Fast Charge Network Program Resources

Tennessee Valley Authority (TVA)

Contents

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Improving charging infrastructure availability:
The Fast Charge Network

Tennessee Valley Authority (TVA) is building partnerships with state agencies, local power companies and third-party developers to create a foundational network of public fast charging stations in its seven-state region. The program is designed to support installing fast charging station at least every 50 miles along interstates and major highways.
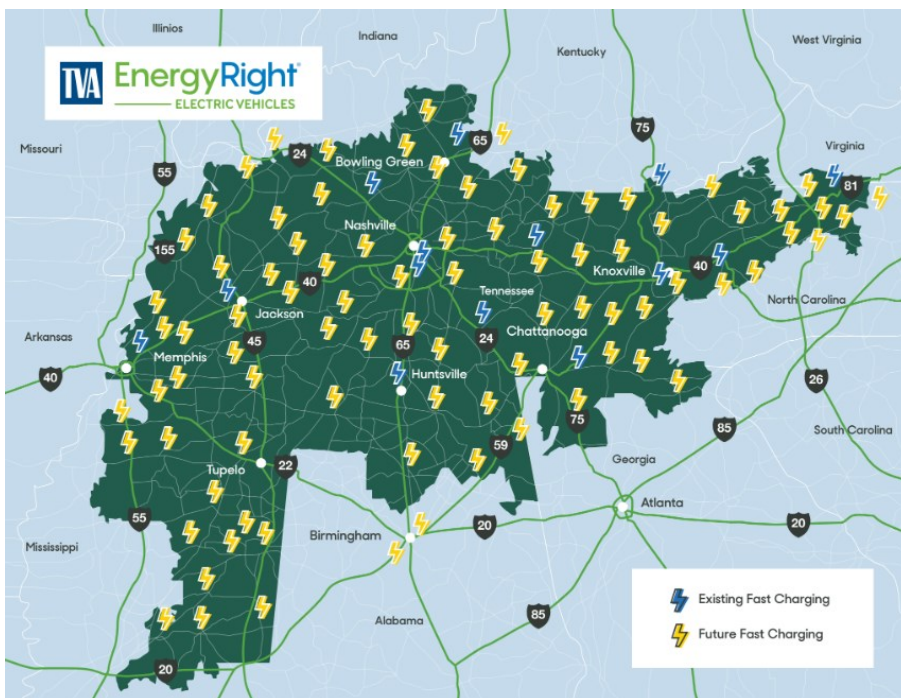
TVA and other funding partners such as the Tennessee Department of Environment and Conservation (TDEC) in Tennessee are working together to provide funding for fast charger development.

Programs will provide 80% reimbursement (up to $150,000) of eligible costs for each fast charger installed along targeted roads. Program participants, such as Local Power Companies (LPCs), will be required to provide at least 20% cost share of the total project cost.

The goal is to work with LPCs to install, own and operate fast charging stations to ensure interstates and major highway corridors are covered with fast chargers at least every 50
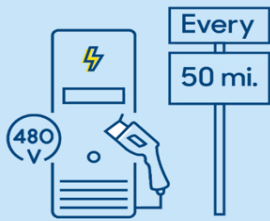
Fast Charge Network Overview

The shared goal of TVA, LPCs and state agencies is increasing the number of consumers choosing EVs in the area, as well as enabling long-distance travel by EV drivers throughout the Southeast with a foundational network of public fast charging stations.

TVA and LPC investment in a foundational network can build a sustainable EV market future where private investment and development can flourish. By removing the top market barriers facing consumers, such as "range anxiety" due to limited charging locations, TVA anticipates the number of EVs across its service territory to increase from approximately **20,000 (in July 2021)** to well over 200,000 by 2028.

To optimize available funding sources, TVA and program partners will structure development in phases.

- Initial eligible applicants shall include TVA-served Local Power Companies (LPCs) whose service territory are located along prioritized corridor gaps. An interactive version of the corridor gap map may be accessed here.

- Later rounds of funding may expand applicant eligibility to include local government entities, private companies, and/or non-profits.

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The Fast Charge Network

Funding & Reimbursement

For selected, eligible projects, the program will provide up to 80% of the cost to purchase, install, operate, and maintain eligible EV charging infrastructure that will be located within a prioritized corridor gap and made available to the public. This program will not support the purchase or rental of real estate, other capital costs (e.g., construction of buildings, parking facilities, etc.), or general maintenance (i.e., maintenance other than of the EV charging infrastructure). Program participants will be required to provide at least 20% of the total project cost through direct or in-kind cost share.

This program will require selected projects to include at least two DC fast chargers at each location, with the option to request to install a maximum of four DC fast chargers per location. Additionally, requests for funding may not exceed $150,000 per fast charger to be installed. Program participants will be responsible for finding a suitable host site and purchasing, installing, owning, operating, and maintaining program-funded fast charging equipment for a period of no less than five years.

Payment of project expenses will take place on a reimbursement basis. Reimbursement will be made following charging station completion, commissioning, and submission of supporting documentation of costs incurred. TVA will provide reimbursement to LPCs through a one-time credit on their monthly wholesale power bill following approval.

Reimbursable costs include:
- Cost to purchase and install (e.g., utility make-ready) eligible EV charging infrastructure
- Support services (e.g., engineering and design, site identification and qualification)
- Operational and maintenance costs purchased upfront, including maintenance services and network fees

Non-eligible expenses include:
- The purchase or rental of real estate
- Other capital costs (e.g., construction of buildings, parking facilities, etc.)
- General maintenance (i.e., maintenance other than of the charging infrastructure)
- Legal fees associated with land acquisition

Site Selection

Site Considerations

Charging sites must follow **Site Selection Guidelines** provided by the program to ensure a positive consumer experience.

Station Proximity to Roadway

Proximity to identified corridors is one important determinant of both consumer appeal and anticipated charging station utilization.

Access
- 24/7 availability
- Publicly accessible
- No charge for entry

Nearby Amenities
- Restaurants
- Shops
- Restrooms

Corridors
- Interstates
- Major U.S. and State highways

Distance from highway
- <1 mile preferred
- 5 miles max
- 50 miles or less between Fast Charge TN Network stations

Power Supply
- Close proximity to 480V, 3 phase power
- Future upgradability

Safety
- Secure
- Well-lit
- On-site personnel

Weather Protection
- Shelter from elements is desirable, but construction of such is not reimbursable under this program

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Installation Term

Program participants will have 15 months from the effective date of the **Contract** to complete the project. No-cost extensions will be evaluated on case-by-case basis.

Site Engineering and Design

- Complete environmental review and return the provided **Environmental Review Checklist,** which will be provided to selected grantees, for final site approval before beginning construction activities; additional information will be provided to outline necessary documentation and required information to complete this review.

- Design and construct site in accordance with **Minimum Technical Specifications,** which can be found in Program Guidelines, provided by the program.

Co-branding

To increase consumer awareness and recognizability of charging stations, a consistent visual design featuring program partner co-branding will be leveraged. Guidance on design and process will be provided by the program.

EV Rate & Pricing

- TVA's EV rate (wholesale EV Rate plus Valley-wide retail adders) is recommended, but LPCs retain rate setting flexibility for electric services.

- Consumer pricing for charging services will be set by station owners and is not regulated by TVA.

Program Income

All program income (gross income earned by the program participant that is directly generated by the project or earned as a result of the project funding during the contract term) must conform with program income requirements in that such income must be reinvested in or used to defray ongoing costs of the project (e.g., other maintenance fees).

