

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes general electrical requirements for all Division 26 work and is supplemental and in addition to the requirements of Division 1.
- B. It is the intention of this Division of the Specifications and the Contract Drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and fully operational condition all equipment, materials, devices and necessary appurtenances to provide a complete electrical system. Provide all materials, appliances and apparatus not specifically mentioned herein or shown on the drawings, but which are necessary to make a complete, fully operational installation of all electrical systems shown on the contract drawings or described herein. Connect equipment and devices furnished and installed under other Divisions of this specification (or the Owner) under this Division.
- C. Workmanship shall be of the best quality and competent and experienced electricians shall be employed and shall be under the supervision of a competent and experienced foreman.
- D. The drawings and specifications are complimentary and what is called for (or shown) in either is required to be provided as if called for in both.
- E. See Division 1 for sequence of work.

1.2 WORK IN OTHER DIVISIONS

- A. See all other specifications for other work which includes but is not limited to:
 - Communications
 - Conveying Systems
 - Cutting and Patching
 - Door Hardware
 - Electronic Safety and Security
 - Equipment Wiring
 - Fire Protection
 - Mechanical Control Wiring
 - Mechanical Equipment
 - Painting, Refinishing and Finishes
 - Temporary Power

1.3 CODES, PERMITS, INSPECTION FEES

- A. The following codes and standards are referenced in the Division 26 specifications. Perform all work and provide materials and equipment in accordance with the latest referenced codes and standards of the following organizations:
 - 1. American National Standards Institute (ANSI)
 - 2. National Electrical Manufacturer's Association (NEMA)
 - 3. National Fire Protection Association (NFPA)
 - 4. Underwriter's Laboratories (UL)
- B. Install the electrical systems based on the following:

NFPA 70 National Electrical Code as adopted and amended by the Local Jurisdiction.

IBC International Building Code as adopted and amended by the Local Jurisdiction.

- C. The referenced codes establish a minimum level of requirements. Where provision of the various codes conflict with each other, the more stringent provision shall govern. If any conflict occurs between referenced codes and this specification, the codes are to govern. Compliance with code requirements shall not be construed as relieving the Contractor from complying with any requirements of the drawings or specifications which may be in excess of requirements of the governing codes and rules and not contrary to same.
- D. Obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. Arrange for inspection of work by the inspectors and give the inspectors all necessary assistance in their work of inspection.

1.4 COORDINATION

- A. Coordinate work with that of the other Contractors and/or other trades doing work on the project. Examine all drawings and specifications of other trades for construction details and coordination. Make every reasonable effort to provide timely notice of work affecting other trades to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods.
- B. Special attention is called to the following items. Coordinate all conflicts prior to installation:
 - 1. Door swings such that switches will be located on the "strike" side of the door.
 - 2. Location of grilles, pipes, sprinkler heads, ducts and other mechanical equipment so that all electrical outlets, lighting fixtures and other electrical outlets and equipment are clear from and in proper relation to these items.
 - 3. Location of cabinets, counters and doors so that electrical outlets, lighting fixtures and equipment are clear from and in proper relation to these items.
 - 4. Recessing and concealing electrical materials in CMU walls, concrete construction and precast construction.
 - 5. At each switchboard, panelboard and motor control center location the Contractor shall monitor the work of all trades to assure that the space and clearance requirements of code are met.
- C. Furnish, install and place in satisfactory condition all raceways, boxes, conductors and connections and all other materials required for the electrical systems shown or noted in the contract documents to be complete, fully operational and fully tested upon completion of the project. Raceways, boxes and ground connections are shown diagrammatically only and indicate the general character and approximate location. The layout does not necessarily show the total number of raceways or boxes for the circuits required, nor are the locations of indicated runs intended to show the actual routing of the raceways.
- D. The horsepower of motors and apparatus wattage's shown on the drawings are estimated requirements of equipment furnished under other Divisions of this contract. Provide overload elements to suit actual equipment nameplate current. Advise Owner's Representative of any equipment changes or substitutions affecting electrical systems.

- E. Consult the architectural drawings for the exact height and location of all electrical equipment not specified herein or shown on the drawings. Make any minor changes (less than 6'-6" horizontal) in the location of the raceways, outlets, boxes, devices, wiring, etc., from those shown on the drawings without extra charge, where coordination requires or if so directed by the Owner's Representative before rough-in.
- F. Provide inserts or sleeves for outlet boxes, conductors, cables and/or raceways as required. Coordinate the installation thereof with other trades.

