

**PHIL HAUPT ELECTRIC**

# **HOW, WHAT, AND WHERE TO INSTALL EVSE CHARGING**

California Department of General Services – EVSE Workshop  
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# PHIL HAUPT ELECTRIC

- ▶ Phil Has Been an Electrician for 24 Years
- ▶ Electrical Contractor for 10 Years
- ▶ Installed Approximately 150 Commercial Electric Vehicle Charging Stations
- ▶ Installed Approximately 325 Residential Electric Vehicle Charging Stations
- ▶ SacEV Members
- ▶ Volt Owner #5945 (currently 231MPG)

# THE PROCESS

- ▶ Management Decides to Install Electric Vehicle Charging Stations
- ▶ Licensed Electrical Contractor is Consulted for Site Evaluation
- ▶ Installation Estimate is Obtained
- ▶ Determine What Brand of Charging Station Fits Your Needs
- ▶ Contract is Prepared and Signed by Both Parties
- ▶ California Pre-Lien is Sent by Contractor to Owner

- ▶ Permitting Process Begins
  - Contractor Contacts Local Authority Having Jurisdiction (AHJ) to Determine Requirements for Commercial EVSE Installation
  - Contractor Produces a Load Calculation to Determine Electrical Load Capacity
  - Contractor Produces Engineered Drawings (24x36)
  - Contractor Produces a One-Line Drawing
  - Contractor Produces a Panel Schedule
  - EVSE Installation Specifications Required
  - Contractor Submits Drawings for Plan Review
  - Commercial Permitting Process Can Take Up to 30 Days

# SCHEDULE DRIVERS

- ▶ Customer Approval and Signature of Contract
- ▶ Completion and Sign-Off of Engineered Drawings Depicting Charger Locations
- ▶ Permit Approval of Permits for Local Authorities (Includes Inspectors, Planners, Historical Societies, etc.)
- ▶ Local Inspector's Availability
- ▶ Local Inspector's Experience With EV Charger Installations is Getting Better

# COMMERCIAL SITE SURVEY

## Cost Drivers/What to Consider

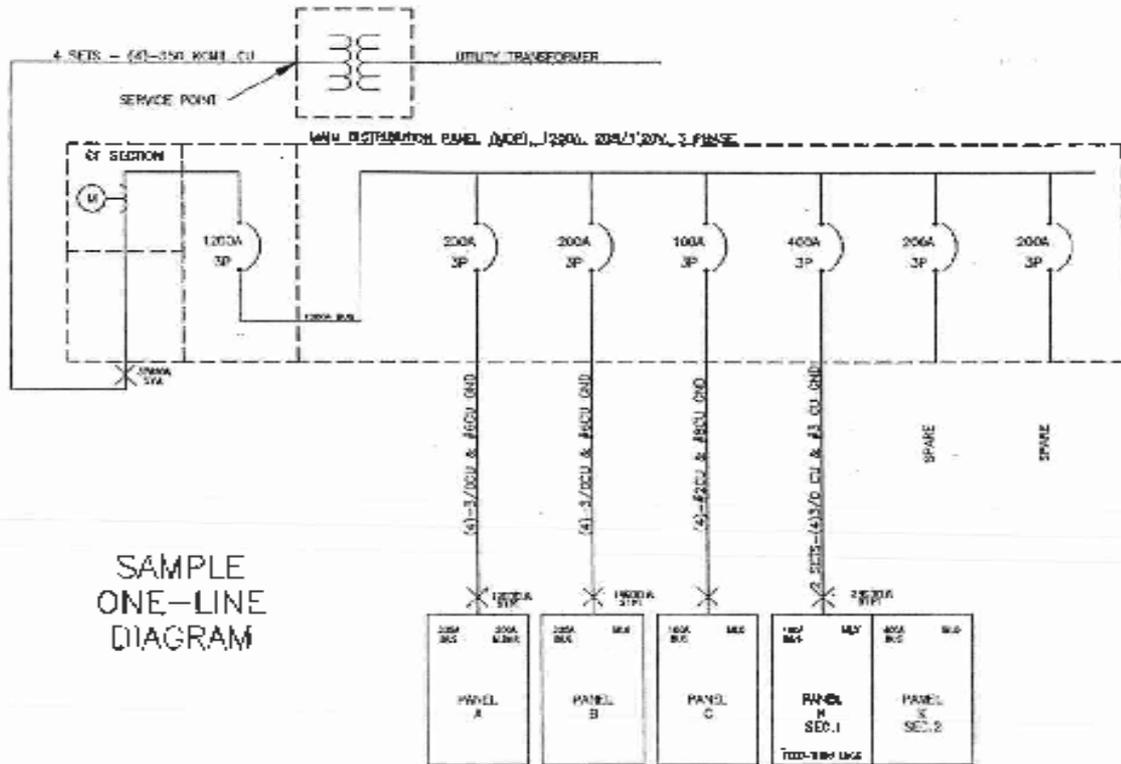
- ▶ Transformers of High Voltage (Required in 20% of Installations)
- ▶ Trenching Distance Between Charger Location and Panel (Average Site Requires 60 Feet of Trenching)
- ▶ Length of Above Ground Conduit (Average Site Requires 100 Feet of Conduit)

- ▶ Poured Concrete Footings Required for 63% of All Our Commercial Installations
- ▶ Determine Convenient and Cost Effective Location
- ▶ Proximity to Electric Room is Essential to Control Costs
- ▶ Adjacent to Building Structure Can Also Reduce Costs
- ▶ Landscape and Sprinklers Can Cause Challenges
- ▶ Hard Trenching vs. Soft Trenching – Cost Control Measure

