SECTION 26 05 02 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Furnish all labor, material, services and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all circuits and electrical equipment.

B. Equipment or Fixtures: Equipment and fixtures shall be connected to provide circuit continuity in accordance with the Specifications, whether or not each piece of conductor, conduit, or protective device is shown between such items of equipment or fixtures, and the point of circuit origin.

C. Work Installed but Furnished under Other Sections: The Electrical Work includes the installation or connection of certain materials and equipment furnished under other sections. Verify installation details. Foundations for apparatus and equipment will be furnished.

D. Provide conduit for all controls and other devices both line and low voltage. Install all control housings and back bone boxes required for installing conduit and wire to the controls. For networked web-based controls systems such as lighting that require Cat 6 cabling or any other similar system, conduits can be substituted with cable trays.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Protect cable ends from entrance of moisture.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

D. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, moisture, chemical, water, construction debris, mechanical damage, and traffic.

E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided.

1.3 ENCLOSURES

A. Due to the corrosive exterior environment at Los Angeles International Airport, all electrical equipment and enclosures including but not limited to switchgear, switchboards, panel boards, motor control centers, electrical cabinets are to be located indoors in conditioned electrical rooms or spaces to the extent possible. Any equipment installation in wet outdoor areas or damp areas with moderate degree of moisture shall be listed for NEMA TYPE 4, TYPE 3R Stainless Steel Gasketed or better. Any equipment installation in dry areas but

open to the environment and not normally subject to dampness, such as tunnels, tug and baggage conveyance areas, shall be listed for NEMA TYPE 3R/12. Canopies, terminal moats, tug and baggage conveyance areas within 25 feet from any opening to the outdoor environment shall be considered a damp location with moderate degree of moisture.

1.4 GENERAL REQUIREMENTS

A. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

B. Codes and Regulations:

1. Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:

   a. Institute of Electrical and Electronic Designers - IEEE

   b. National Electrical Manufacturers' Association - NEMA

   c. Underwriters' Laboratories, Inc. - UL

   d. National Fire Protection Association - NFPA

   e. American Society for Testing and Materials - ASTM

   f. American National Standards Institute - ANSI

   g. American Standard Association - ASA

   h. National Electrical Code - NEC, as modified by the city of Los Angeles

   i. Insulated Power Cable Designers Association - IPCEA

   j. InterNational Electrical Testing Association - NETA

C. Seismic Design of Electrical Equipment:

1. All electrical equipment shall be anchored per Airport Structural Design Standards and the applicable code.

D. Requirements of Regulatory Agencies:

1. Codes, Permits and Fees: Where provisions differ in regard to code application, size, quality, quantity or type of equipment, Contractor shall include in the bid, costs for the most costly provision either denoted in the specifications or on the drawings. This provision shall apply as an amendment to the California Public Contracts Code.

   a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Work shall be obtained by the Contractor at his expense, unless otherwise specified.

   b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

E. Shop Drawings and Submittals: Submittals are required on all material prior to installation. Shop drawings shall be submitted on, but not limited to, the following:

1. Equipment Wiring Connections
2. Medium Voltage Cables
3. Low Voltage Electrical Power Conductors and Cables
4. Grounding and Bonding for Electrical Systems
5. Hangers and Supports for Electrical Systems
6. Raceway and Boxes for Electrical Systems
7. Underground Ducts and Raceways for Electrical Systems
8. Vibration and Seismic Controls for Electrical Systems
9. Identification for Electrical Systems
10. Short Circuit and Overcurrent Protective Device Coordination Study
11. Web Based Power Monitoring Communications System
12. Lighting Control Devices
13. Network Lighting Control Systems
14. Medium Voltage Transformers
15. Metal Clad Switchgear (VacClad) B Medium Voltage
16. 34.5 kV Metering Switchgear
17. Low Voltage Transformers
18. Switchboards
19. Panelboards
20. Motor Control Centers
21. Enclosed Bus Assemblies
22. Electrical Cabinets and Enclosures
23. Wiring Devices
24. Fuses
25. Enclosed Switches
26. Enclosed Circuit Breakers
27. Enclosed Transfer Switches
28. Enclosed Controllers
29. Variable Frequency Motor Controllers
30. Engine Generators
31. Resistive Load Banks
32. Emergency Generators and Distribution Switchgear

33. Battery Equipment (Inverter)
34. Static Uninterruptible Power Supply
35. Emergency Circuit Conductors and Cable.
36. Metal Clad Drawout Switchgear B Low Voltage
37. Transient Voltage Suppression for Low Voltage Electrical Power Circuits
38. Interior Lighting
39. Exterior lighting
40. Fire Detection and Alarm
41. 3@ scale drawings of outdoor 34.5 kV switchgear yard, indoor 34.5 kV electrical vaults, all low voltage electrical rooms comply with all applicable LADWP, CEC and LA City requirements for equipment layout and installation. Also include associated grounding system grid drawings and details.
42. 1/8@ drawings for underground duct bank installation for normal and emergency feeders from main electrical rooms to sub electrical rooms with necessary conduit bank cross section details and equipment terminations.

