

1 **SECTION 26 00 00 - ELECTRICAL**

2
3
4 **PART 1 - GENERAL**

5
6 **1.01 DESCRIPTION**

7
8 A. Work Included: Provide complete electrical service and distribution system with equipment and
9 materials where shown on the Drawings, as specified herein, and as needed for a complete and
10 proper installation including, but not necessarily limited to:

- 11
12 1. Underground Electric Service (200-amp, 1-phase, 120/20-volt), service disconnect -
13 meter cabinet with service ground, distribution panel with main circuit breaker and branch
14 circuit breakers;
15 2. SPD surge protection device;
16 3. Branch circuit wiring for lighting controls and equipment;
17 4. Underground electrical distribution system to exterior lighting poles;
18 5. Hangers, anchor sleeves, hand hole pull boxes, supports, and other related electrical
19 materials;
20 6. Other items and services required to complete the electrical systems.

21
22 B. Related Work:

- 23
24 1. Documents affecting work of this Section include, but are not necessarily limited to,
25 General Conditions, Supplementary Conditions, and Sections in Division 1 of these
26 Specifications;
27 2. Equipment structural supports, enclosures and pads, etc.;
28 3. All line voltage control wiring and starter interlocks, where specified;
29 4. Final lighting equipment electrical connections.

30
31 C. Work of Other Sections:

- 32
33 1. Lighting poles, fixtures and controls by provided and installed MUSCO lighting.

34
35 **1.02 GENERAL PROVISIONS**

36
37 A. Everything essential for the completion of the work implied to be covered by these Specifications
38 to make the system ready for normal and proper operation must be furnished and installed by this
39 Contractor. Accordingly, any omission from either the plans or the Specifications, or both, of
40 details necessary for the proper installation and operation of the system shall not relieve this
41 Contractor from furnishing such detail in full and proper manner.

42
43 B. In addition to the electrical plans, see General Plans of the building, as all electrical work
44 appearing on the latter plans will be part of this contract unless especially specified to be done by
45 other contractors, as well as, the said work detailed on the electrical plans.

46
47 **1.03 QUALITY ASSURANCE**

48
49 A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the
50 necessary crafts and who are completely familiar with the specified requirements and methods
51 needed for proper performance of the work of this Section.

52
53 B. Without additional cost to the Owner, provide such other labor and materials as required to
54 complete the work of this Section in accordance with the requirements of governmental agencies
55 having jurisdiction, regardless of whether such materials and associated labor are called for
56 elsewhere in these Contract Documents.

1 C. Reference Standard: The following standards are imposed, as applicable to the work:

| | | |
|---|------|---|
| 2 | | |
| 3 | ASTM | American Society of Testing and Materials |
| 4 | NEC | National Electrical Code |
| 5 | NEMA | National Electrical Manufacturers Association |
| 6 | NFPA | National Fire Protection Association |
| 7 | UL | Underwriters Laboratories |
| 8 | | |

9 **1.04 CODES AND PERMITS**

10
11 A. The Contractor must comply with national, state of Wisconsin and City of Madison building and
12 electrical codes and other ordinances in force where the building is located as far as same apply
13 to their work.

- 14
15 1. IBC 2015;
16 2. IEEC 2015;
17 3. NEC 2017;
18 4. Wisconsin Electrical Code SPS 316 sections.

19
20 B. He must secure permits from proper offices and pay fees as may be necessary for fulfilling the
21 requirements of these Specifications.

22
23 C. One (1) copy of all permits must be furnished to the Owner.

24
25 D. Electric Service Fee: Electrical Contractor shall secure and pay all fees for new electrical service
26 from electric utility, including temporary power services.

27
28 **1.05 COORDINATION**

29
30 A. Cooperate and coordinate with other trades to assure that all systems in the electrical work may
31 be installed in the best arrangement. Coordinate as required with all other trades to share space
32 in common areas and to provide the maximum of access to each system.

33
34 B. Arrange electrical work in neat, well-organized manner with piping and similar running parallel
35 with primary lines of building construction.

36
37 C. Locate operating and control equipment properly to provide easy access, and install entire
38 electrical systems with adequate access for operation and maintenance.

39
40 D. Give right-of-way to piping which must slope for drainage.