1.5 WARRANTY

- A. Refer to General Conditions of the Contract.

1.6 ITEMIZED SCHEDULE OF COSTS

- A. Refer to Division 1.

1.7 SUBMITTALS AND SHOP DRAWINGS

- A. Submittals and Shop Drawings: Schedule so as not to delay construction schedule and no later than 60 days after award of contract, submit common brochure(s) with index and divider tabs by specification section, containing all required catalog cuts. Allow two weeks for review for each submittal and resubmittal. Incomplete submittals and shop drawings which do not comply with these requirements will be returned for correction, revision and resubmittal. See General Conditions for format, quantity, etc.
- B. Submit in a three ring binder with hardboard covers. Submittals shall show:
 - 1. Indicate listing by UL or other approved testing agency.
 - 2. Highlight with yellow or blue marker adequate information to demonstrate materials being submitted fully comply with contract documents.
 - 3. Review and check all material prior to submittal and stamp "Reviewed and Approved".
- C. Shop drawings shall show:
 - 1. Ratings of items and systems.
 - 2. How the components of an item or system are assembled, interconnected, function together and how they will be installed on the project.
 - 3. System layout floor plans with complete device layout, point-to-point wiring connection between all components of the system, wire sizes and color coding.
 - 4. Coordinate with other division shop drawings and submittals. Identify interface points and indicate method of connection.

1.8 PROJECT CLOSE-OUT

- A. Coordinate with close-out provisions in Division 01 - General Requirements.
- B. Request For Final Punchlist
 - 1. To request a final electrical punch list, forward a letter to Sparling, Inc. stating; "The electrical work on this project is complete, all punch list items to date are complete, items a. - n. in the Punchlist Procure paragraph in Section 260500 - Common Work

Results For Electrical are complete and the project is ready for final punch list observation."

2. Project Punchlist Procedure: Perform the following procedures for project closeout of electrical portions of work.
 - a. Perform testing, tests and documentation per Section 26 01 26 - Maintenance Testing of Electrical Systems.
 - b. Provide engraved nameplates on electrical equipment.
 - c. Refinish electrical equipment finishes which are damaged.
 - d. Clean light fixtures per Section 26 05 00 - Common Work Results For Electrical.
 - e. Color code junction boxes per Section 26 05 33 - Raceways and Boxes For Electrical Systems.
 - f. Provide spare fuses per Section 26 28 13 - Fuses.
 - g. Insert word processed (typed) Panel Schedules in all new and existing panelboards with actual "as-built" circuit descriptions. Include electronic copies in O&M manual.
 - h. Number all circuit breakers.
 - i. Obtain final electrical permit inspection. Include copies in O & M manual.
 - j. Provide written warranty in O & M per the General Conditions of the Contract.
 - k. Furnish Record Drawings per this section. Obtain signature on Job Completion Form.
 - l. Furnish O & M Manuals per this section. Obtain signature on Job Completion Form.
 - m. Give instruction periods to owner's personnel per this section. Obtain signature on Job Completion Form.
 - n. To request final acceptance of project, fill out Job Completion Form in this section and forward to Sparling. Note: If inspectors have not signed form, a copy of signed-off permits will suffice.
 - o. Include with Job Completion Form, a copy of the final punch list with the word "DONE", and the date and Contractor's initials after each item on the list.

1.9 ELECTRICAL EQUIPMENT OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Provide O&M manuals required in Division 01 - General Requirements plus one manual for Sparling for all equipment furnished under Division 26 - Electrical of the specifications. Submit a preliminary copy, complete except for the bound cover, 60 days prior to completion of the project for checking and review. Deliver final bound corrected copies as noted in Division 1 - General Requirements plus a copy to Sparling 20 days prior to scheduled instruction periods. Obtain a receipt for the manuals and forward a copy of the receipt to the Engineer with the Job Completion Form.
- B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
- C. These O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange information in a logical manner for efficient use by the Owner's operating personnel. The information provided shall include but not be limited to the following:
 1. Equipment manufacturer, make, model number, size, nameplate data, etc.