F. Cutting and Patching:

1. Obtain written permission from LAWA before core drilling or cutting any structural members. Exact method and location of conduit penetrations and/or openings in concrete walls, floors, or ceilings shall be as approved by LAWA.
2. Use care in piercing waterproofing. After the part piercing the waterproofing has been set in place, seal openings and make absolutely watertight.
3. Seal all openings to meet the fire rating of the particular wall floor or ceiling.
4. In order to avoid severing any existing structural reinforcement, use ground penetrating radar or x-ray equipment to survey the existing concrete floor slabs/walls before cutting or drilling any new penetrations.

G. Miscellaneous:

1. LED control lights shall be used in all switchgear, switchboards, motor control centers and similar equipment.
2. Outdoor equipment enclosures shall be NEMA Type 4, Type 3R Stainless Steel, or better.
3. All floor mounted equipment shall be installed on a concrete housekeeping pad. Refer to Hangers and Supports for Electrical Equipment (26 05 30) Part 3.5 for requirements. (Added August 2013).

1.5 JOB CONDITIONS

A. Existing Conditions:

1. The contractor shall visit the site and verify existing conditions.

2. Electrical circuits affecting work shall be de energized while working on or near them.

3. Arrange the work so that electrical power is available to all electrical equipment within existing facility at all times. Schedule all interruptions at the convenience of LAWA, including exact time and duration, in accordance with LAWA's power shut down procedures. Provide temporary power during all periods of interruption, which are deemed excessive by LAWA.

B. Protection:

1. Protection of apparatus, materials and equipment. Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment and installations from damage of any kind. LAWA may reject any particular piece or pieces of material, apparatus or equipment scratched, dented or otherwise damaged.

2. Seal equipment or components exposed to the weather and make watertight and insect proof. Protect equipment outlets and conduit openings with temporary plugs or caps at all times that work is not in progress.

3. Provide weather protection, with heaters, for equipment stored outdoors.

1.6 POWER SHUTDOWN PROCEDURES

A. The contractor's construction schedule shall indicate dates of proposed electrical power shutdowns required to perform the installation. The contractor shall notify LAWA a minimum of thirty (30) days prior to each shutdown. All shutdown coordination meetings shall be arranged by the contractor for each shutdown.

B. Power shutdowns shall occur between the hours of 12:00 am and 4:00 am.

C. Only one switchboard shall be shutdown at any one time. Shutdowns shall be scheduled a minimum of three (3) days apart.

D. No interruptions to airport operations shall be allowed during periods deemed by LAWA as Holiday Construction Restriction Periods. These periods are typically from the Friday before the week of the Thanksgiving Holiday to the following Monday after the Thanksgiving Holiday (~9 calendar days), and the Friday before the week of the Christmas Holiday to the Monday following New Years Day (~16 calendar days). Contractor shall verify the Holiday Construction Restriction Periods with LAWA prior to preparing the construction schedule.

E. Refer to the LAWA Utility Shutdown Procedures for additional information.

1.7 TESTING AND ADJUSTMENT

A. Upon completion of all Electrical Work, the contractor shall provide all testing as follows:

1. Operational Test: Test all circuit breakers, receptacles and all other electrical equipment. Replace all faulty devices and equipment discovered during testing with new devices and equipment at no additional cost, and that part of the system (or devices or equipment) shall then be retested.

2. Secondary Grounding Resistance: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point.
3. Ground Fault System Test: Measure system neutral insulation resistances to ensure no shunt ground paths exist.
4. All grounding resistance and ground fault test procedures shall be performed by an independent testing firm.

