SECTION 262743 - ELECTRIC-VEHICLE SERVICE EQUIPMENT - AC LEVEL 1 AND LEVEL 2

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

See "Sustainable Design Considerations" Article in the Evaluations for a discussion of sustainable design requirements that may impact the editing of this Section.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section includes EVSE that provides AC Level 1 and Level 2 EV charging.
			2. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. EV: Electric vehicle.
				2. EV Cable: The off-board cable containing the conductor(s) to connect the EV power controller to the EV that provides both power and communications during energy transfer.
				3. EV Charger or EV Charging Equipment: See "EVSE."
				4. EV Connector: A conductive device that, when electrically coupled to an EV inlet, establishes an electrical connection to the EV for the purpose of power transfer and information exchange. This device is part of the EV coupler.
				5. EV Coupler: A mating EV inlet and connector set.
				6. EV Inlet: The device in the vehicle into which the EV connector is inserted, and a conductive connection is made for the transfer of power and communication. This device is part of the EV coupler.
				7. EVSE: Electric-Vehicle Supply Equipment. It includes the EV charging equipment and conductors, including the ungrounded, grounded, and equipment grounding conductors and EV cables, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for transferring energy between the premise wiring and the EV.
			1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.
			1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for EV charging equipment.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings: For EVSE.

Include plans, elevations, sections, and [**mounting**] [**attachment**] details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Detail fabrication and assembly of mounting assemblies for EV charging equipment.

Include diagrams for power, signal, and control wiring.

Retain subparagraph below if communications service is being used for EVSE communications.

Include verification of [**wired**] [**wireless**] communications service at each location of EVSE.

* + - * 1. Product Schedule: For EVSE.[**Use same designations indicated on Drawings.**]
				2. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.

Retain "Coordination Drawings" paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: Area plans and details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

Structural members to which equipment will be attached.

Electrical service.

Communications service[**, including wireless communications equipment**].

Items penetrating finished [**floor**] [**ceiling**].

Coordinate "Qualification Data" paragraph below and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For [**Installer**] [**Company Service Advisor**].

Retain "Seismic Qualification Data" paragraph below if required by seismic criteria applicable to Project. Coordinate with Section 260548.16 "Seismic Controls for Electrical Systems." See ASCE/SEI 7 for certification requirements for equipment and components.

* + - * 1. Seismic Qualification Data: Certificates, for EVSE, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
				2. Sample Warranty: For manufacturer's warranty.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For EVSE to include in operation and maintenance manuals.

Retain "Software and Firmware Operational Documentation" paragraph below for PC-based control systems.

* + - * 1. Software and Firmware Operational Documentation:

Software operating manuals.

Program Software Backup: On USB, CD, Cloud, or approved media, complete with configuration files.

Device address and password list.

Printout of software application and graphic screens.

* + - 1. MAINTENANCE MATERIAL SUBMITTALS
				1. Furnish extra materials[**, from the same product run,**] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
			2. QUALITY ASSURANCE
				1. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
			3. FIELD CONDITIONS

Retain "Wireless Survey" paragraph below if EVSE uses cellular data service for communications with base station or payment network.

* + - * 1. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.
				2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

Ambient Temperature: Not exceeding minus 22 to plus 122 deg F.

Altitude: Not exceeding 6600 feet.

Retain "Interruption of Existing Electric Service" paragraph below for projects that have existing electric service that may be required to be interrupted.

* + - * 1. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Director’s Representative or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

Notify [**Architect**] [**Construction Manager**] [**Director’s Representative**] no fewer than [**two**] <**Insert number**> days in advance of proposed interruption of electric service.

Do not proceed with interruption of electric service without [**Architect's**] [**Construction Manager's**] [**Director’s Representative's**] written permission.

* + - 1. WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

* + - * 1. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of EVSE that fail(s) in materials or workmanship within specified warranty period.

Verify available warranties and warranty periods.

