- THIS SPECIFICATIONS AND THE CONTRACT DRAWINGS ARE INTENDED TO BE UTILIZED BY THE CONTRACTOR TO INSTALL CERTAIN ELECTRICAL AND COMMUNICATIONS EQUIPMENT, BUT ARE NOT TO BE INTERPRETED TO CONTAIN CERTAIN BASIC SYSTEM INSTALLATION KNOWLEDGE ESSENTIAL FOR A COMPLETE AND QUALITY INSTALLATION.
- 2. THE CONTRACTOR IS TO FURNISH LABOR, MATERIALS AND EQUIPMENT REQUIRED TO COMPLETELY INSTALL EACH SYSTEM INDICATED ON THE PLANS AND AS HERE WITHIN
- THE CONTRACTOR IS TO CAREFULLY EXAMINE THE SITE, PLANS AND SPECIFICATIONS AND INCLUDE LABOR AND EQUIPMENT NECESSARY TO PERFORM, BUT NOT NECESSARILY LIMITED TO. THE FOLLOWING WORK:
- A. THE FURNISHING AND INSTALLING OF A NEW PANELS AND TRANSFORMER.
- B. THE FURNISHING AND INSTALLING OF A NEW POWER (RECEPTACLES, CORD DROPS, EQUIPMENT CONNECTIONS, ETC.).
- C. FURNISH AND INSTALL ONE WALL EXHAUST FAN, DUCTWORK AND GRILLES/REGISTERS, MOTOR OPERATED DAMPER, CONTROLS, POWER AND CONTROLS WIRING FOR A COMPLETE AND FULLY FUNCTIONING SYSTEM. FAN IS TO BE INTERLOCKED TO OPERATE VIA AN ARGON GAS DETECTION SYSTEM, SEE DRAWINGS FOR MORE INFORMATION.
- D. PROVIDE AN AIR BALANCE REPORT TO BE FURNISHED BY AN APPROVED AIR BALANCING

### **GENERAL**

CONTRACTOR.

- THE CONTRACTOR IS TO FURNISH EQUIPMENT, LABOR, MATERIAL TOOLS, SERVICES, FACILITIES AND SUPERVISION NECESSARY FOR INSTALLATION OF THE ELECTRICAL SYSTEMS, IN GENERAL, AS NOTED UNDER THE SCOPE AND MORE FULLY SPECIFIED AND SHOWN ON THE DRAWINGS. THE CONTRACTOR IS TO CAREFULLY EXAMINE THE SITE, EXISTING CONDITIONS. PLANS AND SPECIFICATIONS BEFORE SUBMITTING THEIR PROPOSAL AS THEY WILL BE HELD RESPONSIBLE FOR A COMPLETE INSTALLATION IN EVERY DETAIL.
- EQUIPMENT IS TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR THE TYPE AND CAPACITIES OF EACH PIECE OF EQUIPMENT. THE CONTRACTOR IS TO OBTAIN THESE INSTRUCTIONS FROM THE MANUFACTURER AND INCLUDE SAME WITH THE SUBMISSION OF THE EQUIPMENT. THE TYPE, CAPACITY AND APPLICATION OF EQUIPMENT ARE TO BE SUITABLE AND CAPABLE OF SATISFACTORY OPERATION FOR THE PURPOSE INTENDED.

### INSTRUCTION TO BIDDERS/CONTRACTORS

- MATERIALS AND EQUIPMENT FURNISHED UNDER THE CONTRACT ARE TO BE "COMMERCIAL QUALITY" NEW AND BEAR THE UNDERWRITER'S LABORATORIES, INC., LABEL WHEREVER A STANDARD HAS BEEN ESTABLISHED BY THE AGENCY. CONSTRUCTION IS TO BE EXECUTED WITH THE MAXIMUM SPEED CONSISTENT WITH GOOD WORKMANSHIP. THE COMPLETE INSTALLATION IS SUBJECT TO THE APPROVAL OF THE ARCHITECT.
- . THE COMPLETE ELECTRICAL INSTALLATION IS TO BE SUBJECT TO REGULATIONS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS AND APPLICABLE FEDERAL (INCLUDING OSHA). STATE AND LOCAL CODES, ORDINANCES AND REGULATIONS AND IS HEREBY MADE A PORTION OF THESE SPECIFICATIONS AND IS TO HAVE THE SAME FORCE AS IF PRINTED IN FULL HEREIN.
- ANYTHING DRAWN OR SPECIFIED IS NOT TO CONFLICT WITH ANY LOCAL, MUNICIPAL STATE OR FEDERAL LAW. REGULATION OR ORDINANCE WHICH GOVERNS THE INSTALLATION OF ANY ELECTRICAL OR RELATED WORK. ITEMS ARE NOT TO BE INSTALLED IN CONFLICT WITH ANY CODE OR REGULATION. ANY CONFLICTS ARE TO BE RESOLVED BEFORE INSTALLATION BY THE CONTRACTOR AT NO ADDITIONAL COSTS.
- H. THE CONTRACTOR IS TO BE SOLELY RESPONSIBLE FOR CONSTRUCTION, MATERIAL AND EQUIPMENT FURNISHED FOR THE CONTRACT UNTIL COMPLETION OF THE PROJECT AND FINAL ACCEPTANCE. DAMAGED WORK OR MATERIALS ARE TO BE REPLACED BY THIS CONTRACTOR AT HIS OWN EXPENSE.
- 5. THE ACTUAL LOCATION OF WIRING, OUTLETS, AND EQUIPMENT IS TO BE DETERMINED AT
- CHANGES NECESSARY DUE TO LACK OF COORDINATION OR BECAUSE OF POOR WORKMANSHIP. AS DETERMINED BY THE ENGINEER ARE TO BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COSTS.
- INSPECTION FEES, BACKCHARGES AND PERMITS AND CERTIFICATES REQUIRED FOR THE INSTALLATION, TESTS AND INSPECTIONS OF WORK PROVIDED UNDER THIS CONTRACT ARE TO BE PAID FOR BY THE CONTRACTOR. PRIOR TO BIDDING, THE CONTRACTOR MUST CONTACT EACH UTILITY AND/OR SERVICE COMPANY TO OBTAIN THEIR EXACT REQUIREMENTS.

