GUIDELINES FOR PROFESSIONAL SERVICES

DIVISION 26 – ELECTRICAL

The following items are to be included on the drawings and in the specifications by the Design Professional:

I. <u>GENERAL</u>

- A. Include on the contract drawings a large scale plan and elevations of each electrical room showing all panels, equipment and wiring to scale with conduits to each item to assure adequate size and clearances.
- B. Provide single point metering on all new projects and on major renovations to existing cost centers. Provide payback analysis of meter consolidations. Generally, paybacks of less than seven (7) years will be accepted. The Owner shall review paybacks greater than seven (7) years.
- C. On all new projects and major renovations, provide two (2) empty four (4") inch PVC conduits from the main switchgear to an area near future portable/permanent building locations. This spare conduit shall terminate in a 3'x3' concrete pull box. Also provide three (3) empty four-inch (4") conduits from the telecom/data room to this area and terminate in a similar concrete pull box.
- D. Provide an emergency generator connection for the kitchen walk-in cooler and walk-in freezer. This shall be included with the emergency power at schools designated as shelters and shall be independent at schools that are not shelters.
- E. Provide "Seal off" conduit body at all conduit penetrations to prevent moisture intrusion into any areas with large temperature differentials such as walk-in coolers and freezers. Seal off shall be installed per manufacturer's installation instructions.
- F. Provide a notification system at the kitchen service entrance that can be heard in the kitchen. Provide raceways for kitchen service entrance notification system. Coordinate with Division 27 requirements. Notification system shall be "Red Alert" model 393-00x by GAI-Tronics or equal.
- G. Electrical rooms shall have no ceilings.
- H. Provide spare conduit between buildings in multiple building campuses between electrical and telecom rooms as determined by The Owner.
- I. Provide conduits for power and data to location of future school sign.
- J. Electrical pull boxes / hand holes shall not be of plastic construction. Precast polymer

concrete pull boxes are preferred. After in-ground pull boxes are installed and conduit has been installed, provide one-piece poured-in-place concrete apron around the pull box. Apron shall be at least 6" deep and extend out 12" on all sides. Pull box shall meet tier 15 or higher weight requirements.

- K. Die-cast fittings for EMT shall not be acceptable. Specify only steel fittings when specifying EMT.
- L. All emergency generators shall have a communication tie-in into the building energy management system to indicate run/stop status.
- M. All electrical conductors shall be color coded as follows:

277/480 Volt Phase A – Brown Phase B – Orange Phase C – Yellow Phase A Switch Leg – Black Phase B Switch Leg – Blue Travelers – 2 Pink or 2 Purple 120/208 Volt Phase A – Black Phase B – Red Phase C – Blue

N. All Electrical conduits shall be color coded as follows:

Blue – conduits fed from panels with an "H" prefix and voltage of 277/480 Green – conduits fed from panels with and "EH" prefix of 277/480 Yellow – conduits fed from panels with a "CP" prefix and voltage of 120/208 Orange – conduits fed from panels with a "P" prefix and voltage of 120/208 Green/Orange – conduits fed from panels with a "EP" prefix and voltage of 120/208 Red – Conduits for fire alarm system wiring Purple – conduits for data, voice, TV, intercom, sound

Orange dot – denotes occupancy sensor power pack above ceiling

II. <u>SWITCHGEAR / PANELBOARDS / SURGE SUPPRESSION</u>

- A. All main switch gear shall be equipped with shunt trips, voltage meter, amperage meter and ground fault, and shall not have copper clad steel or aluminum bus bars.
- B. Bolt-in type breakers shall be used on all load centers within permanent facilities. The basis of panelboad design shall be Square D. Acceptable manufacturers are Siemens, Square D and Cutler-Hammer.
- C. Dual voltages shall not be present in the same panel.

