ELECTRICAL SPECIFICATIONS - COMMERCIAL

SECTION 16A - ELECTRICAL WORK

1. GENERAL:
   - A. The GENERAL and SPECIAL CONDITIONS listed under Division 1 shall govern this work where applicable.
   - B. The contractor shall furnish all labor, materials, equipment and accessories necessary for the construction of the complete functioning electrical system.
   - C. All labor and materials, although not specifically mentioned, but necessary for the completion of the work and the successful operation of the electrical systems, shall be as if specifically indicated.
   - D. Materials and equipment installed as part of the permanent installation shall be new unless otherwise indicated or specified, and shall be approved by the Underwriter's Laboratories, Inc., for installation in each particular case where standard's have been established.
   - E. All wiring shall be concealed in wall or above ceilings wherever possible. Exposed locations shall be pre-approved the architect prior to rough-in. Exposed wiring at finished areas shall be installed in conduit or surface metal raceway per architects approval. Exposed surfaces shall be primed and finish painted as directed.
2. SCOPE:
   - A. The Contractor shall provide all labor and materials required to install a completed system of electrical work as indicated on the drawings and/or herein specified. Work includes but is not limited to the following:
     1. Service equipment
     2. Power and lighting feeders, panelboard, safety switches.
     3. Receptacles and equipment connections
     4. Lighting system complete with lamps
     5. Final connections of mechanical equipment, electrical motors.
     6. Coordination with electric & telephone utility companies.
3. REGULATIONS AND CODE REQUIREMENTS:
   - A. All work shall conform to the requirements of the latest editions of the following codes, regulations and specifications.
     1. National Electrical Code (NFPA 70)
     2. National Fire Protection Association (NFPA)
     3. Underwriters Laboratories, Inc.
     4. Building Code
     5. Local and state requirements
4. CERTIFICATES:
   - A. The Contractor shall at his expense, have inspection made by the Electrical Inspection Department of the complete electrical installation and shall deliver certificate approval of the complete work.
5. PERMITS:
   - A. The Contractor shall obtain and pay for all permits required for his work.
6. SHOP DRAWINGS:
   - A. The Contractor shall submit ten (10) copies of shop drawings and manufacturer's catalog cuts showing all details of all equipment to be furnished.
7. GUARANTEE:
   - A. In addition to the guarantee obligations herein before specified in other divisions, the Contractor shall guarantee the complete electrical system installation free from all mechanical and electrical defects for the period of one year from date of final acceptance by the Owner.
8. DRAWINGS AND SPECIFICATIONS:
   - A. The drawings are intended to show the general arrangement of the outlets. Door swings shall checked for arrangement of switches, installed on the latch side. Contractor shall check structural plans, mechanical plans and specifications so that he may coordinate his work with these trades.
   - B. All outlets shall be located uniformly with respect to beams, partitions, ducts, openings, etc., and the general locations shall be checked with the Architect before installing. Should there be any interference between the electrical outlets and other trades, the contractor shall notify the Architect so that the proper location may be decided upon. No outlets shall be installed in back of ducts, grilles, or inaccessible places.
9. UTILITY COORDINATION:
   - A. The Contractor shall coordinate incoming utility service with the utility company at the start of the project and thru duration of the construction phase.
10. GROUNDING:
    - A. Grounding of all conduit, panelboards, boxes, cabinets and equipment shall conform to the requirements of the latest edition of the National Electric Code.
    - B. Ground connectors shall have rigid clamp jaws at water service. The grounding system shall be in strict accordance with Section 250 – BI of the NEC.
    - C. All branch circuits shall include a bonded raceway or conductor. Equipment ground per NFPA 70, article 250 in addition to tick marks indicated on wiring.
    - D. Equipment insulated ground conductor, where indicated, shall be provide in addition to the bonded raceway or jacket (single ground source for non-metalic raceway)
    - E. Isolated ground conductors to be connected to all I.G. terminations along entire circuit length (maintain isolation from equipment ground per NFPA).
11. DISTRIBUTION EQUIPMENT:
    - A. New panelboards shall be equivalent to square 'D' NQOD Panels with bolt-on circuit breakers. All panels shall be labeled and provided with type written circuit directory.
    - B. Fuses for main service shall be class RK1 current limiting type. Fuse protecting motors shall be dual element time delay type as recommended by the supplier.
12. EQUIPMENT CONNECTIONS AND MOTOR STARTERS:
    - A. All power wiring shall be installed and connected under this section, unless already provided by on the equipment.
13. CONDUCTORS:
    - A. All secondary conductors shall be copper, 98% conductivity covered with 600 volt standard type THW or THHN insulation. Agw size shall be per NFPA 70 or larger where indicated on the plans.
    - B. All wiring shall be in strict accordance with the latest edition of the National Electrical Code.
    - C. All wire number 8 and larger shall be stranded.
    - D. A color coding system shall be used throughout the building network of feeders and circuits and used as a basis of balancing the load within 10%.
    - E. Neutral conductors for isolated ground circuits shall be dedicated or sized 1.73 times larger for shared neutral circuits.
    - F. Upon completion of branch circuit wiring, the Contractor shall check and adjust circuit breaker arrangements to assure system load balance is within +10% or –10% across all three phases.
14. WIRING METHODS:
    - A. Feeders rated 100A or greater shall be conductors ran in conduit.
    - B. Branch circuit wiring shall be type MC cable minimum and in a accordance with code requirements.
    - C. Wiring below grade or slab shall be conductors installed in PVC conduit with metallic boot or concrete encased elbows at all stub-up locations.
    - D. Conduit sizes shall be per NFPA 70 or larger as indicated on the plans.
15. OUTLET BOXES:
    - A. Outlet boxes in concealed locations shall be galvanized stamped steel of sizes required by the NEC.
    - B. Boxes in exposed locations shall be cast, with gasketed cover.
    - C. Provide covers for all boxes.
16. PULL-BOXES AND JUNCTION BOXES:
    - A. Pull-boxes shall be provided as shown or wherever required to facilitate pulling of wires and cables, or as junction points. All such boxes shall be installed in accessible locations.
17. WIRING DEVICES:
    - A. Receptacles & switches to be furnished as follows:
      - a. Duplex receptacles: Leviton #5362 (NEMA 5-20R)
      - b. GFI receptacles: Leviton #6898 (NEMA 5-20R)
      - c. Toggle Switches: Leviton #1221 Series
      - d. Wall Plates: 0.032" thick type 302 stainless steel, non-magnetic. Face plate finish shall be as selected by Architect
    - B. 20 AMP rated receptacles shall be used for all dedicated 20 AMP circuit connections per NFPA 70 requirements.
18. LIGHTING FIXTURES:
    - A. The Contractor shall provide all labor and materials, equipment and services necessary for and incidental to the installation of all lighting fixtures.
    - B. Provide a fixture for each outlet shown on the drawings. Fixtures shall be complete with lamps, lenses, glassware, mounting brackets, etc., for a complete assembly. All fixtures shall be UL listed.
    - C. Compact fluorescent & T8 lamps shall have HPF, electronic ballasts with 20% THD maximum.