Operation & Maintenance Term

Program participants will be responsible for owing, operating, and maintaining program-funded fast charging equipment for a period of no less than five years. After termination of the contract term, property disposition requirements may apply depending on the funding source.

Site Acquisition

- A site host agreement or other documentation will be required to show that the program participant has been granted access to the property where charging stations are to be installed. If a program participant owns the property, this will be confirmed via a **Verification of Property Ownership Form** provided by the program. The purchase or rental of real estate is a non-reimbursable cost under the program.

Equipment Acquisition

Purchase and install charging stations that meet the **Minimum Technical Specifications**, which can be found in the Program Guidelines, provided by the program.

Reporting & Station Access

- Program participants will be required to report station usage (or allow "view access" to the charging network for automated monitoring and reporting) and gross income generated for the required 5 year period of operation under this program.

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Example Site Layouts

Below are some example site layouts that include at least one van accessible EV charging space. These layouts are provided as a resource. While there are additional layouts that include at least one van accessible EV charging space, these examples fit within traditional parking space layouts and allow maximum flexibility for larger electric vehicles such as pickup trucks and SUVs. More information on the program requirement to include at least one van accessible EV charging space can be found in the program **Accessibility Requirements.**

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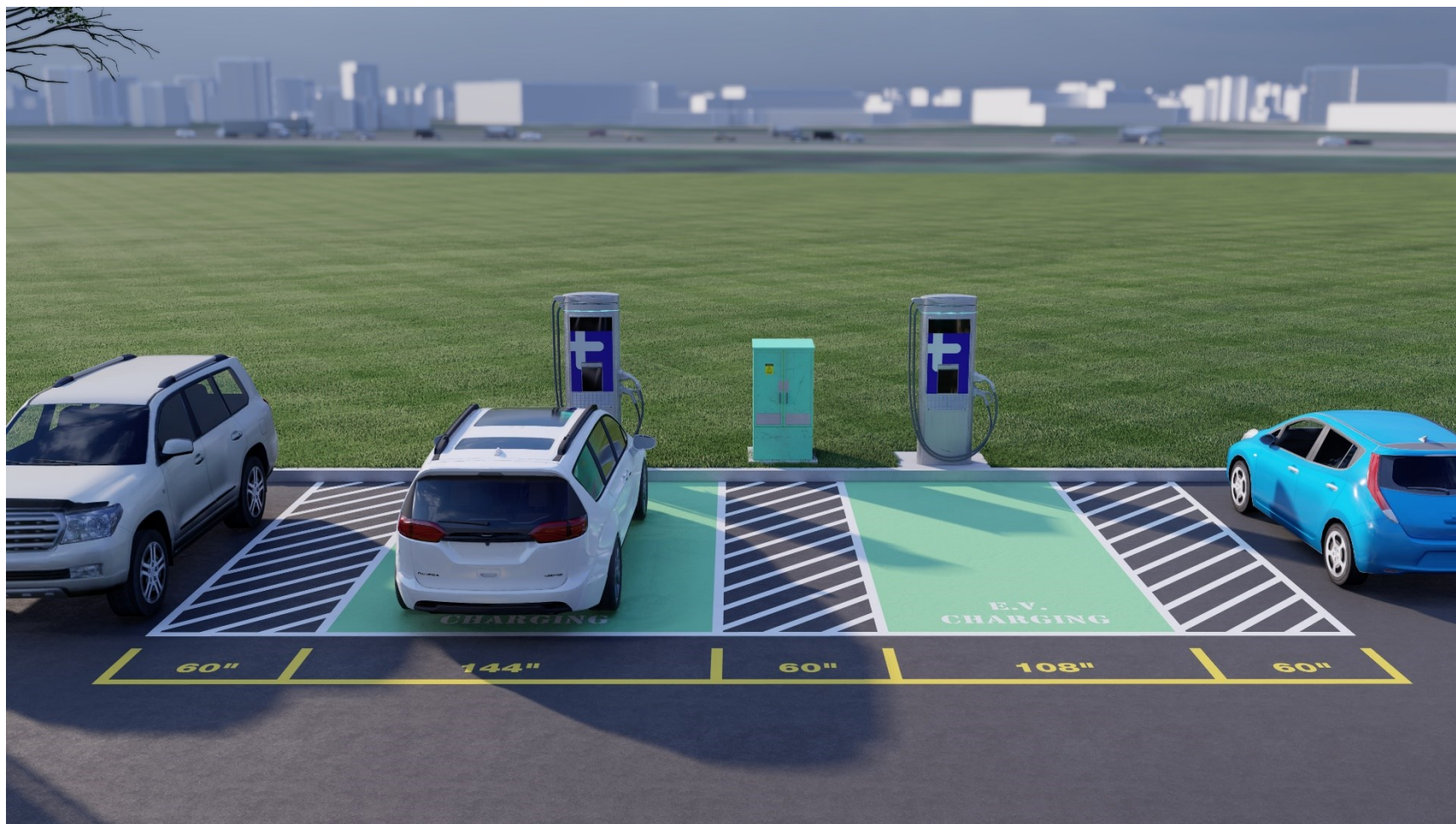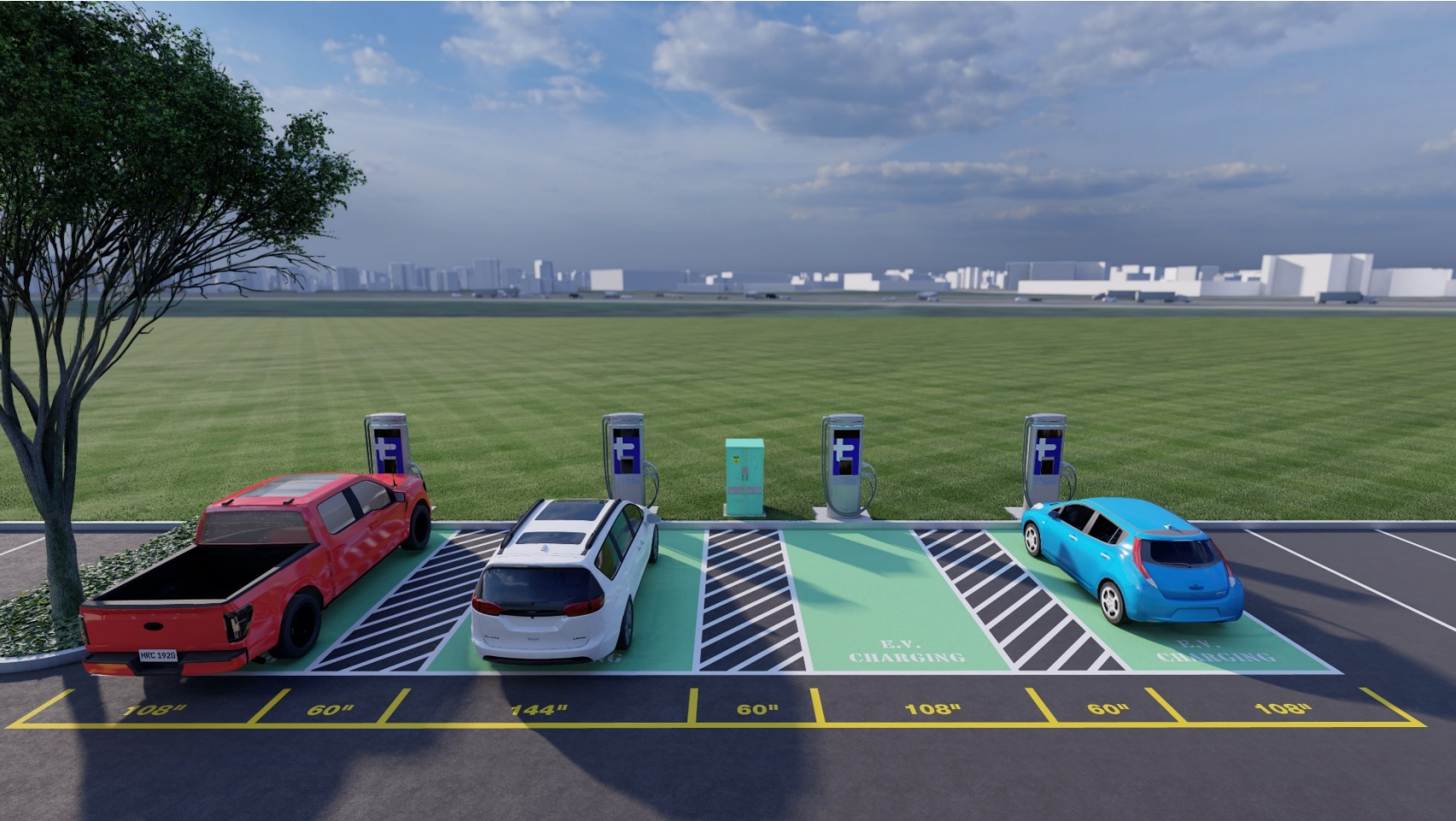
Fast Charge TN Network RFI Summaries