Warranty Period: [**One**] [**Two**] [**Five**] <**Insert number**> year(s) from date of Substantial Completion.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. MANUFACTURERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=13096) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[ABB, Electrification Products Division](http://www.specagent.com/Lookup?uid=123457173535).

[ChargePoint](http://www.specagent.com/Lookup?uid=123457141345).

[Schneider Electric USA, Inc](http://www.specagent.com/Lookup?uid=123457141355).

Or equal.

* + - * 1. Source Limitations: Obtain EVSE from single manufacturer.
			1. PERFORMANCE REQUIREMENTS

Retain "Seismic Performance" paragraph below with "Seismic Qualification Certificates" paragraph in "Informational Submittals" Article for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with structural engineer.

* + - * 1. Seismic Performance: EVSE shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

Retain first subparagraph below to define the term "withstand" as it applies to this Project. Definition varies with type of building and occupancy and is critical to valid certification. Option is used for essential facilities where equipment must operate immediately after an earthquake.

The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."

For life-safety components required to function after an earthquake (such as fire-sprinkler systems, components that contain hazardous content, and storage racks in structures open to the public), the Component Importance Factor is 1.5. For other components, the Component Importance Factor is 1.0 unless the structure is in Seismic Use Group III and component is necessary for continued operation of facility or failure of component could impair continued operation of facility, in which case the Component Importance Factor is 1.5.

Component Importance Factor: [**1.5**] [**1.0**].

See ASCE/SEI 7, Coefficients for Architectural Component Table and Seismic Coefficients for Mechanical and Electrical Components Table for requirements to be inserted in subparagraph below.

<**Insert requirements for Component Amplification Factor and Component Response Modification Factor**>.

* + - * 1. Ambient Temperature: [**41 to 104 deg F**] [**5 to 104 deg F**].

Delete "Relative Humidity" subparagraph below for outdoor units or if outdoor units are covered by this Section.

* + - * 1. Relative Humidity: Zero to 95 percent.
				2. Altitude: Sea level to [**1000 feet**] <**Insert altitude**>.
				3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
				4. Surge Withstand: 6 kV at 3000 A.
				5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
				6. EV Charging Levels:

Retain one or more of three subparagraphs below to specify level of charge provided to EV. See "Electric Vehicle (EV) Charging Equipment" Article in the Evaluations for discussion of SAE J1772 EV charging levels.

Single vehicle, AC Level 1 at up to 1.7 kW per vehicle.

Single vehicle, AC Level 2 at up to 19.2 kW per vehicle.

Dual vehicles, AC Level 2 at up to19.2 kW per vehicle.

* + - 1. EVSE DESCRIPTION
				1. Comply with NFPA 70.
				2. Comply with:

UL 2231-1.

UL 2594.

SAE J1772 for SAE combo chargers.

CHAdeMo for CHAdeMo chargers.

* + - * 1. Comply with ADA-ABA Accessibility Guidelines.
				2. Metering: [**Revenue**] [**Nonrevenue**] grade meter.
				3. Control Power: 20 A, 110/120-V ac, 60 Hz, single phase per charger.
				4. Input Power:

Retain first subparagraph below for AC Level 1 charging equipment. Coordinate with "EV Charging Levels" paragraph in "Performance Requirements" Article.

20 A, 110/120-V ac, 60 Hz, single phase per charger.

Retain first subparagraph below for AC Level 2 charging equipment. Coordinate incoming service with "EV Charging Levels" paragraph in "Performance Requirements" Article. Services are representative of those required by EVSE; consult manufacturer.

[**40 A**] [**Two 40 A**] [**60 A**] [**Two 60 A**] [**80 A**] [**90 A**], 208/240-V ac, 60 Hz, single-phase services per charger.

Confirm subparagraph below with manufacturer.

Dual circuits shall be interlocked.

* + - * 1. Integral GFCI.
				2. Auto-GFCI fault retry.
				3. EVSE Mounting: [**Floor mount**] [**Bollard mount**] [**Pedestal mount**] [**Pole mount**] [**Wall mount**] [**As indicated on Drawings**].
				4. Enclosures:

Rated for environmental conditions at installed location.