SECTION 16B - DEMOLITION WORK

1. SCOPE:
   - A. Material and equipment made superfluous by reason of the new work shall become the property of the contractor and shall be removed from the site unless the equipment is specifically indicated to be retained bye the Owner, in which case the contractor shall disconnect & remove the equipment and return to the Owner.
   - B. The contractor shall furnish all labor, material and equipment necessary to complete the demolition work.
   - C. The work shall include removal and relocation of existing equipment as shown on the drawings.
2. SITE VISIT:
   - A. Prior to preparing the bid, the contractors shall visit the site and familiarize themselves with all existing conditions. Make all necessary investigations as to locations of utilities and all other matters which can affect the work. No additional compensation will be made to the contractor as a result of failure to get familiar with the existing conditions under which the work must be performed.
3. OUTAGES:
   - A. All electrical/telephone service work which will interfere with the normal use of occupied areas in any manner, shall be done at such times as shall be mutually agreed upon by the Contractor and the Owner.
   - B. Unless otherwise specified, outages any services, required for the performance of this contract and affecting areas other than the immediate work area shall be scheduled at least ten (10) days in advance. All such outages shall be performed on other than normal duty hours.
   - C. The Contractor shall include in his price the cost of all premium time required for outages and other work which interferes with the normal use of other building. Which will be performed, in most cases, during other than normal work time and at the convenience of the Owner.
4. CUTTING AND PATCHING:
   - A. Cutting and patching associated with the work in the existing structure shall be performed in a neat and workmanlike manner. Existing surfaces, which are damaged by the Contractor shall be repaired or replaced with new materials.
   - B. Structural members shall not be cut or penetrated. Holes cut through concrete and/or masonry to accommodate non-percussive methods.
   - C. Patching of areas, disturbed by installation of new work and/or required demolition, shall match existing adjacent surface as to material texture and color.