This document provides a high-level summary of the 32 responses to TVA's Request for Information (RFI) on electric vehicle (EV) fast charging station equipment providers, EV charging network providers, and various support service vendors (all responses were due by May 7, 2021 at 5 pm Eastern). This document does NOT contain an exhaustive list of potential vendors and their capabilities. This document does <u>NOT</u> constitute an endorsement of any companies listed below and it does not establish preferred or qualified vendors. Additional details or information regarding specific RFI responses may be requested; all such requests should be submitted via email to McKale Carter at dcarter6@tva.gov and copy Drew Frye at agfrye@tva.gov.

Responses at a Glance:

	Charging Stations	Network	Support Services
ABB	✓		✓
AMP Communications			✓
AmpUp		✓	
Arcadis			✓
Beam Global	✓		
Black & Veatch			✓
Blink Network	R	✓	✓
BTC Power	✓	R	
ChargePoint	✓	✓	✓
CLEAResult			✓
Electrify America	R	✓	✓
EnelX	✓	✓	✓
EVBox	✓		
EVConnect		✓	✓
EvGateway		✓	✓
EVgo	R	✓	✓
Flo	✓	✓	
FreeWire Technologies	✓		✓
Greenlots	R	✓	✓
HDR			✓
Kimley-Horn			✓
LilyPad EV	R	R	✓
Mobilyze.ai			✓
OPCONNECT	R	✓	✓
Prova Group			✓
Seven States Power Corporation	R	R	✓
Siemens	✓	R	✓
SWTCH Energy	R	✓	R
Tritium	✓	✓	✓
Umlaut			✓
Wesco|Anixter	R	R	✓
ZEF Energy	R	✓	✓

✓ = *Vendor provides this product or service*
R = *Indicates that the response was submitted by a hardware or network "reseller" or that a strategic partnership with other vendors was listed within the RFI response.*

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Short Summaries:

ABB is a global corporation with U.S. headquarters in North Carolina. ABB sells multiple models of charging stations including the Terra 124, Terra 184, and others. ABB chargers can connect to various networks, including Greenlots, EVgo, ChargePoint, EV Connect, Electrify America, and others. ABB supplies products around the world (20,000+ stations) and has supplied Electrify America and EVgo for various network builds in the U.S. ABB also offers engineering support services for sites with ABB products, site commissioning services, and preventive and corrective maintenance services in addition to an equipment warranty.
Contact: Sumit Chatterja, sumit.k.chatterjea@us.abb.com

AMP Communications is a New Jersey based services company that provides site identification, site acquisition, engineering, construction, construction management, and maintenance services. AMP has completed electric vehicle charging station projects in the Northeast, Mid-Atlantic, and Southeast U.S. AMP employs 100+ employees consisting of experienced real estate representatives, engineers, program/project managers, certified technicians and electricians.
Contact: Kenton Wallace, kwallace@ampcommunications.com

AmpUp is a California-based software company and network provider. AmpUp's software supports network backend functions for 6 different DC fast charger manufacturers, including Tritium, Efacec, BTC Power, EVBox, SigNet, and Delta. AmpUp's consumer facing mobile app allows for customer authentication, payments, and charging analytics. AmpUp's software solution has been deployed for over 500 customers across North America and offers features including load management and time-of-use pricing.
Contact: Matthew Bloom, matt@ampup.io

Arcadis is a Colorado based services company that provides project management, cost management, engineering design, planning, permitting, construction oversight, electrical grid connection planning, and other services. Arcadis offers full delivery of design and planning for high power electric vehicle charging stations. Arcadis has supported the implementation of 500 DC fast chargers and over 4,000 AC chargers at locations across eight European countries. Arcadis has also designed and installed chargers at 60+ service centers in North America.
Contact: Jeffrey Parris, Jeffrey.Parris@arcadis.com

Beam is a San Diego based sustainable technology innovation company. The patented EV ARC™ generates and stores all its own energy with a tracking solar array and onboard energy storage, which replaces the need for a utility grid electrical connection. The transportable system can be deployed by trailer or forklift without any construction work. It fits in a parking space without reducing parking because vehicles can still use the space. The EV ARC™ DC fast charge system is made up of four interconnected EV ARC™ units, without the need for on-site construction or electrical work, and is deployed with an empty parking space separating each of them. Beam has deployed their EV ARC™ DC fast charging for the California Department of Transportation (Caltrans) at Camp Roberts Rest Areas along US Hwy 101 in Monterey County, California and at other locations.
Contact: Andy Ike, Andy.Ike@BeamForAll.com

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Black & Veatch is an Overland Park, Kansas based services company. Black and Veatch has completed design, engineering, permitting, and construction for over 1,500 DC fast charge electric vehicle charging sites, totaling thousands of chargers for clients such as Tesla, Electrify America, Daimler, Southern California Edison and the NY Power Authority. Black & Veatch's scope of services include site selection, site acquisition, design, permitting, engineering, and construction management.

Contact: Keith Dickerson, DickersonK@BV.com

Blink Network is a Florida based charging equipment, charging network and support services provider. Blink has deployed over 5,600 commercial electric vehicle charging stations across 40 states. Blink listed three DC fast charging stations (the Tritium RT-175S, the Tritium RTM-75, and the Tritium RTM-50 rebranded as a Blink station). Blink's charging network software supports backend functions for ABB, BTC Power, and Tritium chargers. The Blink Network has interoperability agreements with EV Connect, SemaConnect and is working towards agreements with several other networks to allow for "roaming" between networks. Blink also supports site selection, site design, engineering, and commissioning, and provides full-service O&M support.

Contact: Conseulo Capshaw, ccapshaw@blinkcharging.com

BTC Power is a California based charging equipment manufacturer that offers multiple models and configurations of charging stations. BTC currently offers DC fast charging stations capable of 50kW to 350kW output. BTC's upcoming fourth generation lineup of new DC fast charger products includes self-contained All-In-One (AIO) DC fast chargers capable of outputting 120kW and 180kW simultaneously to two vehicles/ports/cords. The first of these new AIO models, the 180kW, will be available in the fourth calendar quarter of 2021. BTC Power is an open charge point protocol (OCPP) vendor and its products are therefore compatible with all third party OCPP network software including Greenlots (listed as a strategic partner on BTC Power's RFI response), EV Connect, EV Gateway, OpConnect, AmpUP, and more. BTC has supplied charging systems to over 18 utility clients across the U.S. and Canada as well as to the Electrify America and EVgo networks. BTCPower's turnkey services also include complete maintenance and repair services with in-house field service technicians.