- D. Provide dedicated sub-panels with no less than 50% spare capacity and 50% spare space for computer areas. Provide over-sized neutral to help with harmonics problems, and provide surge protection.
- E. Provide surge protection of main electrical service and all sub-panels with surge suppression meeting or exceeding a minimum of a Category C3 performance criteria.
 - 1. Surge suppression failure at main electrical service shall alarm through the building management system.
- F. All transformers shall have a means of disconnect within sight of the transformer.
- G. All electrical panel boards shall have a coordination study conducted by the manufacturer or electrical engineer to insure breaker trip settings and properly balanced.

III. <u>LIGHTING</u>

A. The number of different types of fixtures shall be minimized.

B. All interior and exterior lighting shall be LED.

- C. Provide 2X2 and/or 2X4 LED full distribution, recessed static troffer with a minimum of 4,200 delivered lumens, 4000K temperature, universal voltage (120-277V), with integral step dimming (0%, 50%, 100%) LED driver. At a minimum, LEDs shall have 50,000 hour rated life (defined by testing at 70% lumen maintenance (L70)).
- D. Note: The step dimming LED driver requires the use of two wall mounted toggle switches; each one independently wired to the integral step dimming LED driver in order to achieve the lighting levels indicated above. Each switches' position contributes to the change in lighting levels.
- E. For back-of-house spaces provide a 2X4 LED fixture with A125 prismatic lens, recessed static troffer with a minimum of 4,000 delivered lumens, 4000K temperature, universal voltage (120-277V) and fast blow fuse. At a minimum, LEDs shall have 50,000 hour rated life (defined by testing at 70% lumen maintenance (L70)).
- F. All performing art center lighting shall be accessible for servicing without the aid of a man lift. All lighting fixtures installed in stairwells shall be readily accessible without the use of scaffolding or special equipment
- G. Each ceiling light fixture shall be self-contained.
- H. Provide a separate whip from a junction box to each ceiling light fixture (do not loop). Daisy chaining of fixtures is not permitted in new construction. Junction boxes shall be limited to four (4) whips per junction box (see fixture detail at end of section).

- I. Emergency lighting shall be LED wall packs and not part of the ceiling fixtures.
- J. Central mechanical yards shall be adequately lit and be locally switched.
- K. Exterior walkway lighting shall be LED. Fluorescent or metal halide fixtures are not acceptable. Do not install lights in or on aluminum walkways.
- L. Parking lot lights shall be individually fused at the base of each pole.
- M. Parking lot and Security lighting shall be controlled by The Tracer Summit energy management system. Building lighting and each parking lot lighting group shall be separately zoned. Install keyed override for testing and maintenance purposes that will interrupt the Tracer controlled program. In the event the energy management system cannot be utilized, programmable time clocks may be used for lighting control (TORK model no. DZS200BP or equal).
- N. All motion activated lighting controlled by relays shall have the relay in a readily accessible location and preferably directly above the wall switch. Approved manufacturers are Hubbell, Leviton, and Wattstopper.
- O. Where motion activated lighting is required, all controls shall be automatic.

IV. <u>RECEPTACLES / CIRCUITING/WIRING DEVICES</u>

- A. Label all receptacles with the panel number/circuit number using a permanent stick-on attachable label or engraved label (engraving required for new construction).
- B. All wall plates (receptacle, switch, etc.) shall be Nylon Ivory Un-breakable device plates. kitchen ?
- C. Wiring devices shall be acceptable for stranded wiring and colored coded as follows:
 - a. Ivory Normal Power
 - b. Gray Computer Power
 - c. Red Emergency Power
- D. Receptacles serving water coolers shall be readily accessible. Receptacle shall be serviceable without removing the water cooler.
- E. Home run circuitry (junction boxes) shall be accessible above ceilings, not in walls.
- F. MC cable shall be acceptable only above accessible ceilings limited to fixture whips. Cost Effect?
- G. All branch circuit wiring shall be "stranded" copper wire type THHN. No solid wire shall be allowed unless approved by the school board project manager. All devices shall be rated for stranded wire. Cost effect?

H. Refer to Divisions 11, 23, 27, and 28 for electrical requirements for kitchen equipment, HVAC, Communications, and Safety and Security.