# COORDINATION

- CHANGES NECESSARY DUE TO LACK OF COORDINATION OR BECAUSE OF POOR WORKMANSHIP ARE TO BE MADE AT NO ADDITIONAL COST TO THE OWNER, I.E., SHOULD ANY CONTRACTOR PROCEED WITH THE INSTALLATION OF EQUIPMENT. PIPE. ETC., PRIOR TO COORDINATING WITH THE OTHER CONTRACTORS AND THAT EQUIPMENT, PIPE, ETC., PREVENTS PROPER INSTALLATION OF WORK OF OTHER TRADES, THE OFFENDING CONTRACTOR IS TO REMOVE AND REPLACE HIS WORK AT HIS OWN COST.
- THE ACTUAL LOCATION OF CONDUIT AND EQUIPMENT IS TO BE DETERMINED AT THE SITE. THE CONTRACTOR IS TO CONFER WITH THE VARIOUS OTHER PROJECT CONTRACTORS AS TO THE LOCATION OF THE DIFFERENT LINES OF PIPES, DUCTS AND EQUIPMENT INSTALLED UNDER THEIR CONTRACTS BEFORE ERECTING ANY WORK IN ORDER TO AVOID INTERFERENCE. THE CONTRACTOR IS TO COOPERATE WITH OTHER CONTRACTORS FOR THE PROPER SECURING AND ANCHORING OF WORK.
- THE CONTRACTOR IS TO VERIFY THE ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT WITH THE HEATING, PLUMBING AND GENERAL CONTRACTORS BEFORE PURCHASING ANY ELECTRICAL EQUIPMENT (SWITCHBOARD, PANELBOARDS, CIRCUIT BREAKERS, ETC.) AND WIRING.
- VERIFY ALL APPLIANCES AND EQUIPMENT WITH OWNER PRIOR TO CONSTRUCTION TO VERIFY CORRECT RECEPTACLES, WIRING, BREAKERS, ETC. REQUIRED FOR DEDICATED

# <u>CUTTING AND PATCHING - NEW CONSTRUCTION</u>

- THE CONTRACTOR WILL PROVIDE OPENINGS IN NEW WALLS NECESSARY FOR THE INSTALLATION OF ELECTRICAL WORK PROVIDED THE ELECTRICAL CONTRACTOR LOCATES SUCH OPENINGS IN A TIMELY FASHION (PRIOR TO ERECTION). OPENINGS ARE NOT TO BE CUT BEFORE SECURING PERMISSION FROM THE OWNER.
- OPENINGS IN NEW AND EXISTING ROOF WILL BE CUT AND PATCHED BY THE CONTRACTOR.
- NO CUTTING IS TO BE DONE WHICH MAY IN ANY WAY AFFECT THE BUILDING STRUCTURALLY WITHOUT FIRST SECURING THE CONSENT OF THE OWNER.

# <u>CUTTING AND PATCHING - EXISTING CONSTRUCTION</u>

- CUTTING AND PATCHING IN THE EXISTING BUILDING NECESSARY FOR THE INSTALLATION OF THE ELECTRICAL WORK IS TO BE DONE BY THE ELECTRICAL CONTRACTOR. PATCHING IS TO MATCH THE EXISTING MATERIALS AND FINISHES. WHERE PAINTED SURFACES ARE PATCHED, THE ELECTRICAL CONTRACTOR IS TO PAINT PATCHING TO MATCH THE EXISTING COLOR FINISHED WITH A MINIMUM OF A PRIME COAT AND TWO (2) FINISH COATS OF SHERWIN WILLIAMS OR APPROVED PAINTED COLOR AS SELECTED BY THE OWNER.
- PATCHING SHALL BE DONE AS PER APPROVED METHODS AND MATERIALS BY THE OWNER.

# DUST. DIRT AND NOISE

- THE CONTRACTOR IS TO DO CUTTING AND PATCHING IN A MANNER TO CAUSE THE LEAST DUST, DIRT AND NOISE. WALLS, FLOORS FURNITURE ETC. ARE TO BE PROPERLY PROTECTED BY THE USE OF COVERINGS, DROP CLOTHES OR BARRIERS AS REQUIRED.
- THE INTERIOR PREMISES OF THE BUILDING IS TO BE KEPT AS CLEAN AS POSSIBLE DURING THE ENTIRE CONSTRUCTION.