Contact: Donald Jarecki, djarecki@btcpower.com

ChargePoint is a California based provider of integrated electric vehicle charging equipment, network, and services for all electric vehicle charging use cases. For high-speed DC fast charging along corridors, ChargePoint offers the Express 250 solution (up to 125kW) as well as the Express Plus distributed DC platform (up to 350kW). The ChargePoint Network includes over 125,000 active places to charge and access to an additional 160,000 publicly accessible charging locations through roaming integrations with other networks. More than 3,500 of those ChargePoint ports are DC fast chargers including with customers such as Evergy, FP&L, Georgia Power, and Alabama Power. ChargePoint also provides 24/7 electric vehicle driver support, proactive monitoring and repair services to guarantee station uptime, as well as professional services to assist site hosts including site selection, preliminary site design, project management, and station commissioning.

Contact: Libby Bittman, Libby.bittman@chargepoint.com

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CLEAResult is a Texas based services company providing site acquisition, contracting, and site assessment, as well as engineering design, installation, and commissioning of chargers in coordination with local subcontractors. CLEAResult coordinates and manages electric vehicle charging installations from end-to-end, engaging sponsors, site hosts, and hardware and software providers to deliver projects. CLEAResult has managed electric vehicle charging programs for local government agencies and utilities such as Peninsula Clean Energy and Tucson Electric Power.
Contact: Stanford Wiley II, Stanford.Wiley@clearesult.com

Electrify America (a subsidiary of Volkswagen Group of America) is a Virginia based equipment, network, and services provider that sells multiple models of charging stations, including the Signet HPC 175K, Signet HDP350K-NCM2, and Signet HDP350K-NCC. Electrify America offers an end-to-end charging solution that can include analysis of recommended locations, site design and engineering, site development and installation, charging software and hardware, DC fast charging coupled battery storage systems, network operations monitoring with 24/7 consumer support, and ongoing operations and maintenance. The Electrify America network has 600+ locations and 2,500+ individual DC fast chargers (at power levels between 150kW and 350kW), with 11 of these locations and 52 chargers operating in the Tennessee Valley and coupled with battery energy storage. Electrify America plans for 800 additional locations to be open or in development by the end of 2021 and 1,800 locations with 10,000 individual 150kW and 350kW chargers by 2025.
Contact: Aaron Young, Aaron.young@electrifyamerica.com

Enel X (a subsidiary of the international utility Enel) is a Massachusetts based charging equipment, network and support services provider. Enel X has deployed over 140,000 charging ports globally. Enel X sells multiple models of charging stations, including the JuicePump 100kW, JuicePump 150kW, and JuicePump 200kW. Enel X uses their JuiceNet Enterprise network software to integrate with their charging stations. Enel X has over 170,000 charging ports globally that are currently integrated with their JuiceNet Enterprise network; equipment providers include Tritium, BTC, ABB, and Enel X in the US, and many more globally. Enel X has also integrated its charging equipment hardware and has roaming agreements with both the ChargePoint and Red-E network.
Contact: Luis Castro, luis.castro2@enel.com

EVBox is an Illinois based charging equipment company. EVBox sells the Troniq 100 (100kW) DC fast charging station. EVBox chargers utilize OCPP and are currently integrated with nine different OCPP networks in North America (Greenlots, EV Connect, AmpUp, and EV Gateway are among the list of qualified network providers). The Troniq 100 includes both CCS and CHAdeMO plug types, as well as full station branding capabilities. EVBox also offers the Troniq Care Plan, a comprehensive (parts, onsite labor, and shipping) warranty.
Contact: Nick Lalli, Nicholas.lalli@evbox.com

EV Connect is California based network software company that manages networked charging stations on the EV Connect network. There are approximately 8,000 lower power charging ports currently connected to the EV Connect network. EV Connect also offers site identification, site control, site design, construction, and post deployment management services. In past fast charger projects, EV Connect has procured ABB, Tritium and BTC charging stations for deployment.
Contact: David Hughes, david@evconnect.com

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EvGateway is a Disadvantaged Business Enterprise certified, California based network and services provider. EvGateway manages a hardware agnostic OCPP network and provides turnkey project services including site identification/validation, planning, approvals, support with procurement of hardware/chargers, project management, and station monitoring. There are approximately 2,000 lower power charging stations currently connected to the EvGateway network. Within its RFI response, EvGateway provided spec sheets for Tritium charging stations, and noted network integrations with BTC, ABB, Tritium, Power-Electronics, Flo, Delta, EvBox, Efacec, SIEMENS, Tellus Power, and others.

Contact: Reddy Marri, reddy@evgateway.com

EVgo is a California based network and support services provider. EVgo has one of the largest public DC fast charging networks in the U.S., with more than 200,000 customers, 1500 DC fast, and 1100 Level 2 chargers nationwide at 850 sites. EVgo offers partnership-based network design, site acquisition, site design, permitting, engineering, procurement, installation management from qualified third-party contractors, and other services. EVgo purchases fast chargers from ABB, BTC Power, Signet, and Delta Electronics, including the Delta Electronics High Power 350kW and Signet HP 350kW. The EVgo Nationwide Public Network is currently integrated with equipment from BTC, Delta, Signet, ABB, and LiteOn. EVgo offers network interoperability "roaming" with other providers such as ChargePoint and EV Connect. EVgo was awarded the Virginia Department of Environmental Quality's statewide charging network contract, operates a territory wide network of chargers owned by Green Mountain Power, and was also recently selected by General Motors for a nationwide deployment of fast chargers.

Contact: Colin Murchie, colin.murchie@evgo.com

FLO (a subsidiary of AddEnergie) is a Canadian based charging equipment and network provider. FLO sells the SmartDC 100kW fast charger. FLO's charging stations are supported by an open network architecture, 24/7 phone support, remote charging station management, equipment warranties, and maintenance provisions to ensure optimal uptime. There are over 20,000 charging ports currently on the FLO network across the U.S. and Canada with both AddEnergie (FLO) and ABB chargers. The Flo Network has roaming/interoperability agreements with the ChargePoint, Greenlots networks, and GM's Ultium Charge 360.

Contact: Vivek Trivedi, vtrivedi@flo.com

Freewire is a California based, small business certified manufacturer of electric vehicle fast charging stations. Introduced in 2020, Freewire's Boost Charger TM is the first charger integrated with 160kWh of energy storage, compatible with existing electric infrastructure. The Boost Charger TM utilizes low power 208V/240V single phase input (instead of 480V three phase) to continuously charge the integrated battery system and provide high-power charging directly to vehicles (up to 150kW to a single plug or 75kW simultaneously to two plugs) while mitigating ongoing demand costs. FreeWire's charging solution can be deployed in grid-constrained, "hard-to-reach" electrical areas and can be relocated to optimize placement without the risk of stranded investments. Freewire chargers are compatible with EV Connect and Greenlots networks (other networks can be added as needed). Freewire maintains a network of authorized and licensed installers and resellers that can provide site assessment, site preparation and materials, and installation services.