41
42 **1.06 ELECTRICAL PROVISIONS OF THE MECHANICAL WORK**

43
44 A. Line Voltage Wiring: The Electrical Contractor shall make all line voltage (100 volts and greater)
45 electrical wiring, final connections and motor wiring for Mechanical equipment.

46
47 B. Control Wiring: Low-voltage (less than 100 volts) control wiring in conjunction with Mechanical
48 work shall be by the Mechanical Contractor in strict accordance with the applicable sections of
49 the Electrical Specifications.

50
51 C. Motors, Starters, and Disconnects: All motors starter and disconnects shall be provided by the
52 Electrical Contractor, unless provided with the equipment or indicated otherwise.

- 53
54 1. Mechanical Contractors shall furnish list of and location of all Mechanical equipment and
55 requirements for electrical connections, along with wiring diagrams.

56
57 **1.07 FLOOR, WALL, ROOF AND CEILING OPENINGS**

- 1
2 A. The General Contractor will be required to leave openings in new construction ceiling, floors,
3 walls, roof, partitions, etc., as required to install the Electrical work specified or shown on the
4 Drawings. The Electrical Contractor is responsible for correct size and location of openings.
5
6 B. Provisions for openings, holes and clearances through new construction walls, floors, ceilings
7 and partitions are to be made in advance of construction of such parts of the building.
8
9 C. The Electrical Contractor shall set sleeves and anchors for all equipment, etc., and shall provide
10 watertight seals on pipes through exterior walls, floors and roof locations, and where noted on the
11 Drawings.
12

13 **1.08 CUTTING AND PATCHING**

- 14
15 A. General: Refer to Division 1 General Requirements.
16
17 B. Perform all cutting and patching required for complete installation of the Electrical systems,
18 unless specifically noted otherwise. Provide all materials required for patching unless otherwise
19 noted.
20
21 1. All cutting and patching necessary of structural members to install any Electrical work
22 shall not be done without permission, and then only carefully done under the direction of
23 the Architect and General Contractor.
24

25 **1.09 TRENCHING AND BACKFILLING**

- 26
27 A. Comply with pertinent provisions of Division 1.
28
29 B. Perform trenching and backfilling associated with the work of this Section in strict accordance
30 with the provisions of Division 2 of the Specifications.
31

32 **1.10 SUBMITTALS**

- 33
34 A. Comply with pertinent provisions of Division 1.
35
36 B. Shop Drawing Submittals: Submit electronic PDF shop drawings to the Engineer for approval,
37 with complete detail for all equipment, materials, etc., to be furnished and installed for this project
38 as follows:
39
40 1. Electric Service Equipment;
41 2. Distribution Panelboards;
42 3. SPD Surge Protection Device;
43 4. Conductors and Cables;
44 5. Raceways, Boxes and Supports;
45 6. Hand Holds;
46 7. Miscellaneous Electrical Devices.
47
48 C. Shop Drawings:
49
50 1. The Electrical Contractor will be held responsible for correction of work deemed
51 necessary by the Engineer due to proceeding with the electrical work without approved
52 shop drawings that have the Architect/Engineers final approval.
53 2. Shop drawings shall include data on physical dimensions, gauges, materials of
54 construction and capacities. Incomplete drawings will be disapproved.
55 3. This Contractor will be responsible for all figures, quantities and dimensions shown on
56 the shop drawings.

1 4. Approval of shop drawings describing equipment that cannot fit in the space allotted does
2 not relieve this Contractor from responsibility of resubmitting equipment that will meet the
3 space requirements.
4

5 D. O & M Manual: Upon completion of this portion of the Work, and as a condition of its
6 acceptance, deliver to the Architect two (2) copies of an operation and maintenance manual
7 compiled in accordance with the provisions of Division 1 of these Specifications. Include the
8 following within the bound O&M manual:
9

- 10 1. Copy of the approved Record Documents for this portion of the Work;
- 11 2. Copies of all warranties and guaranties.
- 12 3. As-built drawings.