- DAILY CLEANUP IS REQUIRED.
- 4. DUST AND DIRT ARE TO BE REMOVED IN THE BUILDING AREAS BY THE USE OF AN INDUSTRIAL TYPE VACUUM CLEANER

# CONTINUITY OF SERVICE

- 1. UNINTERRUPTED ELECTRICAL SERVICE IS TO BE MAINTAINED DURING THE ENTIRE TIME REQUIRED FOR THE COMPLETE INSTALLATION OF THE WORK CONTEMPLATED UNDER THESE SPECIFICATIONS AND DRAWINGS.
- 2. THE CONTRACTOR IS TO ARRANGE HIS WORK AND PROCEED IN SUCH A MANNER AS WILL LEAST INTERFERE WITH THE NORMAL USE OF THE BUILDING AND FACILITIES. TEMPORARY EQUIPMENT. CABLE AND WHATEVER ELSE IS NECESSARY ARE TO BE PROVIDED AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE. TEMPORARY SERVICE FACILITIES. IF REQUIRED AT ANY TIME, ARE NOT TO BE DISCONNECTED OR REMOVED UNTIL NEW SERVICES ARE PLACED IN PROPER OPERATION.
- 3. IF ANY SERVICE OR SYSTEM MUST BE INTERRUPTED, THE CONTRACTOR IS TO REQUEST PERMISSION IN WRITING STATING THE DATE, TIME, ETC., THAT SYSTEM OR SERVICE IS TO BE INTERRUPTED AND THE AREAS AFFECTED. THIS REQUEST IS TO BE MADE IN SUFFICIENT TIME FOR PROPER ARRANGEMENTS TO BE MADE. WRITTEN PERMISSION IS TO BE OBTAINED FROM THE OWNER BEFORE INTERRUPTING THE ELECTRICAL SERVICE.
- 4. INTERRUPTIONS OF ELECTRICAL SERVICE AND WORK ARE TO BE DONE AT THE TIME DESIGNATED BY THE ARCHITECT AND OWNER.

#### SHOP DRAWINGS

- 1. THE CONTRACTOR IS TO SUBMIT DETAILED SHOP DRAWINGS AND DESCRIPTIVE DATA FOR EACH ITEM OF EQUIPMENT TO THE ENGINEER FOR APPROVAL. THE FOLLOWING IS A LIST OF ITEM CATEGORIES FOR WHICH SHOP DRAWINGS ARE TO BE SUBMITTED TO THE
- A. ELECTRIC PANELS TRANSFORMER
- OXYGEN DEPLETION/ARGON CONTROL PANEL & SYSTEM COMPONENTS AIR BALANCE REPORT
- COPIES OF WARRANTY CARDS DUCT CONSTRUCTION METHODS AND MATERIALS
- EQUIPMENT START-UP FORMS
- H. GRILLES, REGISTERS AND DIFFUSERS
- LETTER OF CERTIFICATION THAT INSTRUCTIONS HAVE BEEN GIVEN OPERATION AND MAINTENANCE MANUALS
- K. SIDEWALL EXHAUSTS FANS L. SUBSTITUTED ITEMS

# INSTRUCTIONS AND MAINTENANCE MANUALS

- 1. THIS CONTRACTOR IS TO FURNISH THE SERVICES OF COMPETENT PERSONNEL TO INSTRUCT EMPLOYEES DESIGNATED BY THE ARCHITECT IN THE PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT AND SYSTEMS INSTALLED UNDER THE CONTRACT.
- 2. A LETTER OF CERTIFICATION ITEMIZING THE EQUIPMENT, SYSTEM, INSTRUCTOR AND BEARING THE SIGNATURE OF THE INSTRUCTORS AND EMPLOYEES INSTRUCTED IS TO BE DELIVERED TO THE ARCHITECT UPON FINAL COMPLETION OF THE PROJECT.
- 3. THE CONTRACTOR IS TO FURNISH THE OWNER WITH THREE (3) COPIES OF A BOUND "MAINTENANCE MANUALS" CONTAINING COMPLETE OPERATING INSTRUCTIONS, PREVENTIVE MAINTENANCE PROCEDURES, MANUFACTURERS' CATALOG NUMBERS AND COMPLETE DESCRIPTION AND PARTS LIST OF EACH PIECE OF EQUIPMENT FURNISHED UNDER THE CONTRACT.

### **BALANCING**

1. THE SYSTEM OF FEEDER AND BRANCH CIRCUITS FOR POWER AND LIGHTING IS TO BE CONNECTED TO PANELBOARD BUSSES IN SUCH A MANNER THAT LOADS CONNECTED THERETO WILL BE BALANCED ON EACH PHASE AS CLOSELY AS PRACTICAL. SHOULD THERE BE ANY UNFAVORABLE CONDITION OF BALANCE ON ANY PART OF THE ELECTRIC SYSTEMS, THE ELECTRICAL CONTRACTOR IS TO MAKE SUCH CHANGES THAT MAY BE SUGGESTED BY THE ENGINEER TO REMEDY THE UNBALANCED CONDITION AT NO ADDITIONAL COST.