Contact: Ethan Sprague, esprague@freewiretech.com

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Greenlots is a California based subsidiary of Shell Renewables and Energy Solutions. Greenlots operates the SKY electric vehicle charging network (~8,000 charging ports) as well as provides various support services to utilities and private developers of electric vehicle charging (hardware, software, O&M). Greenlots can integrate various chargers to their network, including fast chargers from ABB, BTC Power, Efacec, and Tritium. Greenlots can support charging developers in identifying site hosts, evaluating sites for feasibility, and drafting/executing site host agreements. Greenlots' Infrastructure Solutions team can oversee the complete engineering, design, construction, and installation process and can provide charger management, monitoring and maintenance services through the SKY network.

Contact: Virginia Hewitt, vhewitt@greenlots.com

HDR is a Nebraska based engineering services firm with offices located throughout the United States, including offices located throughout the Tennessee Valley. HDR has experience in consulting on state-wide electric vehicle charging systems in Florida, Michigan, Minnesota, Oregon, Washington, and California. HDR can provide various electric vehicle charging infrastructure support services, such as planning, siting, optimizing charger sizes and on-site battery energy storage systems, assisting in charger equipment specifications and selection, charger infrastructure and civil design, utility coordination, and design and engineering services. HDR can fulfill the role of Owner's Engineer (OE), if desired, and can manage the various project components such as construction oversight and coordination between vendors and contractors. In addition, HDR's Strategic Communications group can assist with program acceptance and communication strategies, and HDR's Environmental group can assist with desktop siting analysis, field site assessments, and permitting assistance.

Contact: Shane R. Womack, Shane.Womack@hdrinc.com

Kimley-Horn is a national engineering consulting firm with offices throughout the Southeast including in Nashville, Memphis, and Jackson, TN, and the surrounding states. Kimley-Horn has assisted in the development of over 1,500 electric vehicle charging station sites nationwide, managing hundreds of sites from inception through construction (including for the City of Raleigh NC, Tesla, Evgo, and others). Staff competencies include civil, electrical, mechanical, and structural engineering, construction phase services, landscape architecture, and environmental services. With strategic partner EV Advisors LLC, Kimley-Horn can provide support for site selection/due diligence, site design and engineering, installation and commissioning coordination, monitoring, management, operations and maintenance, and the evaluation of charging equipment and cloud service provider capabilities and interoperability.

Contact: Ryan Gram, Ryan.Gram@kimley-horn.com

LilyPad EV is a national charging station service provider based in Overland Park, Kansas. LilyPad EV is a ChargePoint equipment reseller that provides turnkey charging station services across the U.S. and has experience working with electric utility programs such as Evergy and Ameren, providing charging stations, project management, site acquisition/contracting, design, and installation as needed. LilyPad has deployed over 4,000 charging ports in 37 states. LilyPad EV has experience deploying grant-funded DC Fast charging stations along highway corridors for both electric utility companies and third party owners. LilyPad EV provides advice on the design/layout of their charging project site(s) and recommends the most appropriate products with designs that can accommodate future stations if needed.

Contact: Keith Anderson, keith.anderson@lilypadev.com

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Mobilyze.ai is a Massachusetts based company founded in 2019 by a team of MIT researchers. The Mobilyze.ai platform provides high resolution spatial data and predictive intelligence to optimize the deployment of electric vehicle charging stations, including the identification and prioritization of electric vehicle charging sites that maximize utilization, network coverage, and equity of access.

Contact: David Keith, dave@mobilyze.ai

OpConnect is a minority and veteran owned provider of electric vehicle charging station technology. OpConnect specializes in fleet, multi-family, workplaces, and private label electric vehicle charging solutions. The OpConnect software tracks usage, provides load management, and collects revenue. OpConnect is a turnkey option for electric vehicle charging, providing charging station hardware from various vendors (including ABB, BTC Power, Rhombus and Efacec), installation services, maintenance and repair services, ongoing network operations, 24/7 phone support for electric vehicle drivers, a consumer/driver app, revenue collection including secure credit card processing, data collection and reporting. OpConnect has private label options for standing up your own branded charging network.

Contact: Amy Hillman, ahillman@opconnect.com

Prova Group is a Chattanooga, TN based service provider focused on enhanced mobility solutions that benefit communities (complete streets, bike share, car share, transit, vehicle electrification, etc.). Prova Group designed and deployed electric vehicle charging infrastructure throughout the greater Chattanooga area including: design, siting, construction, operation, reporting, and management of an electric vehicle charging network at twenty locations in the Chattanooga area as well as the deployment of an electric vehicle car-sharing system. This project required the evaluation and installation of charging infrastructure at a wide range of host locations including in the public right-of-way with on-street parking, transit center facilities, parking structures, university complexes, hospitals and medical centers, primary tourist attractions, major retail centers, residential neighborhoods, and underserved communities.

Contact: Philip Pugliese, ppugliese@provagroup.net

Seven States Power Corporation is a generation and transmission cooperative owned by the 153 Local Power Companies in the Tennessee Valley who purchase wholesale power from TVA. Seven States provides electric vehicle charging equipment and network solutions from providers (e.g., ChargePoint and ABB) as well as associated maintenance services. Seven States offers design, development, and deployment services ranging from grant and program preparation to infrastructure planning, site selection, equipment selection (including vendor evaluation and procurement services, budget development, project management, technical consultation, and program administration. Services are offered as a turn-key option or via a la carte services as needed. Seven States has deployed more than 100 charging PLUGS with local power companies across the Tennessee Valley, including DC fast chargers along Interstate 81 with Greenville Energy Authority, in Sevierville off US 411 with Sevier County Electric System, and Interstate 40 with Tennessee Tech University and other stakeholders.

Contact: James Ellis, jellis@7spc.com

Siemens sells fast charging equipment, including the Siemens VersiCharge Ultra 175 manufactured by Tritium. Siemens chargers connect to various network options including EvGateway, Greenlots, Juicebox, EV Connect, and any OCPP compliant network. Siemens also offers site design, engineering support, overall project management services, and maintenance and operational support for project implementation. Siemens also provides longer term periodic maintenance services programs and corrective maintenance support (warranty and non-warranty) to ensure operation.

Contact: Ron Graham, ron.graham@siemens.com

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SWTCH Energy is a Toronto based company that provides electric vehicle charger network management solutions and hardware options. SWTCH follows open standards and the network can integrate with various Open Charge Point Protocol (OCPP) compliant hardware, including ABB (listed in RFI response), Delta, Efacec, Siemens, and Tritium. SWTCH provides consumer-facing applications for both mobile and web browsers, allowing for access control and payments. SWTCH provides installation services through a network of channel partners and has installed and managed DC fast chargers for a number of utilities and private sector customers.

Contact: Nicole Politis, Nicole.politis@swtchenergy.com

Tritium is an Australian based DC fast charging company, with U.S. operations based in Torrance, CA. Tritium sells multiple models of charging stations that meet program minimum technical specifications, including the RTM175, PKM150, and others. Tritium's Pulse network monitors charging stations, but stations can also integrate with any network option that utilizes the OCPP. Tritium products and services are deployed in 38+ countries with clients such as Shell, Volvo, BP, Siemens and the IONITY European charging network. Tritium also provides program support services such as site selection, site design and engineering support as well as installation, commission, and maintenance services through providers certified to work with Tritium products.

Contact: Stephen Tok, *stok@tritiumcharging.com*

Umlaut is a global consulting and engineering services firm with roots in Germany and 600 employees located at 9 offices across the US. With a team of 250 consultants and engineers from automotive, communication, and energy disciplines, Umlaut provides end-to-end services in the electric mobility ecosystem. Umlaut provides strategic consulting, market analysis, product benchmarking, and business case development. Umlaut also provides hardware, software development, and testing as well as engineering and design services, site selection, site assessment, project management, and coordination throughout the project lifecycle.