ELECTRICAL SYMBOL LIST

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE – STANDARD, 125 VOLT. 18" A.F.F.
	DUPLEX RECEPTACLE – STANDARD, 125 VOLT. 44" A.F.F.
	DUPLEX RECEPTACLE – GFI PROTECTED, 125 VOLT. 44" A.F.F. AT KITCHEN COUNTER AND BATHROOM VANITY, OTHERWISE AT 18" A.F.F.
	DUPLEX RECEPTACLE – WP AND GFI PROTECTED, 125 VOLT. 18" A.F.F.
	DUPLEX RECEPTACLE – PC/COMMUNICATION, 125 VOLT. 18" A.F.F. GRAY FINISH. (PROVIDE WITH DEDICATED NEUTRAL PER CIRCUIT)
	QUAD OUTLET; ONE STANDARD 125 VOLT DUPLEX RECEPTACLE & ONE 125 VOLT PC DUPLEX RECEPTACLE; MOUNTING HEIGHT AS NOTED
	QUAD OUTLET; TWO 125 VOLT DUPLEX RECEPTACLES; MOUNTING HEIGHT AS NOTED
	SIMPLEX RECEPTACLE – SPECIAL PURPOSE, VERIFY CONFIGURATION. 18" A.F.F.
	FLOOR BOX (WITH DUPLEX RECEPTACLE SHOWN). DEVICE TYPE SHALL BE AS INDICATED ON THE DRAWINGS. FLUSH IN FLOOR.
C	DUPLEX RECEPTACLE, 125 VOLT. FLUSH IN CEILING.
	VOICE OUTLET. 18" A.F.F.
	DATA OUTLET. 18" A.F.F.
	COMBINATION VOICE/DATA OUTLET. 18" A.F.F.
	COMBINATION VOICE/DATA OUTLET. 18" A.F.F. (ADJACENT NUMBER DENOTES THE QUANTITY OF OUTLETS IN A SINGLE FACE PLATE)
	FLOOR BOX DATA OUTLET. FLUSH IN FLOOR
	FLOOR BOX COMBINATION VOICE/DATA OUTLET. FLUSH IN FLOOR
	TELEVISION OUTLET – MATV/CATV SYSTEM. 18" A.F.F.
J, J	JUNCTION OR PULL BOX – CEILING, WALL MOUNTED. SIZE PER N.E.C. UNLESS NOTED OTHERWISE.
	MULTI-OUTLET RACEWAY – SIMPLEX OUTLETS 12" ON CENTER UNLESS NOTED OTHERWISE. MOUNT ABOVE COUNTER .
$, $2, $3, $4, $°	SWITCH – SINGLE POLE, DOUBLE POLE, THREE WAY, FOUR WAY, SUPERSCRIPT DENOTES OUTLETS CONTROLLED. 44" A.F.F.
$K, $P, $M	SWITCH – KEY OPERATED, PILOT LIGHT, MOTOR RATED
$R	SWITCH – REO-STAT FOR FAN CONTROL
C	CONTACTOR: SEE PLANS FOR SPECIFICATIONS
T	MANUAL THERMAL MOTOR STARTER. SIZE OVERLOAD AS REQUIRED.
TC	TIME CLOCK
	MOTOR CONNECTION. SEE SCHEDULE FOR HP RATING UNLESS NOTED OTHERWISE.
	CONTROL EQUIPMENT
P	PHOTOCELL – CIRCUIT CONTROLLED AS INDICATED ON PLANS.
	WIRING UP
	WIRING DOWN
	WIRING CONCEALED ABOVE CEILING OR IN WALL (2 CONDUCTORS + EQUIPMENT GROUND MINIMUM UNLESS NOTED OTHERWISE).
	WIRING BELOW GRADE OR BELOW FINISHED SLAB (0" C. – 2#10 + 1#10 EQUIPMENT GROUND MINIMUM UNLESS NOTED OTHERWISE).
	WIRING: NEUTRAL (OVERSIZED TICK), 2 PHASE CONDUCTORS
	WIRING: INSULATED EQUIPMENT GROUND CONDUCTOR
	WIRING: INSULATED ISOLATED GROUND (I.G.) CONDUCTOR
	HOMERUN TO PANEL (SOURCE PANEL & CIRCUIT NUMBERS, AS INDICATED)
	FLEXIBLE WIRING: CONDUCTORS TO MATCH SUPPLY CIRCUIT
	ELECTRICAL PANEL: 120/208 VOLT – SURFACE, RECESSED MOUNTED
1	PLAN NOTE – REFER TO NOTES ON DRAWING.
	EQUIPMENT CONNECTION NOTE – SEE SCHEDULE.
NL	SYMBOL INDICATES 24 HOUR LIGHT (NIGHT LIGHT)