# **EQUIPMENT TESTS**

- 1. WHEN THE INSTALLATION IS COMPLETE AND READY FOR ACCEPTANCE, TESTS AND INSPECTION ARE TO BE MADE BY THIS CONTRACTOR IN THE PRESENCE OF THE ARCHITECT TO ASCERTAIN COMPLIANCE WITH THE CONTRACT.
- 2. THE CONTRACTOR IS TO IMMEDIATELY REMEDY DEFECTS AND SHORTCOMINGS. ADDITIONAL TESTS ARE TO BE PERFORMED AT NO ADDITIONAL CONTRACT COST.
- 3. EQUIPMENT FURNISHED TO THE ELECTRICAL CONTRACTOR BY ANOTHER CONTRACTOR IS TO BE TESTED IN THE PRESENCE OF THAT CONTRACTOR TO DETERMINE SATISFACTORY OPERATION AND PERFORMANCE OF FUNCTION INTENDED.
- 4. DO TESTING WHEN SO DIRECTED BY THE ARCHITECT BEFORE FINAL ACCEPTANCE.

# **ELECTRICAL TESTS**

1. THE CONTRACTOR IS TO MAKE VOLTAGE AND MEGGER TESTS OF CIRCUITS AS REQUESTED BY THE ARCHITECT AND/OR ANY INSPECTION DEPARTMENT HAVING JURISDICTION. THE ELECTRICAL CONTRACTOR IS TO FURNISH AND INSTALL EQUIPMENT AND LABOR REQUIRED FOR THESE TESTS.

# **GUARANTEE**

1. THE CONTRACTOR IS TO GUARANTEE FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE IN WRITING BY THE ENGINEER THAT MATERIAL, EQUIPMENT AND WORKMANSHIP, FURNISHED UNDER THE CONTRACT, ARE FREE FROM DEFECTS. THE CONTRACTOR IS TO REPLACE ANY EQUIPMENT OR MATERIAL FOUND DEFECTIVE WITHIN THE GUARANTEE PERIOD AT NO COST TO THE OWNER.

# SPECIAL ENGINEERING SERVICES

- 1. IN THE INSTANCE OF COMPLEX OR SPECIALIZED ELECTRICAL SYSTEMS, THE INSTALLATION, FINAL CONNECTIONS AND THE TESTING OF SUCH SYSTEMS ARE TO BE MADE UNDER THE DIRECT SUPERVISION OF COMPETENT AUTHORIZED SERVICE ENGINEERS WHO ARE TO BE IN THE EMPLOY OF THE RESPECTIVE EQUIPMENT MANUFACTURER.
- 2. ANY EXPENSES INCURRED BY THESE EQUIPMENT MANUFACTURER'S REPRESENTATIVES ARE TO BE BORNE BY THE CONTRACTOR.

# ACCESS PANELS

- 1. THE CONTRACTOR IS TO FURNISH ACCESS PANELS NO LESS THAN 12" BY 16" UNLESS OTHERWISE NOTED ON THE DRAWINGS FOR ACCESS TO CONCEALED PULL BOXES, JUNCTION BOXES OR SIMILAR ITEMS WHERE NO OTHER MEANS OF ACCESS IS PROVIDED. THE ELECTRICAL CONTRACTOR IS TO DELIVER ACCESS PANELS TO THE GENERAL CONTRACTOR FOR INSTALLATION.
- 2. ACCESS PANELS ARE TO BE STEEL CONSTRUCTED WITH NO. 16 GAUGE WALL OR CEILING FRAME AND NO. 14 GAUGE PANEL DOOR. DOORS ARE TO BE PROVIDED WITH CONCEALED HINGES SECURED WITH SUITABLE CLIPS AND COUNTER SUNK SCREWS.
- 3. OUTSIDE OF ACCESS PANEL IS TO FINISH FLUSH WITH FINISHED WALL OR CEILING SURFACES AND HAVE A SHOP COAT OF PAINT TO MATCH THE ADJACENT AREAS.
- 4. ACCESS PANELS INSTALLED IN FIRE RATED CEILINGS OR WALLS ARE TO BE SIMILAR RATED.

# MISCELLANEOUS STEEL

PLACE BY THE CONTRACTOR.

- 1. FURNISH AND INSTALL NECESSARY STEEL ANGLES, BEAMS, CHANNELS, HANGER RODS AND OTHER SUPPORTS FOR EQUIPMENT AND PIPING FURNISHED UNDER THIS CONTRACT REQUIRING SUPPORT OR SUSPENSION FROM BUILDING STRUCTURE EXCEPT SUPPORT STEEL WHERE OTHERWISE NOTED ON THE PLANS.
- 2. THE CONTRACTOR IS TO BE RESPONSIBLE FOR LOCATING SLEEVES AND LINTELS FOR CONDUITS PASSING THROUGH EXTERIOR MASONRY WALLS ABOVE GRADE, WATERPROOF WALLS AND THROUGH ROOFS.