Contact: Soeren Schrader, *soeren.Schrader@umlaut.com*

WESCO|Anixter is a Pittsburgh, PA based solutions provider, with an international distribution footprint including branch locations across Tennessee. WESCO|Anixter provides partnership solutions for electric vehicle charging projects. This includes providing charging hardware from various vendors, design and storage solutions, procurement, construction management, site commissioning, and network monitoring and load balancing software. WESCO|Anixter can also support the backend electrical infrastructure necessary to deploy electric vehicle fast charging such as transformers, connectors, switchgear, and metering. WESCO|Anixter lists ABB as a potential supplier of charging equipment and Greenlots as a potential network partner.

Contact: Jeff Napier, jnapier@wesco.com

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ZEF Energy is an electric vehicle charging solution company headquartered in Minneapolis, MN. ZEF Energy designs and manufactures charging equipment as well as operates a load management software platform. ZEF Energy specializes in working with medium and small utilities offering comprehensive solutions that deliver grid benefit and beneficial electrification programs. ZEF Energy is also a reseller of DC fast charging equipment and provides procurement, development, and ongoing operational services to deliver incremental or full turn-key project deployment. ZEF Energy offers a wide array of DC fast charging equipment options (ABB, Tritium, and Efacec). ZEF Energy has partnered on thousands of installations across the country including multiple large DC fast charging corridor projects (e.g., States of MN/MT/ND/SD and utility based projects) and community based projects like the "Twin Cities EV Spot Network" launching in late 2021.

Contact: Megan Hoye, megan.hoye@zefenergy.com

Charging Site Development and Operation Best Practices

Developing and operating an electric vehicle (EV) fast charger site is a multi-step, multi-stakeholder process that requires thoughtful planning and execution. Planning in advance can help avoid surprises, streamline timelines, and better manage costs. There are several detailed "Best Practices" resources from various organizations such as EPRI, SEPA, and NYSERDA that can be leveraged. Below are topics that should be considered prior to installing the EV charging stations.

Initial Planning:

- Successful infrastructure programs should invest a considerable amount of time in the planning phase.
- Familiarize yourself with EV fast charger technical specifications (typically 480V, three phase power, and 120+ kW for each location, but standards allow power levels up to 350kW per car). For the Fast Charge Network program, please reference the **Minimum Technical Specifications** document found within the **Program Guidelines**.
- Identify local travel corridors, such as interstates and major U.S. and state highways, and determine which of these routes currently have charging options.
- Consider areas of the distribution grid with known constraints or optimal areas (capacity) for hosting fast charger loads.
- Identify and engage relevant project partners early in the process, such as local government officials, third-party service providers, etc.
- Interface with local permitting authorities to understand local permitting requirements and specific codes associated with developing a charging site in your area.
- Consider specific legal requirements and terms you will want to include in a site host agreement with the site owner to secure a host property where chargers will be located.

Site Identification, Review, and Selection:

- Identify a list of potential target sites for hosting charging stations.
- Identify multiple potential sites, as some sites may pose challenges (e.g., conflicts with site host contracting, costs of electric infrastructure, environmental considerations, etc.). Refer to **Site Selection Guidelines**, which can be found in the **Program Guidelines**, for additional details.
- Perform high-level feasibility reviews of potential sites prior to committing significant time and resources into the project.
- Once you have a short list of potential sites, perform site surveys for prioritized site locations.
  - Identify where power will come from and where equipment such as transformers and switch gear will be placed.
  - Note the layout of parking spaces and whether any will need to be expanded or removed. If possible, select the widest and longest parking spaces to support easy access for drivers.
  - Consider potential issues relating to accessibility, including wheelchair accessibility (more on this topic is included below within the design section).
  - Take note of potential safety risks, such as steep drops or trip hazards.
  - Consider environmental impacts of site development. The **Environmental Review Checklist**, which can be found in the **Program Guidelines**, details items to consider. In general, locating charging sites within previously developed areas such as existing parking lots greatly reduce potential impacts.
  - Identify cellular signal strength and the cellular carriers that best service a particular location. Reliable cellular network access is important to connect charging stations to network management systems, including payment processing and monitoring.

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Site Design, Permitting, and Accessibility

- Determine the number and type of charging stations and electrical equipment needed.
  - The **Minimum Technical Specifications**, which can be found in the **Program Guidelines**, for corridor Fast Charge Network locations document detail minimum number of chargers, minimum power levels/charging speeds, etc.
  - A list of qualified providers of EV fast charging equipment, operating network back-end options, and related program support services was developed in response to TVA's Request for Information (RFI); program participants may utilize this list as a reference tool to inform their vendor evaluation and procurement process. Please refer to **RFI Summaries** in this program resources document.
- Evaluate design and construction requirements.
  - Determine what is required to bring electrical service to the site, place transformers, and connect charging stations.
  - Trenching through pavement may be necessary but should be minimized to save costs.
  - Consider how to integrate landscaping into the project. The location and type of landscaping in a parking facility helps to define vehicle and pedestrian movement and enhance visual design by hiding electrical support equipment.
  - Third-party service providers may be helpful during the design process.
- Determine additional site needs.
  - Signage and surface marking (e.g., striping, painting the parking spot, etc.) should be clearly visible to tell drivers where the chargers are and to delineate designated parking spaces, restrictions, etc.
  - Safety and security must be considered such as lighting and proximity to publicly available amenities.
- Public charging stations must enable access for persons with disabilities and follow all federal ADA requirements.
  - For the Fast Charge Network program, at least one van-accessible electric vehicle charging space will be required. This will provide adequate space to move a wheelchair or other equipment in and out of a wheelchair accessible van and allow wheelchair access to plug in common electric vehicles. Please refer to the Fast Charge Network Program **Accessability Requirements**, which can be found in the **Program Guidelines**. Fast Charge Network Program **Accessability Requirements** are not a subsitute for following all federal ADA requirements as they are established and updated.
- Public charging stations should comply with all applicable environmental protection, building codes, and safety ordinances.
- Coordinate regular working sessions with permitting authorities to reduce the time and cost associated with permitting, especially if including an awning or canopy structure for weather protection; such structures may be treated and permitted differently in different areas.
- Include provisions in the site design to allow future deployment of additional charging stations and/or upgrade of current stations to higher power chargers. Example items to consider:
  - Extra conduit runs to additional parking spaces for future chargers.
  - Larger than required conduit to allow higher power upgrades (to support larger conductors in the future).
  - Larger than required concrete pads to accommodate higher-capacity transformers in the future.
  - Appropriately rated switch gear, disconnects, metering bases, etc. to accommodate higher powered chargers and additional chargers in the future.
  - Extra circuit breaker spaces for future chargers.
  - Provisions in site host agreements to enable future expansion.

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Construction, Installation, and Commissioning

- Complete **Environmental Checklist Review**, which can be found in the **Program Guidelines**, for final site approval before beginning construction activities. Additional information will be provided to outline necessary documentation and required information to complete this review.
- After securing the necessary permits, complete civil engineering site preparations such as trenching and pouring foundations for equipment.
  - Third-party service providers may be helpful during the construction process.
- A final inspection by local permitting authorities is usually required; coordinate regular working sessions with permitting authorities throughout construction to speed up reviews and avoid surprises.
- Perform final site commissioning of any charging infrastructure, including the connection of the chargers to the utility's electric service and to the cellular network that provides remote monitoring and service.

