear shall meet all applicable requirements of the ASA, IEEE, NEMA, National Electric Code, and the Baltimore Gas and Electric Company.

(26) The substation shall be tested in accordance with "Recommended Inspections and Test Prior to Energizing of High Voltage Equipment in Customer-owned Substations" dated July 1, 1959 and prepared by the Baltimore Gas and Electric Company.

(27) The high voltage switchgear shall be as manufactured by the S & C Electric Company and complete shop drawings of the unit shall be submitted to the engineer and the Power Company for approval prior to fabrication.

c. High Voltage Substation Transformer

(1) Furnish and install where indicated on the drawings a completely metal enclosed, compartmented pad mounted distribution transformer rated as follows:

(a) Capacity -1000 KVA at 65°C rise.
(b) Primary Voltage - 13,200 volts delta
(c) Secondary Voltage - 480Y/277 volts
(d) Taps-two 2½% full capacity AN and BN
(e) Phase - Three
(f) Cycles - Sixty
(g) Insulation - Askarel filled self-cooled.

(2) The unit shall be constructed for outdoor weatherproof service and be suitable for mounting directly on the concrete pad with high and low voltage cable entrances from below.

(3) The unit shall be comprised of an Askarel filled transformer section with cooling radiator panels located in the rear of the unit. The front shall contain a detachable air-filled terminating chamber divided, with a steel barrier, into two separate sections. The high voltage section on the left shall contain three wet process porcelain, gasketed, side tank type, 95 B.I.L., bushings with isolation barriers, so located as to permit landing and terminating the incoming cable.

(4) The low voltage section on the right shall contain four wet process porcelain, gasketed, full capacity, flat NEMA drilled spade side tank type bushings factory wired to four bracket mounted three pole, 600 volt, moulded case circuit breakers with interrupting rated of not less than 30,000 RMS symmetrical amperes, with frame and trip rating as indicated on drawings.

(5) The following accessories shall be supplied as integral components of the unit:

(a) Tap changer with padlock-able handle for operation only when transformer is de-energized.

(b) Top filter press connection and filling plug.

(c) Bottom drain valve and press connection.

(d) Tank grounding pads.

(e) Provisions for lifting and jacking

(f) Liquid Level indicator

(g) Removable door sill

(h) Provisions for padlocking of air-filled low voltage terminal chamber with access to high voltage compartment only after opening of secondary chamber.

(i) Diagrammatic Nameplate

(6) The tank and enclosure metal parts shall be cleaned of weld scale, prime coated, and painted with a non scaling dark gray #ASA 24 finish.

(7) The unit shall be manufactured in accordance with the latest requirements of IEEE, NEMA and ASA. A full set of factory production line tests shall be imposed on the unit and certification of successful completion of these tests shall be furnished upon request.

(8) The transformer shall be Standard Transformer Company type HT6 - PMC or approved equal of General Electric Co. or Westinghouse.

21. SUBSTATION AND HIGH VOLTAGE CABLE TESTS

a. At the completion of the substation and high voltage cable installation, prior to connections to the supply lines, make the following inspections ans tests in the presence of the engineer.

(1) Inspect all high voltage equipment, wiring and connections for faulty connections prior to application of high voltage tests.

(2) Make complete internal and external inspection of load interruptor switches. Check adjustments of contacts, operating mechanisms, interlocks, etc.

(3) Measure substation ground network resistance as hereinafter specified.

(4) Measure insulation resistance of all transformer windings, buses, etc. Equipment tested isolated electrically from remainder of system.

(5) Make dielectric tests on insulating liquid samples from all transformers.

(6) Verify transformer ratios on all tap positions. Set transformer tap changers on tap position which will give specified secondary voltage.

(7) Apply high voltage tests on all high voltage equipment and wiring. Apply 75% of original factory A.C. test voltage to all equipment in accordance with ASA and AIEE standards. Apply a D.C. test to all high voltage cables. Voltage to be applied to rubber and rubber-like insulated cables shall be in accordance with IPCEA recommendations. Duration of tests shall be for (5) minutes on new cables.