### <u>FIREPROOFING</u>

- 1. WHERE CONDUITS, BOXES OR EQUIPMENT OF ANY TYPE PASS THROUGH FIRE RATED CEILINGS, FLOORS AND WALLS, THE CONTRACTOR IS TO THOROUGHLY SEAL SUCH OPENINGS WITH HIGH TEMPERATURE FIRE RESISTING MATERIALS. O.Z./GEDNEY FIRE-SEAL FITTINGS OR APPROVED EQUAL, IS TO BE USED AT OPENINGS. THE CONTRACTOR IS TO BE RESPONSIBLE FOR PROVIDING NECESSARY FIRE RESISTANT MATERIALS AND COVERS, WHERE FIRE RATED PORTIONS OF THE BUILDING STRUCTURE ARE PENETRATED UNDER THIS CONTRACT, IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA, AND OTHER APPLICABLE CODES.
- HOLES, VOIDS AND SLEEVES CREATED OR INSTALLED TO EXTEND ELECTRICAL SYSTEMS THROUGH WALLS OR CEILINGS TO BE SEALED BY THE CONTRACTOR WITH AN INTRUMESCENT MATERIAL CAPABLE OF EXPANDING UP TO 8 TO 10 TIMES WHEN EXPOSED TO TEMPERATURES BEGINNING AT 250°F. IT IS TO BE U.L. CLASSIFIED AND HAVE APPROPRIATE CODE APPROVED RATINGS FOR THREE (3) HOURS PER A.S.T.M. E-814.
- 3. ACCEPTABLE MATERIALS ARE TO BE 3M BRAND FIRE BARRIER PENETRATION SEALING SYSTEMS CAULK, PUTTY, STRIP AND SHEET FORMS OR APPROVED EQUAL. METHOD OF APPLICATION IS TO BE IN ACCORDANCE WITH MANUFACTURER'S LATEST RECOMMENDATIONS WHICH ARE TO BE FURNISHED AS PART OF THE "SHOP DRAWINGS".
- 4. GENERALLY, BLOCKING MATERIALS ARE TO BE METAL; HOWEVER, SHOULD WOOD BLOCKING BE UTILIZED AT ANY LOCATION, THE BLOCKING MUST BE MADE FIRE-RESISTANT.

### PROJECT RECORD DOCUMENTS

- . DURING THE PROGRESS OF THE WORK, THE CONTRACTOR, ASSIGNED SUB—CONTRACTORS AND MAJOR SUB-CONTRACTORS EMPLOYED BY THEM. ARE TO MAINTAIN A CURRENT (DAILY) RECORD SET OF CONTRACT DWGS. (PRINTS) AND SPECIFICATIONS, INDICATING THEREON WORK INSTALLED AT VARIANCE WITH SUCH CONTRACT DOCUMENTS. INCLUDING WORK COVERED BY SUPPLEMENTAL CONTRACTS, ADDENDA, CHANGE ORDERS OR OTHER BONA FIDE SOURCES.
- 2. AT THE COMPLETION OF THE CONSTRUCTION WORK AND PRIOR TO ACCEPTANCE OF THE PROJECT. THE CONTRACTOR IS TO FURNISH THE ARCHITECT A COMPLETE SET OF "AS-BUILT" RED-LINED PRINTS INDICATED THEREON CHANGES AND REVISIONS FROM THE ORIGINAL CONTRACTOR DOCUMENTS AND SUCH ADDITIONAL DETAILS AS TO PROVIDE A COMPLETE REFERENCE DOCUMENT FOR USE BY OWNER. IF VARIATIONS AND DETAILS CANNOT BE SHOWN CLEARLY THEREON, THEN THE CONTRACTOR IS TO PREPARE SUPPLEMENTAL DRAWINGS ADEQUATE TO IMPART THE INFORMATION.
- 3. INDICATIONS ON "RECORD" DRAWINGS ARE TO BE EXECUTED IN A LEGIBLE MANNER BY A COMPETENT DRAFTSPERSON, PAID BY THE CONTRACTOR, USING METHODS AND LEGEND PRESENTATIONS APPROVED IN CONFERENCE WITH THE ENGINEER AND COMPATIBLE WITH THE OVERALL SCHEME OF THE ORIGINAL DRAWINGS AS RESPECTS SCALE, DRAWING SHEET SIZES AND SEQUENTIAL INDEXING.
- 4. THE ENGINEER IS TO RECEIVE AND REVIEW "AS-BUILT" DRAWINGS AND GUIDE THE CONTRACTOR IN HIS EXECUTION OF ANY NECESSARY CORRECTIONS.

