9.09 Incandescent wall box dimmers shall be linear slide type with smooth face plates, no exposed cooling fins, equal to Lutron NT-600, NT-1000, or NT-1500 for loads to 1500W. For Loads 1500W to 2000W, Lutron N-2000. Verify color of face plate and dimmer with Architect prior to ordering. Dimmer switches for fluorescent and compact fluorescent light fixtures shall be slide type, equal to Lutron. Fluorescent and compact fluorescent dimmer switches shall be compatible with the ballast used with the light fixture. Coordinate with ballast manufacturer.

PART 10 – RECEPTACLES

10.01 Convenience duplex receptacles shall be grounded twin outlet receptacles rated 20 amperes at 125 volts.

10.02 Where receptacles are indicated on the drawings as "WP" (weatherproof) or required by applicable codes to be weatherproof, they shall be G.F.C.I. duplex receptacles, with a industrial grade raintight single or double lift metal coverplate.

10.03 See drawings for special outlet schedule.

10.04 Receptacle body shall be formed of high-impact thermoplastic or urea and receptacle contacts shall be Bronze. Receptacles shall be listed by U.L. and conform to NEMA standards as well as the latest Federal Specification W-C-596. Certification that receptacle meets or exceeds N.E.M.A. Standards shall be submitted to the Engineer for approval.

10.05 Surge suppression (TVSS) duplex receptacles shall be 20A., 125V., NEMA 5-20R devices. Receptacles shall have a red, device verification light which is illuminated when the suppression circuit is functional. The receptacle shall meet or exceed UL Standards 1449 and 498 and be capable of suppressing 70 joules of transient energy. Receptacles shall be P & S #IG5362-ISP, Hubbell IG8362 or Wiremold #B3TB2-V.

10.06 Receptacles: (Verify colors)

Manuf:	DUPLEX GFCI (20A.125V) (15A.125V)	DUPLEX ISOLATED GRD. (20A.125V)	DUPLEX (20A.125V)	CLOCK
P & S	5362A	2091S	IG6300	S3733-SS
Hubbell	HBL5362	GF5352	IG5362	HBL5235
Leviton	5362A	6899	5362-IG	5261-CH
Arrow-Hart	5362	GF5342	IG5362	5708

Once device manufacturer has been selected, all receptacles, switches, and plates in the project shall be by the same manufacturer, unless noted otherwise on the Drawings or in the Specifications.

10.07 Where tamperproof receptacles are indicated on the drawings to be provided, receptacles shall be equal to Hubbell #HBLS063H, 20 amp, 125 volt.

10.08 Install receptacles to clear all cabinets, equipment, etc.

10.09 All receptacles shall have High-Impact Thermoplastic or Nylon (not Thermoset), smooth surface, wall plates. Where plates are noted to be engraved or labeled, provide stainless steel wall plates in color to match other plates and provide engraved filled letters. If approved by the Engineer, high-impact thermoplastic plates with filled letters may be used for engraving provided that a sample plate is submitted for approval. Plates shall be set plumb and parallel with the wall. Stainless steel plates where used or specified shall be .032" nominal thickness, non-magnetic.

10.10 Color of receptacles and plates as selected by the Architect. Verify color prior to ordering.

10.11 Provide duplex receptacle on separate circuit beside each telephone terminal board location and other communications equipment requiring 120 volt power.

PART 11 – FLOOR BOXES

11.01 Unless noted otherwise on the drawings, flush floor boxes shall be equal to Steel City #68 Series floor box with P-60-DS cover plate for power and P-60-1/2-2 cover plate for telephone and data outlets. Provide with carpet flange for floors with carpet. Verify exact location with Architect prior to rough-in.

11.02 All floor boxes shall be cleaned of all construction debris and dirt.

11.03 Where fire rated "poke-through" devices are specified, Contractor shall install devices after concrete pour and after final verification of location with Owner. Fire rated "poke-through" devices shall be spaced apart from each other as required by the manufacturer and U.L.

11.04 PVC floor boxes may be used in lieu of floor boxes indicated above. PVC floor boxes shall be equal to Walker, Wiremold, Hubbell, Carlon, with metal covers. Receptacle covers shall be double flap, telephone and data covers shall be combination 2"/1/2" inserts. Unless noted otherwise on the drawings, all floor boxes for similar devices shall be either metal or PVC, no intermixing of some types of floor boxes will be allowed.