POWER DISTRIBUTION SYMBOLS

SYMBOL	DESCRIPTION
3/225	INDICATES 3 POLE/PHASE, 225A TRIP (FRAME RATING FOR SWITCH)
2/100	INDICATES 1 POLE/PHASE, 100A TRIP (FRAME RATING FOR SWITCH)
60F	INDICATES 60A FUSE RATING
	FUSED SWITCH
	CIRCUIT BREAKER
	MOTOR CONNECTION – 3 PHASE
	MOTOR CONNECTION – 1 PHASE

SYMBOL	DESCRIPTION
	FSS
	NFSS
	CFSS
M	METER
	GROUNDING ELECTRODE
	STEP DOWN TRANSFORMER

FEEDER LEGEND

DESIGNATION	DESCRIPTION
X SETS	QTY. OF PARALLEL SETS (1 SET IF BLANK)
3#XXX	WIRE SIZE IN AWG.
1#XXX N	NEUTRAL SIZE
1#XX G	EQUIPMENT GROUND
1#XX IG	ISOLATED GROUND
X"C	CONDUIT SIZE

EXISTING CONDITIONS

DESIGNATION	DESCRIPTION
	PHANTOM DEVICES TO BE REMOVED
(N)	NEW EQUIPMENT
(E)	EXISTING EQUIPMENT TO REMAIN
(R)	EXISTING EQUIPMENT RELOCATED
(X)	EXISTING EQUIPMENT TO BE REMOVED

NOTE: ALL EQUIPMENT SHOWN IS NEW U.N.O.

ABBREVIATIONS

DESIGNATION	DESCRIPTION
A.F.F.	ABOVE FINISHED FLOOR (TO CENTERLINE UNO)
C	CONDUIT
C/B	CIRCUIT BREAKER
CFSS	COMBINATION FUSED STARTER SWITCH
ECB	ENCLOSED CIRCUIT BREAKER
EWC	ELECTRIC WATER COOLER (VERIFY MTD.)
G	EQUIPMENT GROUND
GFP	GROUND FAULT INTERRUPTER C/B
GFI	GROUND FAULT CIRCUIT INTERRUPTER
FSS	FUSED SAFETY SWITCH
IG	ISOLATED GROUND
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
NFSS	NON-FUSED SAFETY SWITCH
NL	NIGHTLIGHT (24 HOUR OPERATION)
PC	PC/COMMUNICATION OUTLET
S-1	SECTION #1 OF 2 SECTION PANEL (PROVIDE PANEL WITH FEED THRU LUGS)
S-2	SECTION #2 OF 2 SECTION PANEL (COMMON COVER FOR SECTION 1 & 2)
SHUNT	SHUNT TRIP CIRCUIT BREAKER
SP	SURGE SUPPRESSOR
SN	SUPER NEUTRAL
TG	TRANSFORMER GROUND
UNO	UNLESS NOTED OTHERWISE
WP	WEATHERPROOF (NEMA 3R UNO)

INTERIOR LIGHTING FIXTURE SCHEDULE

MARK	FIXTURE DESCRIPTION: ILLUM.	TYPE	DIFFUSER	REMARKS	VOLT	MOUNTING	LAMPS: QTY	TYPE	MANUFACTURER	TYPICAL LOCATION
D1	COMPACT FLUOR.	DOWN LIGHT	SPECULAR CLEAR ALZAK	VERTICAL LAMP, WIDE BEAM 6" APERTURE (NOTE 3)	120	RECESSED	1	32 WATT TRIPLE	OMEGA #OM6 SERIES	–
F2	FLUOR.	2'x4'	DIRECT/ INDIRECT	–	120	GRID	2	F32 T8	DAYBRITE #2STG SERIES (SOFTRACE)	–
F3	FLUOR.	2'x4'	DIRECT/ INDIRECT	–	120	GRID	3	F32 T8	DAYBRITE #2STG SERIES (SOFTRACE)	–
W1	INCAN.	WALL LTS.	GASKETED GLOBE	–	120	SURFACE WALL	1	100W	RED DOT LIGHTING #VWG-01 SERIES	–
W2	FLUOR.	WALL LTG.	WIDE THROW	(NOTE 5)	120	SURFACE WALL	2	32 W	COOPER #CFIPTM SERIES	EMERGENCY EGRESS
–	–	–	–	–	–	–	–	–	–	–