- ▶ Consider the Versatility of Level 1 and Level 2 Charging Available Together
- ▶ Designing Parking Lot Spaces – Consider Placing Charger Between Two Spaces
- ▶ Driving Surface Requirements – Trenching Across Parking Lot Requires 24 Inches Deep of Back Fill and Compacting
- ▶ Night Work May be Required for Traffic Control
- ▶ Paint Striping Can Cost Between \$300–\$500 Per Site

- ▶ Length of Conduit and Routing Path
- ▶ Identify Sites With 208 or 240 Volt Power  
480 Volts Can be Transformed to 208
- ▶ Consider Lighting for Adequate Operation at Night (Safety)
- ▶ Lighting Power Panels and Associated Conduit and Wiring for Parking Lot Lighting Typically Can't be Used Due to EVSE Load Requirements

- ▶ Consider “Future” Installation When Selecting a Site (Spare Conduit, Panel, Parking Spots Available)
- ▶ Review Site Compliance With All Parking Space Regulatory Requirements Prior to Finalizing Site Selection – # of Stalls
- ▶ Bollards or Wheel Stops



SAMPLE  
ONE-LINE  
DIAGRAM

**PANEL LOAD CALCULATION WORKSHEET**

Project \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Panel ID: \_\_\_\_\_

LOAD TYPE	CONNECTED LOAD	NEC ADJUSTMENT FACTOR	CALCULATED NEC LOAD	
Lighting	_____	X 125%	= _____	
General-use Receptacles (First 10KVA)	_____	X 100%	= _____	
General-use Receptacles (Over 10KVA)	_____	X 50%	= _____	
Motors and Compressors	_____	X 100%	= _____	
(Largest Motor Load)	( _____ )	X 25%	= _____	
Dedicated or Specific-use Receptacles	_____	X 100%	= _____	
HVAC and Mechanical Equipment Loads	_____	X 100%	= _____	
Kitchen Equipment (# _____)	_____	X _____%	= _____	
Miscellaneous Loads	_____	X 100%	= _____	
_____	_____	X _____%	= _____	
_____	_____	X _____%	= _____	
_____	_____	X _____%	= _____	
<input type="checkbox"/> 240/120 <input type="checkbox"/> 3Ø	TOTAL CONNECTED LOAD		TOTAL CALCULATED LOAD	
<input type="checkbox"/> 208/120 <input type="checkbox"/> 1Ø				
<input type="checkbox"/> 480/277 <input type="checkbox"/> _____				
System Voltage			TOTAL CALCULATED AMPS	

**Connected Load-**

1. The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit. (Water heaters, space heaters, ranges, refrigerators, etc.)
2. 180 VA for each general-use receptacle.
3. Maximum VA of lighting fixtures.
4. VA of all motors based on full load amps from table 430-247, 248, 249 and 250 of the National Electrical Code.

**Calculated NEC Load-**

The connected load after any adjustment factors allowed by code, have been applied. Load calculations shall be submitted/expressed in VA and converted to amps when sizing feeders and equipment, and is the minimum size allowed based upon these calculations.

Panel ID: _____ Location: _____ Fed From: _____	<b>PANEL SCHEDULE</b>  <i>Three Phase</i>	Bus Rating: _____ A <input type="checkbox"/> Main Breaker _____ A <input type="checkbox"/> Main Lugs Only <input type="checkbox"/> Fed-Thru Lugs <input type="checkbox"/> Double Lugs Three Phase <input type="checkbox"/> 3-wire <input type="checkbox"/> 4-wire <input type="checkbox"/> 1cc. GND Voltage <input type="checkbox"/> 480/277V <input type="checkbox"/> 208/120V <input type="checkbox"/> 240/120A <input type="checkbox"/> _____
Panel A.I.C. Rating: <input type="checkbox"/> 10 K <input type="checkbox"/> 11 K <input type="checkbox"/> 18 K <input type="checkbox"/> 22 K <input type="checkbox"/> 25 K <input type="checkbox"/> 42 K <input type="checkbox"/> 65 K <input type="checkbox"/> 100 K <input type="checkbox"/> 150 K <input type="checkbox"/> 200 K		

Circuit Description		LOAD(VA)	Code	Breaker	Ø	Breaker	Code	LOAD(VA)	Circuit Description	
1					A					2
3					B					4
5					C					6
7					A					8
9					B					10
11					C					12
13					A					14
15					B					16
17					C					18
19					A					20
21					B					22
23					C					24
25					A					26
27					B					28
29					C					30
31					A					32
33					B					34
35					C					36
37					A					38
39					B					40
41					C					42

Code Description:    L = LIGHTING LOADS    M = TOTAL MOTOR LOAD    H = HVAC    LM = LARGEST SINGLE MOTOR  
                           R = GENERAL USE RECEPTACLES    S = DEDICATED RECEPTACLES    K = KITCHEN EQUIPMENT    Z = MISC. OR APPLIANCES

# INSTALLATION

- ▶ Clear Work Area
- ▶ Call Before You Dig - USA
- ▶ Allow Appropriate Amount of Time for Install
- ▶ Night Work
- ▶ How Will Installation Affect Parking Lot Flow
- ▶ Contractor to Call AHJ for Rough Electrical Inspection

# FINAL INSPECTION

- ▶ Electrical Contractor Calls for Inspection
- ▶ Inspections are Completed
- ▶ Inspector Needs Access to Charging Stations, Drawings, and Permit
- ▶ Inspector Will Want to See EVSE Installation Specification Documents





























# ENJOY THE RIDE

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