13
14 E. As-built Drawings: Record installation as-built on a set of blueline prints during construction.
15 Plan shall represent actual locations, materials and circuiting of equipment installed.
16

17 1.11 PRODUCT HANDLING

18
19 A. Comply with pertinent provisions of Division 1.
20

21 1.12 WARRANTY

22
23 A. In addition to standard one year warranty on all labor and materials, provide an additional
24 warranty on ballasts for all new fluorescent and HID lighting fixtures as specified.
25

26 1.13 HOUSEKEEPING AND CLEAN-UP

27
28 A. Periodically as work progresses and/or as directed by the Architect, the Contractor shall remove
29 waste materials from the building and leave the area of the workroom clean. Upon completion of
30 work remove all tools, scaffolding, broken and waste materials, etc., from the site.
31

32 1.14 TEMPORARY SERVICES

- 33
34 A. This Contractor shall provide temporary lighting and power as required throughout the
35 construction period.
36
37 B. Arrange for temporary electrical utility with local electrical utility. Electrical Contractor shall pay all
38 temporary electrical service and usage fees.
39
40

41 PART 2 - PRODUCTS

42 2.01 GENERAL

43
44 A. Provide only materials that are new, of the type and quality specified. Where Underwriters'
45 Laboratories, Inc. has established standards for such materials, provide only materials bearing
46 the UL label.
47
48

49 2.02 SERVICE ENTRANCES AND METERING

- 50
51 A. New Service: Provide new underground 200A, 120/240 volt, 1-phase, 3-wire electric service
52 from pad-mounted transformer as required by the local electrical utility(MG&E) and as shown on
53 Drawings.
54
55 B. Metering: Provide combination service disconnect with ground and metering socket cabinet for
56 exterior mounting and related metering equipment per local electrical utility requirements(MG&E).
57

1. Utility approved metering equipment: Milbank U5784-O-200-5T-CB

C. Main Switches: Provide a 200-amp main circuit breakers in the service metering cabinet with current limiting capabilities to meet utility AIC requirements.

D. Service Distribution Panel (Panel 'A'):

1. Provide 200-amp, 1-phase main distribution panel as indicated on plans complete with 200-amp main circuit breaker rated for 22,000 AIC, branch circuit breakers, NEMA 3R enclosure, main service ground and solid neutral buss lugs and other components required for a complete installation.

2.03 SURGE PROTECTIVE DEVICES

A. The surge protective device (SPD) shall be designated a location Type 2 device intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the main service panel. The SPD shall be Listed in accordance with UL 1449.

B. The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV's with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.

C. The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.

1. MCOV = 150 volt.

D. Protection Modes: The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for grounded wye configured systems. For a delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.

E. Voltage Protection Rating (VPR):

The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:

1. Surge current per phase rating: 80kA

2.. 240/120 volt applications: 900V L-N, 1200V L-G, 700V N-G, 1500 L-L

F. Nominal Discharge Current (In): The SPD shall have a UL 1449 Nominal Discharge Current Rating (In) of not less than 20kA.

G. Short Circuit Current Rating (SCCR):

The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

2.04 GROUNDING SYSTEM

A. Ground all equipment, including switches, transformers, conduit systems, motors, and other apparatus, by conduit or conductor to cold water main and to independent electrode, using ground clamps manufactured by Burndy or T&B, and approved by the Engineer.

B. Provide new service grounding electrode system. Add ground rod grounding electrodes as required per NEC 250.50 for a common grounding electrode system.

C. Provide grounding conductor from service ground to solid ground buss bar at all distribution panelboards.

D. Provide grounding jumper from grounding electrode to metallic support posts.

1 E. Ground all motor and equipment connections with dedicated ground conductor.

2
3 **2.05 IDENTIFICATION**

4
5 A. Junction and pull boxes shall be stenciled utilizing a coded identification system. The following
6 junction and pull boxes shall be identified using a coded system. Coding shall be submitted to
7 Engineer for approval.

- 8
9 1. Controls - 120V;
10 2. Power & Lighting - 120/240V.

11
12 B. Label circuit numbers for all accessible line voltage power distribution raceways and junction
13 boxes.

14
15 C. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely fastened to the
16 following equipment. Size 1" x 4" with 3/8" high letters unless space available dictates differently.

- 17
18 1. Panelboards.

19
20 D. Typewritten Directory: Each panelboard shall be provided with a typewritten directory in a steel
21 frame with plastic cover contained on the inside of panel door. These directories shall indicate
22 load served and rooms served by each protective device in the respective panel.