INTERIOR LIGHTING NOTES:

1. ALL T8 & COMPACT FLUORESCENT FIXTURES TO BE FURNISHED WITH ELECTRONIC BALLAST. PROVIDE MULTI-BALLASTS AND CONNECT FOR DUAL LEVEL LIGHTING WHERE INDICATED ON THE PLANS.
2. ALL T8 & COMPACT FLUORESCENT LAMPS TO BE 4100 K, 80 COLOR RENDERING INDEX + U.N.O.
3. FIXTURE SHALL BE CAPABLE OF OPERATING 26 WATT OR 32 WATT LAMPS.
4. RECESSED LIGHT FIXTURE HOUSING THAT IS IN CONTACT WITH INSULATION SHALL BE IC RATED.
5. PROVIDE FIXTURE WITH INTEGRAL EMERGENCY BATTERY PACK AND PHOTOCELL.

EMERGENCY LIGHTING FIXTURE SCHEDULE

MARK	DESIG. (NOTE 3)	FIXTURE DESCRIPTION: ILLUM.	TYPE	SOURCE	REMARKS	VOLT	MOUNTING	LAMPS: QTY	TYPE	MANUFACTURER	TYPICAL LOCATION
	EX1	LED	EXIT	INTEGRAL BATTERY	HIGH IMPACT THERMO WHITE PLASTIC HOUSING, SINGLE FACE	120	UNIVERSAL	–	FURNISHED W/ FIXTURE	EMERGI-LITE #EC SERIES	EXITS
	EX2	LED	EXIT	INTEGRAL BATTERY	HIGH IMPACT THERMO WHITE PLASTIC HOUSING, DOUBLE FACE	120	UNIVERSAL	–	FURNISHED W/ FIXTURE	EMERGI-LITE #EC SERIES	EXITS
	EB1	HALOGEN	EMERG.	INTEGRAL BATTERY	TWIN HEAD, NO REMOTE	120	WALL	2	FURNISHED W/ FIXTURE	EMERGI-LITE #EC SERIES (12V, 12W HEADS)	–

EMERGENCY LIGHTING NOTES:

1. EXIT SIGNS SHALL HAVE DIRECTIONAL ARROWS AS INDICATED ON THE PLANS.
2. VERIFY COLOR AND CONFIGURATION OF EXIT SIGN LETTERS WITH LOCAL CODES.
3. EXIT SIGNS AND EMERGENCY BATTERY PACKS ARE INDICATED BY SYMBOL ON THE PLANS IN LIEU OF LETTER DESIGNATION.
4. EXIT SIGNS AND EMERGENCY BATTERY PACKS SHALL BE CONNECTED AHEAD OF LOCAL SWITCH.
5. EXIT LIGHTS SHALL BE MOUNTED: (1) ON WALL 6" ABOVE DOOR WHERE POSSIBLE. (2) CEILING MOUNTED. (3) ON WALL TO THE SIDE OF THE DOOR AS HIGH AS POSSIBLE, WHERE CEILING IS TO LOW. EXIT SHALL BE NO MORE THAN 2' HORIZONTALLY FROM THE OPENING. (4) WHEN DEALING WITH HIGH CEILING, I.E. WAREHOUSE, REPAIR BAYS, THE BOTTOM OF THE NEW EGRESS MARKINGS SHALL BE LOCATED AT A VERTICAL DISTANCE OF NOT MORE THAN 80" ABOVE THE TOP EDGE OF THE EGRESS OPENING INTENDED FOR DESIGNATION BY THE MARKING.
6. TYPE 'EB1' EMERGENCY LIGHTING SHALL BE WALL MOUNTED AT 7'-0" A.F.F. UNLESS NOTED OTHERWISE.

COORDINATION SET 03/13/2009

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ARCHITECT'S SEAL

"Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the state of Maryland License No. 22131 Expiration Date: 10/13/2010"

REVISIONS:

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3	
4	
5	
6	
7	

RELEASED FOR:
- ☐ Preliminary Only
- ☐ Bidding
- ■ Permits
- ☐ Construction

Date: 03/12/09
Project No.: 09-004
Drawn: SRBR
Designed: SRBR
Check: SRBR

LIGHTING FIXTURES SCHEDULES, LEGEND SPECIFICATIONS

E-7