PART 12 – CONTACTORS AND RELAYS

12.01 Shall be as manufactured by Cutler-Hammer, General Electric, Siemens, Allen Bradley, or Square "D". They shall be as sized on the drawings.

12.02 All contactors and relays shall be "T" (Tungsten) rated.

PART 13 – TIME SWITCHES

13.01 Time switches by Tork, Intermatic, or Paragon equal to those shown on the drawings or specified below, and approved by the Engineer, will be acceptable.

13.02 Exterior lighting or interior time switches shall be Intermatic ET7011SC Series, 7 day with carry-over, unless specified otherwise. Set time switch per Owners Requirements.

13.03 All time switches shall be provided with momentary contacts if required.

13.04 All time switches shall be provided with manual bypass switches and standby battery systems.

PART 14 – PHOTO ELECTRIC CONTROLS

14.01 Photo Electric Controls by Tork, Intermatic, or Paragon equal to those indicated below and approved by the Engineer will be acceptable.

14.02 Photo Electric Controls (Photo Switches-Photo Cells) shall be Intermatic #K4133 rated at 3000W, 277 Volts, or #K4121 rated at 1800W, 120 volts, weatherproof. Mount on roof and orient photo electric controls to the north. Photo-electric controls supplied as a part of a fixture assembly shall be as provided by Fixture Manufacturer.

14.03 All photocell housings supplied as part of the light fixture assembly or mounted on the light fixture shall be painted to match the light fixture finish.

PART 15 – STARTERS (SEPARATELY MOUNTED)

15.01 Starters for all devices shown on all drawings shall be supplied by the Electrical Contractor unless specifically noted otherwise on the drawings.

15.02 Starters shall have melting alloy relays or bimetallic overload relays (as required for load served). Starter housing shall have NEMA rating for the location (general purpose, weatherproof, etc.). Each starter shall have an H-O-A switch in cover and control transformer (if required) for controls. See drawings for multispeed starter requirements.

15.03 Coil voltage shall be as required for controls as shown on all drawings and control power transformer size shall be adequate to provide control functions as shown.

15.04 Provide each starter with a spare set of auxiliary contacts. One closed when the starter is deactivated and one closed when the starter is activated.

15.05 Overload thermal units shall be sized on the basis of actual motor nameplate current. Overloads shall be non-adjustable NEMA standard trip and shall be available in sizes covering the complete NEMA horsepower. Starters shall be Class 20 (Class 10 not acceptable).

15.06 Starters shall be fully NEMA rated; I.E.C. design starters will not be acceptable.

15.07 Separately mounted starters shall be by the same manufacturer as the distribution equipment, or Allen Bradley or Furnas.

PART 16 – DISCONNECT SWITCHES

16.01 The Contractor shall furnish and install externally operated, non fused and/or fused (with Class R rejection features), heavy duty, horsepower rated, disconnect switches at all points indicated on the drawings or required by code. These switches shall be by the same manufacturer as the distribution equipment.

16.02 All disconnect switches shall be fused except for disconnect switches that have individual fuse protection at point circuit receives its supply.

16.03 Provide dead front type for all exterior disconnects on grade level when so required by local code.

16.04 All fused disconnect switches shall have a minimum rating of 100,000 A.I.C. with fuses installed unless noted otherwise on the drawings.

16.05 All disconnect switches shall be provided with grounding kits.

PART 17 – FUSES

17.01 Cartridge type fuses of proper size as required shall be furnished and installed for all switches and panelboards throughout, and an additional supply of three (3) spare fuses of each size shall be furnished in original packages to the Owner. Furnish a NEMA enclosure with hinged cover equal to Bussmann type SFC for storing all spare fuses and locate adjacent to main service equipment. Fuses for motor and mechanical equipment shall be sized from the nameplate data per N.E.C. requirements.