1.8 MAINTENANCE, SERVICING AND INSTRUCTION MANUALS, AND WIRING DIAGRAMS

A. Prior to substantial completion, the contractor shall submit 4 copies of operating and maintenance and servicing instructions, as well as an equal number of copies of complete wiring diagrams all neatly bound in hard cover 3 ring binders with table of contents and tabs for the following items or equipment:

1. Lighting Control Devices System
2. Medium Voltage Transformers
3. Medium Voltage Vacuum Circuit Breakers
4. Medium Voltage Metering Switchgear
5. Low Voltage Transformers
6. Switchboards
7. Panelboards
8. Motor Control Centers
9. Enclosed Bus Assemblies
10. Wiring Devices
11. Fuses
12. Enclosed Switches
13. Enclosed Circuit Breakers
14. Enclosed Transfer Switches
15. Enclosed Controllers
16. Variable Frequency Motor Controllers
17. Engine Generators
18. Resistive Load Banks
19. Emergency Generators and Distribution Switchgear
20. Battery Equipment (Inverter)
21. Static Uninterruptible Power Supply
22. Transient Voltage Suppression for Low Voltage Electrical Power Circuits
23. Interior Lighting

24. Exterior Lighting
25. Fire Detection and Alarm
26. Web Based Power Monitoring System

B. All wiring diagrams shall specifically cover the installed system indicating zones, wiring, and components added to the system.

C. Include Product and calculations data with maintenance and Operations manuals. Include all testing reports with Maintenance and Operation manuals.

1.9 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the specifications and/or the drawings have been fully completed, representatives of LAWA will inspect the Work. The Contractor shall provide competent personnel to demonstrate the operation of any item of system, to the full satisfaction of each representative. The Contractor shall provide 8 hours of minimum scheduled operation and maintenance training to staff to be trained on each system indicated above. See specific sections for additional training/operation hours required.

B. Provide manuals for attendees.

C. Final acceptance of the work will be made by LAWA after receipt of approval and recommendation of acceptance from each representative.

D. The Contractor shall furnish Record Drawings before final payment of retention.

1.10 WARRANTIES

A. Special Warranties:

1. All 34.5kV Electrical Equipment, Switchgear and Accessories for 3 years (parts and labor).

B. During the period between Substantial Completion and Partial Acceptance (Final Acceptance of a defined area of the work), the Contractor shall provide the necessary services to Operate and Maintain the equipment in proper working order including, but not limited to:

1. Operation and Maintenance Response:

a. Provide twenty (24) hour emergency service during this period consisting of:

1) Critical Issue: A prompt response (within 15 minutes) to emergency request by telephone or otherwise from LAWA or designated representative. Onsite within 30 minutes of notification to triage and assess the situation.

2) Non Critical Issues: A prompt response (within 15 minutes) to request by telephone or otherwise from LAWA or designated representative. Onsite within one (1) hour after receiving notice from LAWA representative or having knowledge of a need to service the system. If event occurs after business hours, weekends or holidays, response shall be within one (1) hour

of commencement of next business day.

3) Scheduled Operational Needs: 24 hour notice of scheduled operational need. Failure to respond to scheduled operational need render need as a Critical Issue.

b. For Critical issues, on site response shall be within 30 minutes of notification. Repair or service of respective components and/or system shall be commenced immediately upon arrival on site. This requirement shall include after business hours, weekends, and holidays. Critical issues are defined as complete system failure, failure of controls, entrapments, and/or potential injury to persons, or other item that LAWA deems a critical operational need.

c. For Noncritical issues, on site response shall be within one (1) hour of notification. If event occurs after business hours, weekends, or holidays, response shall be within one (1) hour of commencement of next business day. Repair or service of respective components and/or system shall be commenced within (4) hours of the arrival on site.

2. Maintenance:

a. Inspection of completed installation and periodic testing to maintain equipment in completely operable, like new condition.

b. Perform any necessary regulatory testing to ensure system(s) are compliant with applicable code, all to the satisfaction of the Authority Having Jurisdiction.

c. Periodic lubrication of parts, filter changes and equipment components as per OEM's recommendation. Documentation to be provided for each piece of equipment when services are provided.

d. Spare Parts: The Contractor shall maintain adequate supply of spare parts during this period. Any spare parts utilized during this period that are part of the contractually obligated inventory of spare parts for Final Acceptance shall be replenished prior to Final Acceptance.

3. Operation:

a. All necessary work to operate/maintain the equipment in proper working order.

b. Perform daily maintenance and system health checks as applicable, and any necessary system backups, failover/failback testing.

c. Routinely monitoring equipment and systems for anomalies and respond or report to system maintenance team to respond and resolve.

d. Perform configuration changes as needed to support project, airport, tenant operations, etc.

e. Maintain logs of configuration changes.

4. Perform work without removing equipment from service during peak traffic periods (unless emergency and/or unless specifically authorized by LAWA) and those peak periods have been determined by LAWA as 7:00 a.m. to 12:00 a.m. (midnight) daily.
5. Unlimited regular time callbacks are included with the applicable response time. Regular time will be Monday through Friday, 8:00am to 4:30pm, exclusive of holidays. Overtime\Premium time call backs originating from an operational error related to the performance requirements of the equipment shall be borne by the Contractor.

END OF SECTION 26 05 02