Commercial Operation

- After final site commissioning, the EV charger commences commercial operation and will then undergo regular preventative maintenance as well as unplanned corrective maintenance throughout its lifetime.
- Assess charging infrastructure maintenance and operation needs and costs.
  - Charger companies and network providers typically offer subscription-based services for regular O&M services for a set period (e.g., five years).
- Chargers are typically remotely monitored and controlled through a software back-end and user interface "network." In many cases, over-the-air firmware updates can continuously improve charger functionality.
- Certain local customer service functions such as general housekeeping, and/or maintenance support functions may be best supported by the site host (e.g., the site host can alert the O&M provider if the station appears to be damaged); ensure these expectations are communicated to local site host staff members and are reflected in the site host agreement.
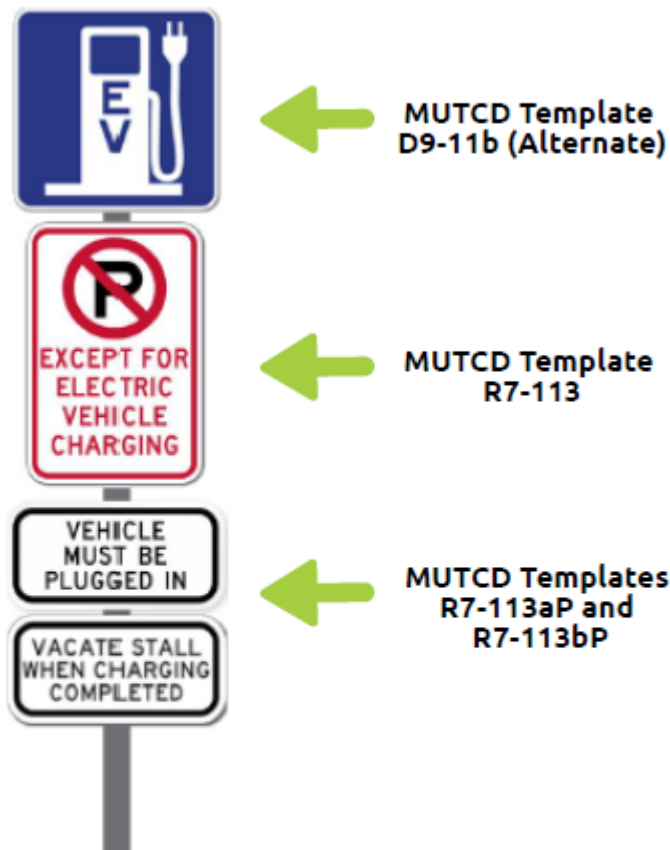
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Signage Recommendations

Sign Design and Location

On the next page is an example of signage that the Fast Charge Network program would encourage at fast charging sites. Although there are many EV charging station sign designs used by different stakeholders across the U.S., the recommendations below were designed to create simple and consistent signage for fast charging locations given the following considerations:

- Given the short duration of a fast charging session, it is preferred that site hosts utilize signage that encourages parking spot turnover by allowing EVs to park in said spots only while actively charging.

- The Federal Highway Administration (FHWA) provides a number of signage templates in its Manual on Uniform Traffic Control Devices (MUTCD). These FHWA-approved templates were utilized when designing these signage recommendations. Visit mutcd.fhwa.dot.gov for more information.

- EV signage should be erected for each parking spot with access to the fast charging equipment. For example, site hosts with one fast charger that can charge two vehicles at the same time should install two sets of signposts, one centered in front of each parking spot accessing the charging station.

- For those fast charging sites located in large campuses or parking lots, it is important for wayfinding signage to be provided within the property to assist EV drivers in finding the actual charging stations. Such wayfinding should be placed at major campus/parking lot entrances and continually placed throughout the property so as to lead drivers to the charging station location. Wayfinding markers should combine EV charging station logo signs (MUTCD Template D0-11b (Alternate)) with directional arrows and be placed at regular intervals, where needed.

Signage Recommendations were created through a Drive Electric Tennessee (DET) EV stakeholder group with experience in EV charging and road signage

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Recommended DC Fast Charging Signage

MUTCD Template
D9-11b (Alternate)

MUTCD Template
R7-113

MUTCD Templates
R7-113aP and
R7-113bP

Wayfinding Signage

From left to right, MUTCD Templates M5-1, M5-2, M6-1, M6-2, and M6-3

Parking Spot Striping and Stencling

All parking spots with access to fast charging station(s) should be painted to provide added visibility for EV motorists. Specifically, it is recommended that site hosts solidly paint parking spots with access to the fast charging equipment in the "electric green" color, #00FF00. For those spots, it is also recommended to stencil the words "Electric Vehicle Charging" at the entrance to the charging stall. These features will help EV drivers find the charging station(s) while also discouraging non-EV drivers from parking in said stalls and blocking off charging station use.

Additionally, it is suggested that a yellow parking bumper/wheelstop with black striping be placed in each spot with access to the fast charging station(s), to improve pedestrian safety, help further designate the parking spot(s) as reserved for special use, and minimize the possibility of drivers damaging loose charging station cables when parking.

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The left figure below is a side-angle of a single parking spot, demonstrating the posting of signage at the head of the fast charging parking space, the placement of a bumper/wheelstop, and the electric green stenciling design in the aforementioned recommendations. The right figure below is a top-down view of a typical fast charging site, which shows the fast charging station positioned in the center of two adjacent parking spots. EV signage is centered in front of each parking spot, reflected in this example as blue rectangles. These two figures show recommended fast charging station stenciling needed to maximize parking spot visibility and minimize the risk of non-EVs parking in the reserved spots.
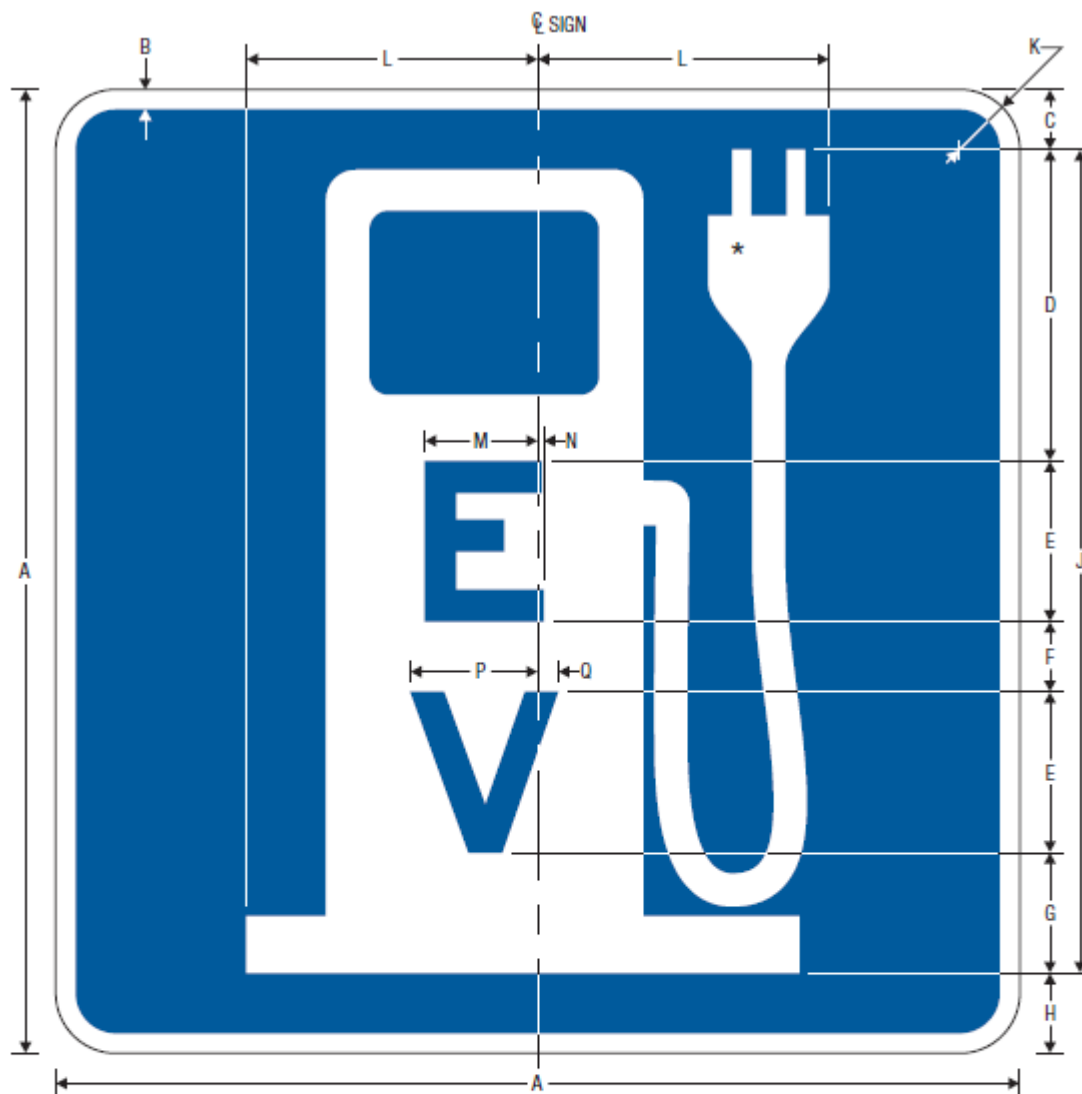