17.02 Fuses shall be manufactured by Bussmann Mfg. Co., Gould-Shawmut Co., Littelfuse or approved equal by Engineer. Fuse types shall be installed as follows:

Main Service and Distribution Feeder Protection:

Gould Bussman	Littelfuse	Shawmut
601 amps and larger Gould Bussman	KRP-C/KTNKLPC	A4BQ
	Littelfuse	Shawmut
600 volts and less (Class L)		
600 amps and less	LPN-RK	LLN-RK A2D-R
250 volts and less (Class RK1)		
600 amps and less	LPS-RK	LLS-RK A6D-R
600 volts and less (Class RK1)		

Motors and Primary Feeders for Transformers:

250 volts and less (Class RK5)	FRN-R	FLN-R	TR-R
600 volts and less (Class RK5)	FRS-R	FLS-R	TRS-R

17.03 Class T fuses will not be accepted, unless they are a part of a manufacturers assembly or approved by the Engineer. Class J fuses may be used as an alternate to the Class R fuses listed above.

17.04 Fuses installed on project shall be by one manufacturer only. (Do not intermix Manufacturers.)

PART 18 – EQUIPMENT CONNECTIONS

18.01 For 120 volt motors 1/2 HP– and less, 15 amperes and less, Contractor shall provide Bussmann "SSY" box cover unit for indoor application and "SSN" box cover unit for outdoor applications, or equal by Perfect-Line, with fustat plug fuse and integral toggle switch for motors 1/2 HP–120V. and less. Fustats for cord and plug equipment with fuses 15 amperes and less shall be Bussmann "SRY" box cover unit, or equal by Perfect-Line, with fustat plug fuse. Mount fustats in housings of equipment served wherever possible. Plug fuses for motors shall be sized based upon 125% of manufacturer's nameplate full load amperage unless otherwise indicated on drawings.

18.02 For 3/4 HP–120V. motors, Contractor shall provide (1) 20 amp 1 pole 120 volt toggle disconnect switch with a Bussmann 'HPD' fuse holder and 'FNQ' fuse at each unit. Switch and fuse holder to be mounted in cover of a 4" square junction box at each unit. For 3/4 HP–120V. motors that are provided with cord and plug, Contractor shall provide 20 amp 120 volt duplex receptacle with (1) 20 amp 1 pole 120 volt toggle disconnect switch on line side of receptacle, and Bussmann 'HPD' fuse holder and 'FNQ' fuse on line side of receptacle. Switch, receptacle, and fuse holder to be mounted in cover of a 4" square junction box at each unit. Fuses for motors shall be sized based upon 125% of manufacturer's nameplate full load amperage unless otherwise indicated on drawings.

18.03 For connections to 277 volt equipment, Contractor shall provide (1) 20 amp 1 pole 277 volt toggle disconnect switch with a Bussmann 'HPD' fuse holder and 'FNQ' fuse at each unit. Switch and fuse holder to be mounted in cover of a 4" square junction box at each unit. Fuses for motors shall be sized based upon 125% of manufacturer's nameplate full load amperage unless otherwise indicated on drawings.

DIVISION 16 ELECTRICAL

SECTION 16030

SERVICE AND DISTRIBUTION

PART 1 – MAIN SERVICE

1.01 Primary: See the plans.

1.02 Secondary: See the plans. Voltage will be, 277/480-volt, 3-phase, 4-wire, WYE, 120/208-volt, 3-phase, 4-wire, WYE, 240-volt, 3-phase, 3 wire Delta, or 120/240-volt, 1-phase, 3 wire.

1.03 Consult power company for their requirements and for coordinating with their installation. Contractor shall provide any work thus required beyond that indicated by drawings and/or specifications and pay for costs incurred for Utility Company to install both temporary and permanent service to the project. Verify costs with Utility Company prior to bidding. Contractor shall provide guard posts around electrical transformers and electrical pedestals per Utility Company standards.

PART 2 – DISTRIBUTION EQUIPMENT

2.01 Part 2 applies to all distribution equipment supplied on the Project.

2.02 All electrical distribution equipment (switchboards, panelboards, disconnect switches, transformers, starters, etc.) shall be of one manufacturer, unless specifically noted on the drawings, in the specifications, or approved by the Engineer. Intermixing of distribution equipment by different manufacturers will not be permitted.

2.03 If shown on the plans, provide surge arrester for lightning protection on main service entrance. Refer to drawings for voltage and phasing of service. Arrester shall be located within, or adjacent to, the main switch enclosure as indicated on the plans.

2.04 Equipment layouts on the drawings are based upon one manufacturer. Verify all actual equipment sizes with equipment manufacturer prior to bidding.

2.05 If layout changes are required due to other electrical manufacturers equipment size, they must be submitted to and approved by the Engineer prior to bidding. National Electric Code working clearances must be maintained at all times. In no case will extra remuneration be allowed for layout changes that differ from those shown.