23
24 E. Identify all conductors per NEC:

- 25
26 120/240V - Phase A - Black
27 - Phase B - Red
28 - Neutral - White
29 - Ground - Green
30

31 **2.06 POWER DISTRIBUTION SYSTEM**

32
33 A. See plans for panelboard capacity, voltage ratings, and branch circuit breaker units.

34
35 B. All panelboards to be of the circuit breaker type with bolt-on circuit breakers. AIC rating as
36 scheduled on drawings.

37
38 C. Branch circuit breakers shall be thermal magnetic; quick-make and quick break. Multi-pole
39 breakers to have common trip. Handle ties of any sort not allowed.

40
41 D. Panelboards shall be Square 'D' type NQOD with bolt-on branch circuit breakers rated for 10,000
42 AIC.

- 43
44 1. Square 'D' is the only approved manufacturer for this project.

45
46 E. Each panel shall be provided with a typewritten directory mounted on inside of panel door and
47 covered with clear plastic. This directory shall indicate the load supplied by each branch circuit
48 breaker in panel. Room numbers shall be actual room numbers.

49
50 F. Each panelboard shall be securely attached to support structure with galvanized unistrut
51 supports.

52
53 G. All panelboards shall be equipped with an equipment grounding bar that is separate from the
54 solid neutral bar.

55
56 **2.07 RACEWAY SYSTEM**

- 1 A. Steel Conduit: Galvanized or sheradized steel intermediate or rigid metal conduit, or electrical
2 metallic tubing (EMT) with steel set screw or compression ring type fittings.
3
- 4 1. Provide rigid galvanized steel conduits as all exterior exposed areas.
5 2. Where conduit is installed underground or in the floor slab, provide rigid galvanized steel
6 conduit, or PVC coated steel conduit is acceptable.
7 3. Provide liquid-tight flexible conduit in all exterior locations
8
- 9 B. Conduit:
10
- 11 1. Rigid Threaded: Steel, ANSI C80.1
12 2. Electrical Metallic Tubing: ANSI C80.3
13 3. Rigid Nonmetallic Tubing: Schedule 40 PVC; NEMA TC-2 & WC-1094
14
- 15 C. Rigid Steel Conduit and Fittings:
16
- 17 1. Manufactured to ANSI C80.1 standards
18 2. Fittings: Threaded steel type as per ANSI/NEMA FB1
19
- 20 D. Rigid Non-Metallic Conduit: Schedule 40 PVC with solvent welded fittings.
21
- 22 1. Below grade installation only.
23 2. Encase in concrete below drives and roadways.
24
- 25 E. Liquid-Tight Flexible Conduit Fittings:
26
- 27 1. Conduit: Flexible metal conduit with PVC jacket.
28 2. Fittings as per ANSI/NEMA FB1.
29
- 30 F. Pull Boxes: Pull boxes and junction boxes shall be minimum 4 inch square by 2-1/8th inches
31 deep for use with 1 inch conduit and smaller. On conduit systems using 1-1/4 inch conduit or
32 larger, pull and junction boxes shall be sized per NEC but not less than 4-11/16 inch square.
33
- 34 1. Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot
35 welded joints and corners.
36 2. Sheet Metal Boxes Larger Than 12 Inches (300 mm) in any dimension shall have a
37 hinged cover or a chain installed between box and cover.
38 3. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6,
39 flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast
40 iron or aluminum box and cover with ground flange, neoprene gasket, and stainless
41 steel cover screws.
42 4. Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.
43 5. Wireways shall not be used in lieu of junction boxes.
44 6. Pull Boxes and Junction Boxes: NEC metal construction with screw or hinged
45
- 46 G. Electrical Hand Hold Splice Boxes:
47
- 48 1. Provide flush at grade splice boxes constructed of fiberglass polymer
49 concrete reinforced with removable access cover labeled "ELECTRIC" and stainless
50 steel cover fasteners. Cover shall be cast iron, bronze or fiberglass polymer UV rated.
51 2. Cover assembly shall be load tested per ANSI/SCTE 77 for 12,000 lbs.
52 3. Mount splice box on 6" compacted gravel base and pour 4" concrete collar(4" deep)
53 with reinforcing rod around top for protection.
54 4. MacLean Highline CHA132412-H(12"x21-1/2"x12"high) or approved equal.
55

1 H. Provide sleeves and chases where conduits pass through floors and walls.

2
3 **2.08 CONDUCTORS**

4
5 A. Wire and Cable (600 Volt): Provide 600 V insulated copper wire and cable, NEC standard, of
6 types specified below for different applications, with UL label, and color coded as required by
7 governmental agencies having jurisdiction. Use only copper wires and cables.