2. Description of system configuration and operation including component identification and interrelations. A master control schematic drawings(s) may be required for this purpose.
 3. Dimensional and performance data for specific unit provided as appropriate.
 4. Manufacturer's recommended operation instructions.
 5. Manufacturer's recommended lubrication and servicing data including frequency.
 6. Complete parts list including reordering information, recommended spares and anticipated useful life (if appropriate). Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier not acceptable.
 7. Shop drawings.
 8. Wiring diagrams.
 9. Signal equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation.
 10. A complete list of local (nearest) manufacturer representative and distributor contacts for each type of equipment and manufacturer. Include name, company, address, phone, fax, e-mail address, and web site.
 11. Excel format panelboard schedules.
- D. Furnish complete wiring diagrams for each system for the specific system installed under the contract. "Typical" line diagrams will not be acceptable unless revised to indicate the exact field installation.
- E. Group the information contained in the manuals in an orderly arrangement by specification index. Provide a typewritten index and divider sheets between categories with identifying tabs. Bind the completed manuals with hard board covers not exceeding 5" thick. (Provide two or more volumes if required.) Signal and communication systems shall be in separate volumes. Imprint the covers with the name of the job, Owner, Architect, Electrical Engineer, Contractor and year of completion. Imprint the back edge with the name of the job, Owner and year of completion. Hard board covers and literature contained may be held together with screw post binding.

1.10 INSTRUCTION PERIODS

- A. After substantial completion of the work and 20 days after the O&M manuals have been delivered to the owner and after all tests and final inspection of the work by the Authority(s) Having Jurisdiction; demonstrate the electrical systems and instruct the Owner's designated operating and maintenance personnel in the operation and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be superintendents or foremen knowledgeable in each system and suppliers representatives when so specified. When more than one training session is specified, the second session shall be 30 to 90 days after the first as agreed to by the Owner.
- B. Include in each instruction session an overview of the system, presentation of information in maintenance manuals with appropriate references to drawings. Conduct tours of the building areas with explanations of maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures and adjustment locations.

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| C. | Include the following scheduled instruction periods: | 1 st Session | 2 nd Session |
| | 1. Power Distribution System | 4 hours | 4 hours |
| | 2. Lighting Control & Dimming System | 4 hours | 4 hours |
| | 3. Transient Voltage Suppression System(s) | 2 hours | 2 hours |
| | 4. Power Monitoring System | 2 hours | 2 hours |
- D. Factory trained suppliers representatives shall provide instruction for lighting control/dimming, power generation, paralleling medium voltage switchgear, and transient voltage suppression system(s).
- E. Provide one professionally produced digitally recorded or video tape of each training session in DVC or VHS format. Furnish two (2) copies to the owner.

1.11 RECORD DRAWINGS

- A. Continually record the actual electrical system(s) installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone.
1. Mark record prints with red erasable pencil. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown.
 2. Accurately locate with exact dimensions all underground and underslab raceways and stub-outs.
 3. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed.
 4. Include addenda items and revisions made during construction.
 5. Erase conditions not constructed or "X-out" and annotate "not constructed" to clearly convey the actual "as constructed" condition.
 6. Organize record drawings sheets in manageable sets, bind and print suitable titles, dates and other identification on the cover of each set.

1.12 ABBREVIATIONS AND DEFINITIONS

- A. When the following abbreviations and definitions are used in relation to the work for Division 16 they shall have the following meanings:

<u>Item</u>	<u>Meaning</u>
AHJ	Authority Having Jurisdiction.
Boxes	Outlet, Junction or Pull Boxes.
Code	All applicable codes currently enforced at project location.
Compression	Compressed using a leverage powered (hydraulic or equivalent) crimping tool.
Connection	All materials and labor required for equipment to be fully operational.
Exterior Location	Outside of or penetrating the outer surfaces of the building weather protective membrane.
Fully Operational	Tested, approved, and operating to the satisfaction of the AHJ, manufacturer and contract documents.
Furnish	Deliver to the jobsite
Install	To enter permanently into the project and make fully operational.
Kcml	Thousand circular mils (formerly MCM).
Mfr.	Manufacturer.

NEC	National Electrical Code, National Fire Protection Association, Publication #70.
Noted	Shown or specified in the contract documents.
Provide	Furnish and install.
Required	As required by code, AHJ, contract documents, or manufacturer for the particular installation to be fully operational.
Shown	As indicated on the drawings or details.
Wiring	Raceway, conductors and connections.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Authority Having Jurisdiction (Inspector).
- B. All materials to be new, free from defects and not less than quality herein specified. Materials shall be designated to insure satisfactory operation and operational life in the environmental conditions which will prevail where they are being installed.
- C. Each type of materials furnished shall be of the same make, be standard products of manufacturers regularly engaged in production of such materials and be the manufacturer's latest standard design.
- D. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using date specific information shall perform properly in all respects regardless of the century. Any interface to other new or existing materials, equipment or systems shall function properly and shall be century compliant, both in regards to information sent and received.