2.06 Shop drawings shall be furnished for all distribution equipment indicating the following information:

A. Switchboard voltage/current rating.

B. Overall outline dimensions including weight, available conduit space.

C. Switching and protective device ampere ratings.

D. Bus ratings and material.

E. One line diagram.

F. Integrated short circuit rating.

G. Coordination of any ground fault system settings shall be as per the manufacturers requirements.

H. Adequate conduit space shall be provided to meet the requirements established on the drawings.

2.07 All items of distribution equipment required to be floor mounted shall be mounted on a minimum 3 1/2" concrete base above floor. Concrete base to be by Electrical Contractor.

2.08 All phase and neutral busing and all ground bars in panelboards and switchboards shall be copper only. All lugs shall be AL/CU rated. All panelboards supplied by 'K' factor transformers shall have 200% rated neutrals.

2.09 Panel schedules are not shown on the drawings, however, copies of these schedules are available to the Contractor after bids are let, upon request to the Engineer.

PART 3 – BRANCH CIRCUIT AND DISTRIBUTION PANELBOARDS

3.01 General:

A. All panels shall be provided with key locking door.

B. Panels shall have hinged covers with concealed trim clamps, doors shall have laser cut trims with concealed hinges, and flush lock, master keyed. Hinged cover shall have continuous piano hinge down one side with door opening by a single latch. Where multi-section panelboards are indicated on the drawings, panel enclosures and covers shall be of the same size for each section.

C. Key all doors alike and furnish two (2) keys for each lock. Doors over 48" high and double doors shall have 3-point latching per U.L. 50. Consult drawings for flush or surface mounting.

D. After wiring, label each circuit and provide under plastic in door of panel a typewritten schedule indicating load description of all circuits in panel. Mark spare breakers and provisions for future breakers in pencil on schedule for future circuit marking.

E. Breakers shall have individual plastic cases sized as scheduled on the plans. Two and three pole breakers shall have common trip (single pole units with tie bars are not acceptable). Main circuit breakers shall be vertically mounted. Back-fed main circuit breakers above 100 amps will not be acceptable. Where spaces are noted in the panel summary, provide all necessary bussing, device support, and connections for future circuit breakers. Provide blank cover for all spaces.

F. All panelboards shall have copper ground buses installed and grounded per the requirements of the N.E.C. All panelboards serving devices having isolated ground circuits shall be provided with an additional insulated copper ground bus for connection of isolated ground conductors. All neutral and ground bars shall have a minimum number of lugs equal to 66% of number of pole spaces in panel. In computer rated or isolated ground panelboards, all neutral, ground and isolated ground bars shall have a minimum number of lugs equal to 100% of number of pole spaces in panel

G. Where flush mounted panels occur on drawings Contractor shall stub into ceiling void for future use, (1) 1" empty conduit for every four spare 20A. breakers or unused panel spaces. On multi-story buildings, Contractor shall stub into ceiling void above panel and into ceiling void of floor below for future use, (1) 1" empty conduit for every four spare 20A. breakers or unused panel spaces. Conduits stubbed into ceiling void below panel shall be provided with conduit cap and labeled "To Panel Above".

H. All panelboards supplied from an emergency source shall have breakers provided with handle lock-offs for each breaker. Breaker handles to be set in the "ON" position.

I. All phase and neutral busing and all ground bars in branch circuit panelboards and circuit breaker distribution panelboards shall be copper only. All lugs shall be AL/CU rated. All panelboards supplied by 'K' factor transformers shall have 200% rated neutrals.

3.02 Branch Circuit Panelboards:

A. Panelboards rated up to 240V (400A. max) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 10,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings. All breakers shall be of either the plug-in type or bolt-on type.

B. Panelboards rated over 240V and up to 480V (400A max) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 14,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings. All breakers shall be of the bolt-on type only.