- 8
9 1. With conductors No. 4 and larger, provide insulating bushings.
10 2. Wire and cable shall be THHN or THWN.
11 3. Branch circuit wiring installed in wiring channels of continuous row-mounted fixtures shall
12 be provided. UL listed type RHH or other approved 90 degree C wires, rated at 600 V.
13 4. Wire No. 10 and smaller shall be solid or stranded wire; wire larger than No. 10 shall be
14 stranded wire.
15 5. Wire in conduits subjected to direct sunlight shall be THWN or RHWN.
16 6. Provide XHHW/CU wiring in underground exterior conduit.
17 7. Identify feeder neutrals with white tape or white paint.
18 8. All low-voltage wiring located in accessible areas shall be installed in metallic conduit.
19 9. Provide separate identified neutral conductor for emergency and exit lighting circuits.
20 10. All branch circuit conductors shall be connected by means of a screw terminal.

21
22 **2.09 EQUIPMENT WIRING**

- 23
24 A. See plans for approximate location and sizes of all lighting equipment wiring. Verify exact
25 locations at job site with the contractor that is furnishing the lighting equipment.
26
27 B. The Drawings indicate that the anticipated loads and circuit sizes. Verify all these requirements
28 with the site lighting contractor and install accordingly under this contract.
29
30 C. All final connections to motors to be made by this Contractor.

31
32 **2.10 SAFETY SWITCHES**

- 33
34 A. Provide safety switches of general duty type, horsepower rated, quick-make and quick-break
35 design, externally operated with provision for padlocking, fusible or non-fusible as shown on the
36 Drawings.
37
38 B. Provide enclosures clearly marked for maximum voltage, current, and horsepower rating, and:
39
40 1. Indoor: NEMA type 1.
41 2. Outdoor: NEMA type 3R, raintight.
42
43 C. Approved Manufacturers: Square D, Cutler Hammer or Siemens.

44
45
46 **2.11 OTHER MATERIALS**

- 47
48 A. Provide other materials, not specifically described but required for a complete and proper
49 installation, as selected by the Contractor subject to the approval of the Architect.
50

51
52 **PART 3 - EXECUTION**

53
54 **3.01 SURFACE CONDITIONS**

- 1 A. Examine the areas and conditions under which work of this Section will be performed. Correct
2 conditions detrimental to timely and proper completion of the Work. Do not proceed until
3 unsatisfactory conditions are corrected.
4

5 **3.02 PREPARATION**

7 A. Coordination:

- 8
9 1. Coordinate as necessary with other trades to assure proper and adequate provision in
10 the work of those trades for interface with the work of this Section.
11 2. Coordinate the installation of electrical items with the schedule for work of other trades to
12 prevent unnecessary delays in the work schedule.
13

- 14 B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but
15 their absolute accuracy is not warranted. The exact locations, distances, levels, and other
16 conditions will be governed by actual construction and the Drawings and Specifications should be
17 used only for guidance in such regard.
18

- 19 C. Where outlets are not specifically located on the Drawings, locate as determined in the field by
20 the Architect. Where outlets are installed without such specific direction, relocate as directed by
21 the Architect and at no additional cost to the Owner.
22

- 23 D. Verify all measurements at the building. No extra compensation will be allowed because of
24 differences between work shown on the drawings and actual measurements at the site of
25 construction.
26

- 27 E. The Electrical Drawings are diagrammatic, but are required to be followed closely as actual
28 construction and work of other trades will permit. Where deviations are required to conform with
29 actual construction and the work of other trades, make such deviations without additional cost to
30 the Owner.
31

32 **3.03 INSTALLATION OF ELECTRIC SERVICE**

- 34 A. Coordinate installation with local utility as required for a complete electric service installation.
35

- 36 B. Installation shall be approved by the local utilities.
37

38 **3.04 TRENCHING AND BACKFILLING**

- 40 A. Perform trenching and backfilling associated with the work of this Section in strict
41 accordance with the provisions of Division 2 of these Specifications.
42

- 43 B. Cut bottom of trench to grade, make trench 12" wider than the widest dimension of the pipe.
44