### ELECTRICAL REQUIREMENTS FOR EQUIPMENT INSTALLATION

- 1. CONDUIT AND POWER WIRING OF REQUIRED SIZE AND VOLTAGE FROM A PANELBOARD OR SIMILAR SOURCE ARE TO BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR, TO THE EQUIPMENT FURNISHED BY THE HEATING CONTRACTOR, PLUMBING CONTRACTOR OR GENERAL CONTRACTOR. A JUNCTION BOX OR MEANS OF DISCONNECT (AS REQUIRED) IS TO BE FURNISHED AND INSTALLED AT THE EQUIPMENT BY THE CONTRACTOR FURNISHING THE EQUIPMENT.
- 2. UNLESS OTHERWISE SPECIFIED OR NOTED ON THE DRAWINGS, A FULL COMPLEMENT OF CONTROL COMPONENTS, REQUIRED FOR THE INTENDED USE AND/OR OPERATION OF EQUIPMENT, INCLUDING LINE STARTERS, CONTACTORS, MAGNETIC CONTROLLERS, START-STOP SWITCHES. MULTI-SPEED SWITCHES, STEP CONTROLLERS AND/OR OTHER CONTROL DEVICES REQUIRED WHETHER INTEGRAL OR REMOTE, IS TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR FURNISHING THE EQUIPMENT. THE POWER WIRING (WHERE REQUIRED) THROUGH THESE DEVICES IS TO BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
- 3. FURNISHING AND INSTALLING OF CONTROL WIRING FOR CONTROL DEVICES AND PROPER FUNCTIONING OF EQUIPMENT IS TO BE THE RESPONSIBILITY OF THE CONTRACTOR
- 4. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR POWER CONNECTIONS TO EQUIPMENT AND FOR PROPER ROTATION OF MOTORS.
- 5. THE APPROXIMATE LOCATION OF MOTORS AND CONTROL EQUIPMENT IS INDICATED ON THE DRAWINGS. THE CONTRACTOR IS TO MAKE ALLOWANCE FOR RELOCATIONS THAT MAY DEVELOP AT THE TIME OF INSTALLATION. THE EXACT LOCATION OF THE EQUIPMENT WILL BE DETERMINED AT THE SITE BY THE ARCHITECT. THE CONTRACTOR WHOSE EQUIPMENT IS BEING INSTALLED AND THE ELECTRICAL CONTRACTOR.

# WIRING SYSTEMS AND DEVICES

# PANELBOARDS - BRANCH CIRCUITS

- 1. FURNISH AND INSTALL, WHERE SHOWN ON THE DRAWINGS OR SPECIFIED, AUTOMATIC CIRCUIT BREAKER PANELBOARDS COMPLETE WITH ENCLOSING CABINET.
- 2. PANELBOARDS ARE TO BE ARRANGED AND RATED FOR DISTRIBUTION VOLTAGE CHARACTERISTICS INDICATED ON THE DRAWINGS.
- 3. BUSSING IS TO BE IN ACCORDANCE WITH THE LATEST A.S.A. (U.S.A.) AND NEMA STANDARDS AND BE CONSTRUCTED OF HIGH CONDUCTIVITY COPPER NOT TO EXCEED A CURRENT DENSITY OF 1.000 AMPERES PER SQUARE INCH OR HIGH CONDUCTIVITY ELECTRICAL GRADE ALUMINUM NOT EXCEEDING 800 AMPERES CURRENT DENSITY PER SQUARE INCH. NEITHER TO EXCEED A TEMPERATURE RISE OF 35°C (95°F) ABOVE AMBIENT TEMPERATURE INSIDE THE ENCLOSURE OF 55°C (131°F) AT FULL LOAD CURRENT IN STILL, BUT UNCONFINED AIR, AS DEFINED IN THE I.E.E.E. STANDARD RULES.
- 4. ALUMINUM BUS IS TO BE TIN PLATED BY FIRST REMOVING ALUMINUM OXIDE AND THEN DEPOSITING AN INTERMEDIATE CONDUCTIVE PLATING OR PLATINGS FOLLOWED BY FINAL ELECTROPLATING OF TIN.
- 5. PANELBOARDS ARE TO BE ARRANGED WITH A SEPARATE GROUNDING TERMINAL BAR BONDED TO THE PANELBOARD CABINET FOR EQUIPMENT GROUNDING AND AN INSULATED NEUTRAL BAR. GROUNDING TERMINAL BAR IS NOT TO BE CONNECTED TO THE INSULATED NEUTRAL BAR.
- . WHERE A MAIN CIRCUIT BREAKER IS INDICATED ON THE PANEL SCHEDULE ON THE DRAWINGS OR WHERE SAME IS REQUIRED. THE MAIN BREAKER IS TO BE ARRANGED TO FEED THE PANEL IN WHICH THE BREAKER IS INSTALLED AND IF THE PANELBOARD IS A DOUBLE COMPARTMENT, THE MAIN CIRCUIT BREAKER IS TO ALSO FEED THE ADJOINING PANEL THROUGH SUITABLE CABLE CONNECTIONS.
- 7. PANELBOARDS ARE TO BE ARRANGED WITH A MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS AND ARE TO BE PROVIDED WITH PROPER SIZE LUGS FOR THE FEEDER CONDUCTORS SHOWN.
- 8. A TYPEWRITTEN INDEX OF CIRCUITS IS TO BE ENCLOSED IN AN INDEX HOLDER ON THE BACK OF EACH PANELBOARD DOOR. THE INDEX HOLDER IS TO BE PROVIDED WITH A
- 9. THE PANELBOARDS, CABINETS, CIRCUIT BREAKERS, ETC., ARE TO BE LISTED BY THE UNDERWRITER'S LABORATORIES AND BEAR THEIR LABEL.
- 10. CIRCUIT BREAKERS ARE TO HAVE THERMALLY OPERATED INVERSE TIME LIMIT TRIPPING ELEMENTS THAT WILL NOT TRIP THE BREAKER ON HARMLESS MOMENTARY OVERLOAD BUT INSURE ADEQUATE CIRCUIT PROTECTION. RAPID INTERRUPTION OF SHORT CIRCUIT CURRENTS IS TO BE ACCOMPLISHED WITH AN INSTANTANEOUS MAGNETIC TRIP ELEMENT
- 11. CIRCUIT BREAKERS ARE TO BE 1, 2, OR 3-POLE WITH TRIP ELEMENTS CALIBRATED FOR 15 TO 400 AMPERES IN WIRE SIZE CAPACITIES AS INDICATED ON THE DRAWINGS. CIRCUIT BREAKERS ARE TO BE OF SUITABLE VOLTAGE RATINGS FOR THE CIRCUIT THEY
- 12. CIRCUIT BREAKERS ARE TO BE OF THE "BOLT-IN" TYPE.
- 13. CIRCUIT BREAKERS TO BE AS MANUFACTURED BY SQUARE D. CUTLER HAMMER. GENERAL ELECTRIC OR EQUIVALENT AS REVIEWED BY THE ARCHITECT FOR GENERAL CONFORMANCE