C. Branch Circuit Breaker Panelboards:

Panel Rating	Square D Siemens G.E. Cutler-Hammer			
240V (400A max)	NQOD	S1/S3	AL	PRL1
480V (400A max)	NF	S2/S3	AE	PRL2

3.03 Circuit Breaker Distribution Panelboards:

A. Panelboards rated up to 240V (600A. and above) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 10,000 A.I.C. unless noted otherwise on the drawings. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings

B. Panelboards rated over 240V and up to 480V (600A and above) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 14,000 A.I.C. unless noted otherwise on the drawings. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings

C. Circuit Breaker Distribution Panelboards:

Panel Rating	Square D G.E. Cutler-Hammer			
All Ratings	I-Line	S4/S5	Spectra	PRL4

D. Distribution panels located in finished rooms (other than mechanical, electrical rooms or janitor rooms) shall be provided with key locking doors.

PART 4 – DRY TYPE TRANSFORMERS (AS INDICATED BY DRAWINGS)

4.01 Dry type transformers up to 10 KVA (115 deg. C. rise), 15 KVA thru 112 1/2 KVA, (150 deg. C. rise), above 112–1/2 KVA, (80 deg. C. rise or higher rating), all in ambient of 40 deg. C, unless noted otherwise on plans.

4.02 Transformers (15 KVA and larger) shall have core isolated from the housing by vibration isolators. The entire housing shall also be isolated from the building by vibration isolators. Connecting conduits shall have flexible steel sections (12" long) to isolate sound transmission. Transformers shall meet NEMA ratings for sound levels and have not less than 4 full–capacity 2 1/2% taps (2 above and 2 below normal). These units may be as manufactured by the manufacturers providing distribution equipment or Hevi–Duty or Jefferson.

4.03 Provide 'K' factor transformers where indicated on the drawings. 'K' factor transformers shall be provided with electrostatic shielding, Class 220 insulation, reduced core flux, and 200% neutral terminal.

DIVISION 16 ELECTRICAL

SECTION 16040

LIGHTING

PART 1 – LIGHTING FIXTURES

1.01 This work shall include all lighting fixtures and lamps as specified on the drawings and herein. Fixtures shall be completely free of defects, dents, rust or chipped surfaces. No cracked, broken, or chipped lenses will be acceptable. Fixtures that are cracked, broken, chipped, rusted, dented or otherwise damaged, shall be replaced without additional cost to the Owner. Fixtures shall be furnished complete including hickeys, suspension nipples, and all other materials and equipment as required for hanging and supporting fixtures in accordance with U.L. UBC, and NEC requirements. This Contractor shall furnish and install lamps for all fixtures and shall wipe fixtures and lamps before and after installation. All recessed mounted fixtures shall be mounted with the trim flush to the finish ceiling or wall surfaces, free of gaps or cracks.

1.02 Electrical Contractor shall verify exact ceiling types in all areas with architectural room finish schedule for exact fixture mounting (i.e., grid or flange type mounting) prior to ordering of fixtures. Electrical Contractor shall verify ceiling construction details in all areas and provide appropriate mounting hardware for installation of lighting fixtures. All surface mounted fixtures shall be supported independent from ceiling system and shall be securely mounted. Lay-in fixtures shall be supported directly from structure, unless ceiling system has been designed for support of such fixtures.

1.03 General Contractor shall provide fireproofing around recessed fixtures installed in fire-rated ceilings per U.L. requirements, Electrical Contractor shall coordinate.

1.04 Provide clear tempered glass shields on all metal halide, and quartz fixtures. Exterior fixtures shall be constructed with gasketed shield and be "buglight".

1.05 Provide thermal switches on all recessed fixtures as required by N.E.C

1.06 Light fixtures supported by framing members of suspended ceiling systems shall be attached to the framing member by mechanical means. Clips identified for use with the type of ceiling framing member and fixture shall be provided.

1.07 All fluorescent fixture lenses shall be 100% virgin acrylic and be a nominal thickness of 0.125". (Nominal thickness shall be no less than 0.115" thick). Styrene lenses shall not be provided for any light fixtures, unless specifically so noted on the drawings.

1.08 All fluorescent fixtures (housing, door, etc) shall be provided with factory applied powder coat baked enamel finish, applied after final fabrication, unless specifically noted otherwise on the lighting fixture schedule or drawings. Fixtures using pre-painted metal components will not be acceptable.

1.09 All fluorescent fixtures shall be provided with captive spring loaded latches, unless specifically noted otherwise on the lighting fixture schedule or drawings. Fixtures using non captive springs will not be accepted.

1.10 All fluorescent fixtures using F40T12 or F032T8 type lamps shall be provided with twist-in (not push-in), bi-pin type, lamp holders.