2.2 NAMEPLATES

- A. Provide nameplates per Section 26 05 53 - Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Handle all equipment carefully to prevent damage, breakage, denting, and scoring of finishes. Do not install damaged equipment.
- B. Store products subject to damage by the elements above ground, undercover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instruction.

3.2 CUTTING BUILDING CONSTRUCTION

- A. Obtain permission from the Owner's Representative and coordinate with other trades prior to cutting. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or concrete saws except where space limitations prevent the use of such tools.
- B. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.3 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire rated floor and wall assemblies to maintain fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 07 Section 07 84 46 "Penetration Firestopping".

3.4 PAINTING

- A. Items furnished under this Division that are scratched or marred in shipment or installation shall be refinished with touchup paint selected to match installed equipment finish.

3.5 EQUIPMENT CONNECTION

- A. For equipment furnished under this or other Divisions of the specifications, or by owner, provide complete all electrical connections necessary to serve such equipment and provide required control connections to all equipment so that the equipment is fully operational upon completion of the project. Provide disconnect switch as required by code whenever an equipment connection is shown on the drawings.
- B. Investigate existing equipment to be relocated and provide new connections as required.

3.6 HOUSEKEEPING PADS

- A. Provide steel reinforced concrete housekeeping pad under each floor mounted switchboard, transformer, motor control center, generator and/or other free standing electrical equipment. Size 4" greater (horizontal minimum) than base of equipment mounted thereon. Minimum height 3-1/2". Use 3000-psi (20.7-Mpa), 28 day compressive strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete". Chamfer edges and finish smooth with all blockouts square and plumb.
- B. When housekeeping pad is poured on previously poured concrete or is for engine or motor driven equipment, the pad shall be reinforced (4# rebar, 12" o.c., both ways) and the rebar shall be tied to the existing floor via #4 rebar epoxy grouted into the existing concrete on 18" centers or other acceptable means. The existing slab shall be thoroughly cleaned and prepared for the pad just before the pour.

3.7 CLEAN UP

- A. Contractor shall continually remove debris, cuttings, crates, cartons, etc., created by his work. Such clean up shall be done daily and at sufficient frequency to eliminate hazard to the public, other workmen, the building or the Owner's employees. Before acceptance of the

installation, Contractor shall carefully clean cabinets, panels, lighting fixtures, wiring devices, cover plates, etc., to remove dirt, cuttings, paint, plaster, mortar, concrete, etc. Blemishes to finished surfaces of apparatus shall be removed and new finish equal to the original applied.

1. Wipe surfaces of electrical equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
2. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent, high pressure sodium, metal halide, and mercury vapor fixtures to comply with requirements for new fixtures.

3.8 TESTING AND DEMONSTRATION

- A. Demonstrate that all electrical equipment operates as specified and in accordance with manufacturer's instructions. Perform tests in the presence of the Owner's Representative, Owner or Engineer. Provide all instruments, manufacturer's operating instructions and personnel required to conduct the tests. Repair or replace any electrical equipment that fails to operate as specified and or in accordance with manufacturer's requirements.

ELECTRICAL JOB COMPLETION FORM

PROJECT NAME: UWMC (Project Name)
PROJECT LOCATION: Seattle, WA
DATE: _____

A. Electrical Inspectors Final Acceptance (Copy of certificate attached.)

Name	Agency	Date
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B. Fire Marshal's Final Acceptance of Fire Alarm System (Copy of certificate attached.)

Name	Agency	Date
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C. The following systems have been demonstrated to Owner's representative.

1. Power Distribution System	Owner's Rep.	Date
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2. Lighting Control & Dimming System	Owner's Rep.	Date
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3. Transient Voltage Suppression System(s)	Owner's Rep.	Date
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D. Record Drawings
Attached Transmitted previously to _____
Date

E. O & M Manuals
Attached Transmitted previously to _____

F. Test Reports
Attached Transmitted previously to _____
Date

G. The work is complete in accordance with contract documents and authorized changes except for

_____ and the architect/engineer's representative is requested to meet with

Supervisor of Electrical Work at _____ Time on _____ Date

Contractors Rep. Signature _____ Date

END OF SECTION