### RIGID CONDUIT

- CONDUIT IS TO BE HEAVY WALL, RIGID STEEL, MANUFACTURED OF MILD STEEL TUBE OF UNIFORM THICKNESS AND SMOOTH CIRCULAR BORE APPROVED FOR USE AS AN ELECTRICAL RACEWAY AND CONFORM TO THE FEDERAL SPECIFICATIONS WW-C-581, AND BE ZINC-COATED, GALVANIZED OR SHERADIZED INSIDE AND OUTSIDE. FACTORY THREADED CONDUIT IS TO BE FURNISHED WITH PROTECTIVE COATED THREADS. CONDUIT IS TO BE H.K. PORTER COMPANY, YOUNGSTOWN SHEET AND TUBE COMPANY OR TRIANGLE CONDUIT AND CABLE COMPANY.
- CONDUITS ARE TO BE ASSEMBLED WITH GALVANIZED HEAVY WALL THREADED COUPLINGS AND FITTINGS.

### RIGID NON-METALLIC CONDUIT

CONDUIT IS TO BE PVC TYPE 40 CONDUIT FOR APPLICATION IN UNDERGROUND AND ENCLOSED APPLICATIONS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ARTICLE 347).

CONDUIT AND STAMPED OR MOLDED ON EVERY FITTINGS.

- 2. CONDUIT IS TO BE 90° C, UL RATED OR EQUIVALENT. MATERIAL IS TO COMPLY WITH NEMA SPECIFICATION TC-2 (CONDUIT), TC-3 (FITTINGS - UL-514) AND UL-651.
- 3. THE CONDUIT AND FITTINGS ARE TO CARRY A UL LABEL ON EACH 10'-0" LENGTH OF
- 4. CONDUIT AND FITTINGS ARE TO BE IDENTIFIED FOR TYPE AND MANUFACTURER AND BE TRACKABLE TO LOCATION OF PLANT AND DATE MANUFACTURED.
- 5. THE CONDUIT IS TO BE MADE FROM POLYVINYL CHLORIDE C-300 COMPOUND WHICH INCLUDES INERT MODIFIERS TO IMPROVE WEATHERABILITY, HEAT DISTORTION. CLEAN REWORK MATERIAL, GENERATED BY THE MANUFACTURER'S OWN CONDUIT PRODUCTION, MAY BE USED BY THE SAME MANUFACTURER, PROVIDED THE END PRODUCTS MEET THE REQUIREMENTS OF THIS SPECIFICATION.
- THE CONDUIT AND FITTINGS ARE TO BE HOMOGENEOUS PLASTIC MATERIAL FREE FROM VISIBLE CRACKS, HOLES OR FOREIGN INCLUSIONS. THE CONDUIT BORE IS TO BE SMOOTH AND FREE OF BLISTERS, NICKS OR OTHER IMPERFECTIONS WHICH COULD MAR CONDUCTORS OR CABLES.
- CONDUIT, FITTINGS AND CEMENT ARE TO BE PRODUCED BY THE SAME MANUFACTURER TO ASSURE SYSTEM INTEGRITY.
- CONDUIT AND FITTINGS ARE TO BE TESTED IN ACCORDANCE WITH THE TESTING REQUIREMENTS DEFINED IN NEMA TC-2, NEMA TC-3 AND UL-651 AND UL-514 (FITTINGS). THE ACCEPTANCE CRITERIA IS TO BE AS GIVEN IN THE SAME STANDARDS.
- 9. CONDUIT AND FITTINGS ARE TO BE SOLVENT CEMENTED IN APPLICATIONS IN ACCORDANCE WITH INSTRUCTIONS FROM THE MANUFACTURER.
- 10. WHERE CONDUIT IS RUN UNDER FLOORS AND EXTERIOR OF BUILDING, CONTRACTOR IS TO CHANGE TO A METAL CONDUIT (AS SPECIFIED) UNDERGROUND AND CONTINUE CONDUIT RUN. WHERE CONDUITS PASS THRU FOOTER, OR BELOW GRADE WALL, CONTRACTOR IS TO SLEEVE CONDUIT WITH A SLEEVE TWICE THE SIZE OF THE CONDUIT.