1.11 Connections to all fixtures mounted in lay-in ceilings shall be as follows:

A. Provide J-Box on structure above fixtures for power circuit supply connections. Install U.L. listed 3/8" flexible (min.) steel conduit (whip) down to each fixture. Each whip shall be field cut to length to allow fixture to be relocated up to 4'–0" in any horizontal direction. Whips shall include (2) or (3) #12 AWG Copper, 90 degree rated, conductors (numbers as indicated) and a #12 AWG Copper ground conductor. Fixtures factory supplied with U.L. listed whip assemblies shall also be provided with the conductors as listed above. Tandem fluorescent fixtures shall have a factory supplied U.L. listed whip assembly with conductors as required to interconnect fixtures, and be of sufficient length to allow mounting fixtures 12'–0" on center in any horizontal direction.

B. Contractor may use a pre–manufactured flexible wiring system for light fixture connections. System shall be similar to "AFC" systems and shall not be used for switch drops or systems other than lighting.

C. If tandem wired fixtures are used, the maximum whip length between fixtures for electronic ballasts shall be 9 feet.

1.12 Where fluorescent fixtures are mounted in continuous rows, each row shall be supplied with 2 #12 AWG & 1 #12 AWG "green" ground, 90 degree C. rated, Copper conductors, all within 1/2" flexible steel conduit. Feed through wiring shall also be #12 AWG. 90 degree C. copper. Where flexible steel conduit is to be used, all fittings shall be U.L. labeled for the purpose.

1.13 When different lamps in the same fixture are controlled by separate switches (2 or 3 level lighting), the switches shall control the same lamp positions in all fixtures controlled by those switches. Arrangement of switching will generally be that one switch controls middle lamp or lamps, and other switch controls outside lamps unless noted otherwise on the drawings.

1.14 All T8 fluorescent lamp ballasts shall comply with the following requirements unless noted otherwise on the drawings.

A. Electronic integrated circuit, solid–state, full light output, energy efficient type compatible with lamps and lamp combinations to which connected. Ballasts shall be certified by E.T.L., and labeled by C.B.M.. Ballasts shall be Class P, high power factor (minimum 90%), sound rating of 'A' or greater, and have a minimum efficiency of 85% Lamp current crest factor (LCCF) shall be less than 1.7.

B. Ballasts shall be provided in voltages to match connected circuits. Verify circuit voltage prior to ordering light fixtures.

C. Ballasts shall have lamp flicker less than 5% and have total harmonic distortion (THD) of less than 20%

D. Ballasts shall be provided in one or two lamp configurations. Three and four lamp electronic ballasts will not be allowed unless noted otherwise on the drawings, or as provided in 'Master–Satellite' wiring arrangements.

E. Ballasts shall conform to FCC Regulations Part 15, Subpart J and CFR 47, Part 18 for EMI and RFI limits. Ballasts shall conform to IEEE C62.41, Category A for resistance to voltage surges for normal and common modes.

F. All ballasts shall be secured by a minimum of two bolts.

G. Electronic dimming ballasts shall provide smooth dimming over a minimum range from 100 to 10 percent light output. Ballasts shall be listed for use with the specific fluorescent dimming system provided.

H. Ballasts shall be as manufactured by Sylvania, Motorola, Magnatek, Universal, Jefferson, Howard, or Advance.

1.15 All compact fluorescent and biax lamp ballasts shall be electronic with the same characteristics as listed for T8 lamps except that compact fluorescent or biax ballasts shall be provided with end–of–life sensing and cutoff for disconnecting the lamp on end of life.

1.16 All T12 fluorescent lamp ballasts shall comply with the following requirements unless noted otherwise on the drawings.

A. All ballasts shall be ETL–CBM, U.L. listed, high power factor, Class P, Energy Saver and have a sound rating of A or B.

B. Ballasts shall be provided in voltages to match connected circuits. Verify circuit voltage prior to ordering light fixtures.

C. All ballasts when installed in a fixture shall not exceed 90 degree C. operating case temperature in a 55 degree C. heat box.