45 C. Bedding and backfilling:

- 46
47 1. Install piping promptly after trenching. Keep trenches open as short a time as
48 practicable.
49 2. *Under the building slab:* Install all pipes on a compacted bed of damp sand 6" deep. Do
50 not lay piping on large stones, rocks or bricks.
51 3. *Outside the building:* Install all underground piping on a compacted bed of damp sand
52 6" deep. Backfill to within 12" of finish grade with damp sand. Backfill the remainder with
53 native topsoil. Backfill in layers and compact sufficiently to prevent settlement.
54 4. Do not start backfill operations until underground plumbing work has been properly
55 inspected and approved by governing authorities.
56

57 **3.05 INSTALLATION OF RACEWAYS AND FITTINGS**

- 1
2 A. Where conduit is installed concealed in walls or above ceiling, or exposed in work areas, provide
3 rigid galvanized conduit or electrical metallic tubing with compression type fittings.
4
5 1. Seal joints to prevent entrance of water.
6 2. Provide ground wire of proper size per NEC 250.
7 3. Use nylon (rather than steel) fish tape.
8
9 B. Use flexible conduit only for short motor connections, or where subject to vibration.
10
11 C. Provide necessary sleeves and chases where conduits pass through floors and walls and provide
12 other necessary openings and spaces, arranging for proper time to prevent unnecessary cutting
13 in connection with the Work.
14
15 D. Where conduit is exposed, run parallel to or at right angle with lines of the building.
16
17 E. Securely and rigidly support conduits throughout the work.
18
19 F. Provide tracing tape 6" above non-metallic underground conduit.
20

21 **3.06 INSTALLATION OF LIGHTING EQUIPMENT**
22

- 23 A. Provide power and control wiring for lighting equipment as shown on the Drawings.
24

25 **3.07 INSTALLATION OF CONDUCTORS**
26

- 27 A. Unless otherwise shown on the Drawings or noted in these Specifications, use No. 12 AWG
28 conductors for all branch circuits, protected by 20 amp circuit breakers. For runs exceeding 100
29 feet, use larger wires to limit voltage drops.
30
31 B. Use identified (white) neutrals and color-coded phase wires for all branch circuit wiring.
32
33 1. Make splices electrically and mechanically secure with pressure-type connectors.
34 2. Provide "Scotchlok", Buchanon "B-cap", or Ideal "Wing-nut" connectors for wires sizes 6
35 AWG and smaller.
36 3. Provide Burndy compression-type connectors, "Hydent" or equal applied with a
37 mechanical tool and die equipment for wire sizes 4 AWG and larger.
38 4. Insulate splices with a minimum of two half-lapped layers of Scotch Branch No. 33 vinyl-
39 plastic electrical tape where insulation is required.
40

41 **3.08 INSTALLATION OF PANELBOARDS**
42

- 43 A. Unless otherwise shown on the Drawings, install panels with the top of the trim 6'-3" above the
44 finished floor.
45
46 B. Mount a typewritten directory behind plastic on the inside of each panel door and on the
47 directory, showing the circuit number and complete description of all outlets on each circuit.
48
49 C. Provide two (2) spare 1" conduits, stubbed out of the top of each flush-mounted panel and
50 terminated in accessible ceiling space, with each conduit tagged with panel description.
51

52 **3.09 TESTING AND INSPECTION**
53

- 54 A. Provide personnel and equipment, make required tests, and secure required approvals from the
55 Architect and governmental agencies having jurisdiction.
56

- 1 B. Make written notice to the Architect adequately in advance of each of the following stages of
2 construction:
3
4 1. Test all parts of the electrical system and prove that all such items provided under this
5 Section function electrically in the required manner.
6 2. Immediately submit to the Architect a report of maximum and minimum voltages and a
7 copy of the recording volt-meter chart.
8 3. Also measure voltages between phases and between phase wires and neutrals and
9 report these voltages to the Architect.

10
11 **3.10 PROJECT COMPLETION**
12

- 13 A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the
14 electrical installation, removing all traces of soil, labels, grease, oil, and other foreign material,
15 and using only the type cleaner recommended by the manufacturer of the item being cleaned.
16
17 B. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the
18 operations and maintenance manual required to be submitted under Article 1.3 of this Section of
19 these Specifications.
20

21 **END OF SECTION**