### **ELECTRICAL METALLIC TUBING**

- ELECTRICAL METALLIC TUBING IS TO BE MADE OF COLD ROLLED STEEL, OXYACETYLENE WELDED TO FORM A PERFECTLY TRUE TUBE OF UNIFORM THICKNESS. TUBING IS TO BE PICKLED AND CLEANED TO REMOVE SCALE AND FOREIGN SUBSTANCES AND THEN GALVANIZED. ELECTRICAL METALLIC TUBING IS TO CONFORM TO FEDERAL SPECIFICATIONS WW-C-806A. TUBING IS TO BE H.K. PORTER COMPANY, YOUNGSTOWN SHEET AND TUBE CO. OR TRIANGLE CONDUIT AND CABLE COMPANY.
- ELECTRICAL METALLIC TUBING IS TO BE ASSEMBLED BY USE OF THREADED OR SET-SCREW TYPE CONNECTORS AND COUPLINGS. THREADLESS TYPE FITTINGS ARE TO BE TIGHTENED WITH WRENCHES. SET SCREW TYPE FITTINGS ARE TO HAVE CAPTIVE TYPE SCREWS. COUPLINGS AND FITTINGS ARE TO BE AS MANUFACTURED BY THOMAS AND BETTS CO., ETP DIVISION OF BURGO INDUSTRIES, STEEL CITY OR RACO. SET SCREW FITTINGS 1/2" AND LARGER ARE TO HAVE DUAL SET SCREWS.

# FLEXIBLE METALLIC CONDUIT

1. FLEXIBLE METALLIC CONDUIT IS TO BE HOT DIPPED, GALVANIZED STEEL CONSTRUCTION

WITH INTERLOCKING CONVULSIONS, CONFORMING TO FEDERAL SPECIFICATION WW-C-566.

2. FLEXIBLE CONDUIT IS TO BE ATTACHED TO RIGID CONDUIT, FIXTURES OR BOXES WITH

# FLEXIBLE LIQUID-TIGHT METALLIC CONDUIT

MALLEABLE IRON, GALVANIZED COUPLINGS.

- 1. FLEXIBLE CONDUIT IS TO BE CONSTRUCTED WITH GALVANIZED STEEL CORE WHICH HAS EXTRUDED POLYVINYL CHLORIDE COVER. FLEXIBLE CONDUIT IS TO BE ASSEMBLED WITH FITTINGS MANUFACTURED FOR USE WITH FLEXIBLE, LIQUID-TIGHT CONDUIT. CONDUIT IS TO BE ANACONDA "SEALTITE" TYPE UA, WITH BONDING CONDUCTOR, STEEL CITY OR
- 2. CONDUIT IS TO BE ASSEMBLED BY USE OF LIQUID-TIGHT INSULATED CONNECTORS MANUFACTURED BY THOMAS AND BETTS COMPANY, RACO OR STEEL CITY.
- CONDUIT AND FITTINGS ARE TO BE UNDERWRITERS" LABORATORIES, INC. APPROVED.

# METAL CLAD. TYPE 'MC' CABLE

- TYPE 'MC' CABLE IS TO BE CONSTRUCTED OF GALVANIZED STEEL ARMOR JACKET. CONDUCTORS ARE TO BE SOLID COPPER IN SIZES FROM 14 THRU 8 AND STRANDED COPPER IN SIZES FROM 6 THRU 1. CONDUCTORS ARE TO BE INSULATED WITH THHN-90° C INSULATION. EACH CABLE IS TO INCLUDE AN INTERNAL INSULATED COPPER EQUIPMENT GROUND CONDUCTOR MADE OF COPPER. 600 VOLTAGE RATED.
- 2. CABLE FITTINGS ARE TO BE UNDERWRITERS' LABORATORIES, INC., APPROVED.
- 3. PROVIDE ANTI-SHORT DEICES AT TERMINATIONS.
- 4. INSTALLATION OF TYPE 'MC' CABLE IS TO BE IN A WORKMANLIKE MANNER. "SPAGHETTI" TYPE INSTALLATION IS NOT PERMITTED.
- 'MC' TYPE CABLE CONNECTED TO SURFACE MOUNTED PANELS ARE TO BE ENCLOSED IN SUITABLE METAL ENCLOSURES FROM PANELBOARDS TO CEILING AND FROM PANELBOARDS TO FLOOR. ENCLOSURES ARE TO BE PAINTED TO MATCH PANELBOARD.

PROFESSIONAL CERTIFICATION I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME. AND THAT LAM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS. OF THE STATE OF MARYLAND, LICENSE NO. 50053, EXPIRATION DATE: 10-13-2024 DATE <u>12-06-202</u>3 BRETT NICHOLAS YONISH



Z COUNT BUILDING RE ALLEGAN' LAVALLE Z Q

A LIMITED LIABILITY COMPANY

541 MAIN STREET WINDBER, PA 15963 (814) 467-6877

BRETT N. YONISH, P.E.

CHRISTOPHER G. ALBRIGHT, P.E.

**REVISIONS** MARK DATE

DRAWING NO. 12-06-202 DRAWN BY: HECKED BY:

ROJECT NO. EHEA 2302

BUILDING BY ALLOWING DEBRIS, EXCESS MATERIALS, ETC., TO REMAIN ON THE PREMISES. ORIGINAL DRAWING SIZE = 24"x36"