(8) Make voltage build-up tests on all equipment and wiring with a voltage sufficient to determine that no short circuits exist.

(9) All tests shall be performed by an approved testing organization. Submit three (3) copies of all test results to Engineer for approval.

22. GROUNDING

a. Grounding of raceways, equipment and system neutral in accordance with the requirements of the National Electric Code.

b. Provide a ground grid for substation as follows:

(1) Provide a minimum of six (6) ground rods connected together with buried cable and tested as a unit before being covered over with a slab or other construction and before connections are made to the water main. Grid shall measure not less than five (5) ohms to ground as measured with a ground megger or equal. Additional grounds driven as necessary and tied into the grid to achieve the desired reading.

(2) Ground rods 5/8" x 10' copperweld with at least 8' in undisturbed earth.

(3) Connections to ground rods, splices in cables and any other connections below grade, brazed using 7% phoscopper brazing rod or thermit welded by "Cadweld" or equal process.

(4) Ground grid cables shall be 4/0 bare stranded medium hard drawn copper wire, a minimum of 1' below finished grade.

(5) Connections to equipment ground busses, etc. shall be made with mechanical connector, Burndy CQA28-2N or approved equal employing two bronze bolts, minimum diameter 3/8" for securing to item being grounded.

(6) Splices in ground cable above grade shall be made employing two (2) Burndy type "KVS" connectors for each connection.

(7) Submit drawing of ground grid and ground rod location for approval prior to installation.

23. LIGHTING FIXTURES

a. Unless otherwise noted, provide all lighting fixtures indicated on the drawings and specified herein. Each fixture complete with necessary hangers, stems, canopies, installation hardware, lamps, socket extensions, etc., as necessary for a complete installation.

b. All incandescent lamps 120 volts by General Electric, Westinghouse or Sylvania. Lamps inside frosted, general service.

c. Fluorescent lamps shall be by General Electric, Westinghouse, or Sylvania. All fluorescent lamps shall be cool white. 40 watt tubes shall be rapid start with output of 3100 lumens.

d. All fluorescent ballasts E.T.L., CBM approved of the quietest rating for the particular size required. Ballasts for 36" and 48" shall be General Electric "Bonus Line" or approved equal. Ballast voltages shall be 117 or 277 volts, depending upon the voltage of the circuit to which they are connected. Ballasts for 6 watt, 15 watt and 20 watt fluorescent tubes shall be low power factory trigger start with "A" sound rating, Advance, Jefferson or General Electric individually fused.

e. Where lighting fixtures fall under ducts, pipes, etc., they shall be supported from Kindorf or equal channel which is supported independently of the ducts, etc.

f. Fixture types shall be as follows:

(1) Type A - Surface mounted fluorescent fixture employing 2-40 watt rapid-start fluorescent tubes and having a prismatic diffuser of 100% virgin acrylic. Provide Day Brite #1x42-718 Guth AOK5805/BF or approved equal by Smithcraft.

(2) Type B - Square incandescent surface mounted "drum" unit employing two 60 watt lamps. Provide Prescolite #7009 or approved equal.

(3) Type BE - Same as type "B" except that it shall also be equipped with double contact bayonet socket and a 21 candlepower 32 volt lamp supplied from the emergency battery.

MICROFILMED

REVISIONS

NO.	DATE	ITEM	REF.

FIRM H. A. INC.
DESIGNED BY —
DRAWN BY —
CHECKED BY R B
APPROVED BY R B

SEAL H. A. JOB NO. N-16
STATE OF MARYLAND — RICHARD BRADLEY — No. 5070 — REGISTERED PROFESSIONAL ENGINEER

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
1747 N St. N.W. Washington, D.C. 20007
(301) 825-7440
202 [illegible]
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 9