D. Ballasts shall be guaranteed not to overheat capacitor insulating media beyond manufacturer's warranty limits.

E. Ballasts shall be as manufactured by Sylvania, Motorola, Magnatek, Universal, Jefferson, Howard, or Advance.

F. All ballasts shall be secured by a minimum of two bolts.

1.17 H.I.D. Fixture Ballasts shall be capable of starting and operating the specified lamps within the limits specified by the lamp manufacturer. The ballast shall limit lamp wattage variation to a maximum of +5 percent from nominal. At rated line voltage the ballast shall have a minimum power factor of 95%. Ballast primary current during lamp starting must not exceed current during normal lamp operation. The ballast must reliably start and operate the lamp in ambient temperatures down to –20 degree F. where installed outdoors and down to +20 degrees F. where installed indoors. The ballast shall be capable of withstanding continuous operation with the ballast secondary in a short–circuit condition without loss of ballast life. Ballasts shall be Jefferson, Sylvania, Universal, Magnetek, Advance, Wide–Lite, Holophane or Westinghouse.

1.18 Lamps shall be as follows. Once a manufacturer has been selected, all lamps on the project shall be by the same manufacturer.

A. Incandescent lamps shall be inside frosted unless otherwise called for in the fixture specifications, (Rated at 130 Volts). Incandescent lamps shall be as manufactured by Philips, G.E., Sylvania, or equal approved by the Engineer.

B. Fluorescent lamps, unless noted otherwise on the drawings, shall be Sylvania F40/DB35/SS for T–12 lamps and Sylvania F032/835 for T–8 lamps ,or equal by Phillips, G.E. or as approved by the Engineer. Verify all lamp colors with Architect prior to ordering.

C. Mercury vapor lamps shall be warm deluxe white unless otherwise noted on the drawings, lamps as manufactured by G.E., Sylvania, Philips, or equal approved by the Engineer.

D. Metal halide lamps shall be Metalarc/C (coated) as manufactured by G.E., Sylvania, Philips, or equal approved by the Engineer. Refer to lighting fixture manufacturer for lamp type.

E. High pressure sodium lamps shall be Lumalux/D (coated) as manufactured by G.E., Sylvania, Philips, or equal approved by the Engineer. Refer to lighting fixture manufacturer for lamp type.

COMMUNICATIONS SYSTEMS

PART 1 – TELEPHONE SYSTEM

1.01 General: These specifications include the furnishing of all labor and materials necessary for the installation of a complete system of conduits, outlet boxes, and terminal boards for use by the Telephone system supplier. Unless noted otherwise on the drawings, all telephone devices and cables are to be furnished and installed by the telephone system supplier.

1.02 This installation must be done according to the requirements of the local system supplier and the general specifications contained herein. Consult the serving Telephone Co. to verify all requirements.

1.03 Outlets: All telephone outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim, unless noted otherwise on the drawings. Telephone coverplates to be as furnished by telephone system supplier unless noted otherwise on the drawings. All floor outlets shall be adjustable water–tight floor box, per Section 16020. All floor outlets shall be adjustable water–tight floor box, per Section 16020. Telephone outlet boxes not located as directed. Telephone outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.

1.04 Provide and install nylon pull wires in all telephone conduits. Provide tags on all pull wires to indicate termination of wire or conduit.

1.05 Provide and install pull boxes at all locations as required by the telephone system supplier.

1.06 Provide and install conduit sleeves thru floors and walls as required by the telephone system supplier.

1.07 The telephone system shall be provided with a 2" minimum main service conduit from the telephone terminal board to the property line unless noted otherwise on the drawings or required by the Telephone Co. Conduit to be routed per the requirements of the serving Telephone Co.. Verify conduit size with Telephone Co. prior to installation and bidding.

1.08 Each telephone outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. Telephone conduits shall be stubbed into ceiling void, if ceiling void is accessible and not an air return plenum. Telephone conduit shall be routed to nearest telephone terminal board if ceiling void is not accessible or is an air return plenum. Pay telephone outlets shall have 1" conduit with pull wire routed directly to main telephone terminal board, not a sub–terminal board. Verify conditions of job prior to rough–in.

1.09 Provide telephone terminal board as shown on the drawings or as required by telephone system supplier. Board shall be 3/4" plywood sized as required by telephone system supplier, minimum 4' x 4'. Telephone terminal board to be mounted on wall and painted to match.