See "Enclosures" Article in the Evaluations for discussion of enclosure types. Coordinate first five subparagraphs below with Drawings (by identifying the designated areas) or schedules (by including the required enclosure type). Consult manufacturers for availability and limitations of other than Type 1 enclosures.

Indoor Dry and Clean Locations: NEMA 250, [**Type 1**] <**Insert type**>.

Outdoor Locations: NEMA 250, [**Type 3R**] <**Insert type**>.

Other Wet or Damp Indoor Locations: NEMA 250, [**Type 4**] <**Insert type**>.

[**Stainless steel**] [**Aluminum**] [**Composite**] [**UV-resistant plastic**].

[**Paint**] [**Powder coat**] [**Thermoset, polyester powder paint**] [**Anodized**].

Lockable.

Tamper resistant.

Coordinate "EV Cable and Connectors" paragraph with "EV Charging Levels" paragraph in "Performance Requirements" Article.

* + - * 1. EV Cable and Connectors:

[**SAE J1772**] [**CHAdeMO**] connector.

[**Single**] [**Double**] connectors[**with locking holster**].

[**10-foot**] [**18-foot**] [**20-foot**] [**24-foot**] cable[**with cable management system**].

Field-replaceable connector and cable assembly.

Retain "Status Indicators" or "Display Screen" paragraph below. Confirm type of display and display content with manufacturers.

* + - * 1. Status Indicators:

LEDs to indicate power, charging, charging complete, system status, faults, and service.

* + - * 1. Display Screen:

Daylight viewable, UV-protected display with human-machine interface capability.

Displays power, charging, charging complete, remote control, system status, faults, and service.

* + - * 1. Networking:

WAN Communications: Cellular [**GSM/GPRS**] [**CDMA**].

LAN Communications: [**Modbus**] [**802.11b/g/n**] [**Zigbee**] [**10/100/1000 Base T Ethernet**].

Capable of remote configuration and reporting.

* + - * 1. Payment System:

[**RFID**] [**NFC**] [**Contactless credit card**] reader.

PCI compliant.

Capable of remote control and authorization.

Confirm charging network compatibility with manufacturer or with manufacturers listed in "Manufacturers" Article.

* + - * 1. Charging Network: Compatible with the [**Aerovironment**] [**Blink**] [**Chargepoint**] [**EV Connect**] [**eVgo**] [**GE Wattstation**] [**PlugShare**] [**SemaConnect**] EV charging network.

Retain one of first two subparagraphs below.

Multiple units shall independently connect to charging network.

Multiple units shall have one unit designated as a master unit that is configured as a gateway unit between the EVSE and the charging network.

Individual units shall be capable of [**indicating station status and availability**] [**providing or connecting user to customer support**] [**remote control**].

* + - 1. GENERAL FINISH REQUIREMENTS
				1. Protect mechanical finishes on exposed surfaces from damage by utilizing cushioning materials or foam or by applying a strippable, temporary protective covering before shipping.
				2. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
				2. Examine roughing-in for EVSE electrical conduit to verify actual locations of conduit connections before equipment installation.
				3. Examine [**walls**] [**walls and floors**] [**pavement**] for suitable conditions where EVSE will be installed.
				4. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION
				1. Comply with NECA 1 and NECA 413.
				2. Concrete Base Mounting:

Retain first subparagraph below for equipment supported on concrete bases attached to concrete slabs. Confirm base size with manufacturer or Structural Engineer if resistance to pull-out is needed.

Install EVSE on 6-inch nominal-thickness concrete base.

Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.

For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

Install anchor bolts to elevations required for proper attachment to supported equipment.

Secure EVSE to concrete base according to manufacturer's written instructions.

Retain first subparagraph below for equipment supported on cast-in-place concrete bases. Confirm base size with manufacturer or structural engineer if resistance to pull-out is needed.

Install EVSE on 12-inch nominal-diameter and 48-inch- deep concrete base.

Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

Install anchor bolts to elevations required for proper attachment to supported equipment.

Secure EVSE to concrete base according to manufacturer's written instructions.

* + - * 1. Wall Mounting:

Install EVSE, so that its receptacles or holders are not less than 18 inches and not more than 4 feet above finished floor.

Mounting electrical equipment with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in three subparagraphs below provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.

Mount EVSE to steel slotted supports [**5/8 inch**] [**1-1/4 inches**] in depth. Orient steel slotted supports vertically.

Ensure that EVSE is plumb and rigid without distortion of box.

Secure EVSE according to manufacturer's written instructions.

* + - * 1. Pole Mounting:

Allow a minimum of 24 inches of clearance around EVSE.

EVSE receptacles or holders shall be not less than 24 inches and not more than 4 feet above finished grade.

Mount EVSE plumb and rigid without distortion of enclosure.

Secure EVSE according to manufacturer's written instructions.

Retain one of two "Wiring Method" paragraphs below and coordinate with Drawings. Delete both if wiring methods for system are indicated on Drawings.

* + - * 1. Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.
				2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
				3. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

"Disconnect" paragraph below is mandatory for EVSE rated more than 60 A or 150 V phase to ground.

* + - * 1. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking from enclosures and components.
				2. Secure covers to enclosure.
				3. Cybersecurity:

Software:

Coordinate security requirements with [**IT department**] [**CIO**] <**Insert entity responsible for IT security**>.

Ensure that latest stable software release is installed and properly operating.

Disable or change default passwords to password of at least eight characters in length, using a combination of uppercase and lower letters, numbers, and symbols. Record passwords and turn over to party responsible for system operation and administration.

Hardware:

Coordinate location and access requirements with [**IT department**] [**CIO**] <**Insert entity responsible for IT security**>.

Enable highest level of wireless encryption that is compatible with Director’s Representative's ICT network.

Disable dual network connections.

* + - 1. CONNECTIONS

Coordinate conduit installations and specialty arrangements with Drawings and with requirements specified. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Drawings indicate general arrangement of conduit, fittings, and specialties.
				2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
				3. Verify that all electrical connections have been made according to the manufacturer's instructions. Remove all burrs, shavings, and detritus from inside the enclosure.
				4. After confirming all connections, install covers and tighten fasteners to according to manufacturer's instructions.
			1. IDENTIFICATION
				1. Identify system components, wiring, cabling, and terminals.
			2. FIELD QUALITY CONTROL

Retain "Manufacturer's Field Service" paragraph below to require a factory-authorized service representative to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform tests and inspections" paragraph below to require Contractor to perform tests and inspections and retain option to require Contractor to arrange for assistance of a factory-authorized service agent.

* + - * 1. Perform tests and inspections[**with the assistance of a** **Company Service Advisor**].
				2. Tests and Inspections:

For each unit of EVSE, perform the following tests and inspections:

Unit self-test.

Retain one of two operational tests below.

Operation test with load bank.

Operation test with EV.

Retain test below for EVSE connected to a communications network.

Network communications test.

* + - * 1. EVSE will be considered defective if it does not pass tests and inspections.
				2. Prepare test and inspection reports.
			1. STARTUP SERVICE
				1. [**Engage a Company Service Advisor** **to perform**] [**Perform**] startup service.

Complete installation and startup checks according to manufacturer's written instructions.

<**Insert startup steps if any**>.

* + - 1. SOFTWARE SERVICE AGREEMENT

Services in this article may not be allowed for publicly funded projects.

* + - * 1. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for [**two**] <**Insert number**> years.
				2. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within [**two**] <**Insert number**> years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

Upgrade Notice: At least [**30**] <**Insert number**> days to allow Director’s Representative to schedule and access the system and to upgrade computer equipment if necessary.

* + - 1. DEMONSTRATION
				1. [**Engage a Company Service Advisor** **to train**] [**Train**] Director’s Representative's maintenance personnel to adjust, operate, and maintain EV charging equipment.

END OF SECTION 262743