1.10 Provide duplex receptacle on separate circuit beside each telephone terminal board location and other communications equipment requiring 120 volt power

PART 2 – DATA OUTLET SYSTEM

2.01 Part 2 will only apply if there are data outlets shown on the drawings.

2.02 General: These specifications include the furnishing of all labor and materials necessary for the installation of a complete system of conduits, outlet boxes and terminal boards where shown on the drawings for use by the data system supplier. Unless noted otherwise on the drawings, all data system devices and cables are to be furnished and installed by the data system supplier.

2.03 This installation must be done according to the requirements of the system supplier and the general specifications contained herein.

2.04 Outlets: All data outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim, unless noted otherwise on the drawings. Coverplates to be as furnished by data system supplier unless noted otherwise on the drawings. All floor outlets shall be adjustable water–tight floor box, per Section 16020. All data outlet boxes to be located as directed. Data outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.

2.05 Provide and install nylon pull wires in all data conduits. Provide tags on all pull wires to indicate termination of wire or conduit.

2.06 Provide and install pull boxes at all locations as required by the data system supplier.

2.07 Provide and install conduit sleeves thru floors and walls as required by the data system supplier.

2.08 Each data outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. Data conduits shall be stubbed into ceiling void, if ceiling void is accessible and not an air return plenum. Data conduit shall be routed to data terminal board if ceiling void is not accessible or is an air return plenum. Verify conditions of job prior to rough–in.

2.09 Provide data terminal board as shown on the drawings or as required by data system supplier. Board shall be 3/4" plywood sized as required by data system supplier, minimum 4' x 4'. Unless shown otherwise on the drawings, data terminal board to be mounted on wall adjacent to telephone terminal board and painted to match wall

2.10 Provide duplex receptacle on separate circuit beside each data terminal board location and other communications equipment requiring 120 volt power.

PART 3 – CATV (TELEVISION) OUTLET SYSTEM

3.01 Part 3 will only apply if there are CATV outlets shown on the Drawings.

3.02 General: These specifications include the furnishing of all labor and materials necessary for the installation of a complete system of conduits, outlet boxes and terminal boards where shown on the drawings for use by the CATV system supplier. Unless noted otherwise on the drawings, all CATV devices and cables are to be furnished and installed by the CATV system supplier.

3.03 This installation must be done according to the requirements of the system supplier and the general specifications contained herein.

3.04 Outlets: All CATV outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim, unless noted otherwise on the drawings, with separately mounted 20 amp 125 volt duplex receptacle adjacent to CATV outlet. CATV coverplates to be as furnished by CATV system supplier unless noted otherwise on the drawings. All floor outlets shall be adjustable water–tight floor box, per Section 16020. All CATV outlet boxes to be located as directed. CATV outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.

3.05 Provide and install nylon pull wires in all CATV conduits. Provide tags on all pull wires to indicate termination of wire or conduit.

3.06 Provide and install pull boxes at all locations as required by the CATV system supplier.

3.07 Provide and install conduit sleeves thru floors and walls as required by the CATV system supplier.

3.08 Each CATV outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. CATV conduits shall be stubbed into ceiling void, if ceiling void is accessible and not an air return plenum. CATV conduit shall be routed to the CATV terminal board if ceiling void is not accessible or is an air return plenum. Verify conditions of job prior to rough–in.

3.09 The CATV system shall be provided with a 1" minimum main service conduit from the CATV terminal board to the property line unless noted otherwise on the drawings or required by the CATV company. Conduit to be routed per the requirements of the serving CATV company. Verify conduit size with CATV company prior to installation.

3.10 Provide CATV terminal board as shown on the drawings or as required by CATV system supplier. Board shall be 3/4" plywood sized as required by CATV system supplier, minimum 2' x 2'. Unless shown otherwise on the drawings, CATV terminal board to be mounted on wall adjacent to telephone terminal board and painted to match wall.

3.11 Provide duplex receptacle on separate circuit beside each CATV terminal board location and other communications equipment requiring 120 volt power

No.	Date	By	Approved	Revision

PARKSTONE ADDITION
STREET IMPROVEMENTS
VICTOR PLACE

CITY OF WICHITA, KANSAS
JAMES L. ARMOUR, P.E. – CITY ENGINEER
O.C.A. # 766166
Private Project # 472–85471

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FINAL

Designed By: ICE
Drawn By: ICE
Poe Job No.: 1879A
Date: September 2008

JOHN WIEGERT 11701 12-16-08 KANSAS PROFESSIONAL ENGINEER

08126–045

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