Recommended DC Fast Charging Stenciling
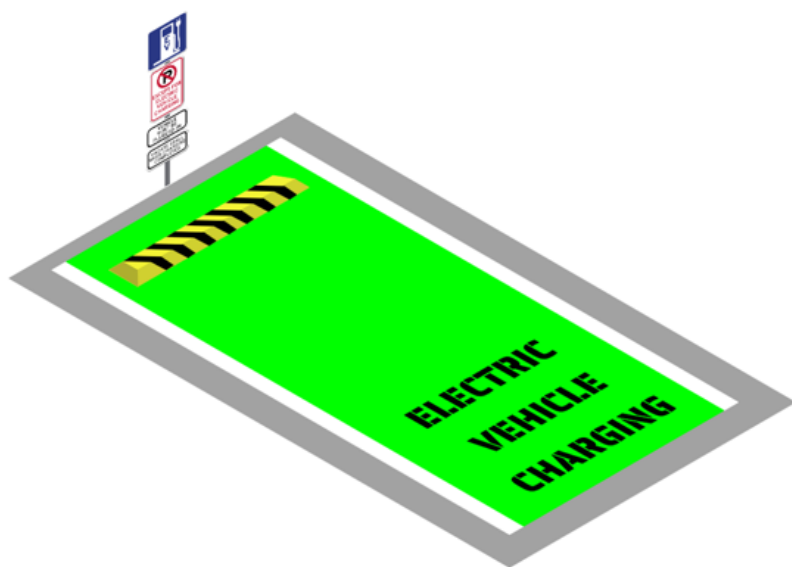
Minimum stenciling and signage recommendations
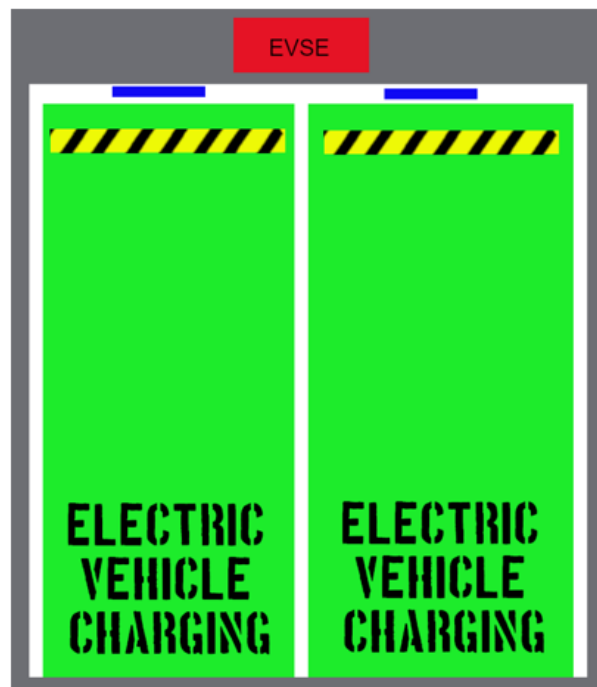
Minimum stenciling recommendations

FHWA MUTCD Appendices

- Sign Template D9-11 b (Alternate), issued April 1, 2011
- Sign Template R7-113, issued June 17, 2013
- Sign Template R7-113aP, R7-113bP, issued June 17, 2013

D9-11b (Alternate)
Electric Vehicle Charging (Alternate Symbol)

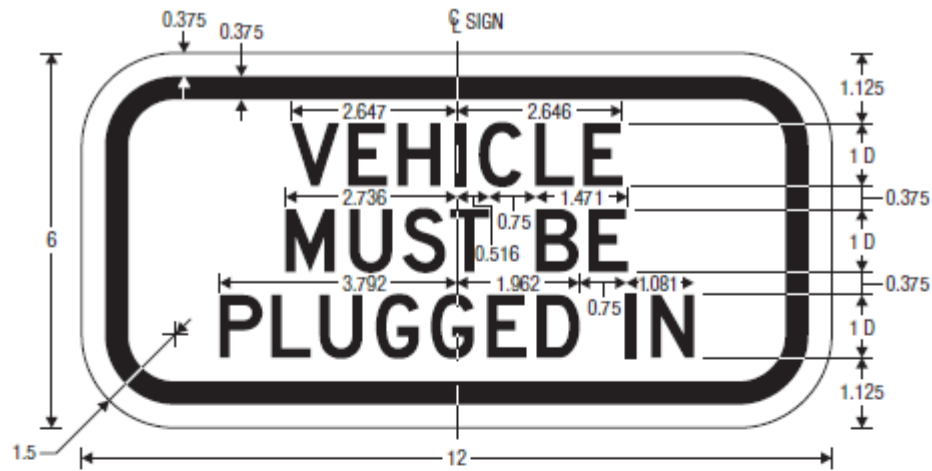| C	A	B	C	D	E	F	G	H	J	K	L	M
	24	0.5	1.5	7.75	4 E(m)	1.75	3	2	20.5	1.5	7.25	2.814
	30	0.75	1.875	9.625	5 E(m)	2	4	2.5	25.625	1.875	9.063	3.518

N	P	Q
0.148	3.174	0.507
0.185	3.968	0.635

★ See page IA-13-2 for symbol design

COLORS: LEGEND, BACKGROUND — BLUE (RETROREFLECTIVE)
SYMBOL, BORDER — WHITE (RETROREFLECTIVE)

R7-113
NO PARKING EXCEPT WHILE CHARGING

★ Reduce character spacing 40%.
★★ Reduce character spacing 60%.
★★★ Type D Arrow.

UPPER LEFT SECTION
COLORS: LEGEND, BORDER — WHITE (RETROREFLECTIVE)
        BACKGROUND   — RED (RETROREFLECTIVE)
UPPER RIGHT SECTION
COLORS: LEGEND, BORDER — RED (RETROREFLECTIVE)
        BACKGROUND   — WHITE (RETROREFLECTIVE)

LOWER SECTION
COLORS: LEGEND, BORDER — RED (RETROREFLECTIVE)
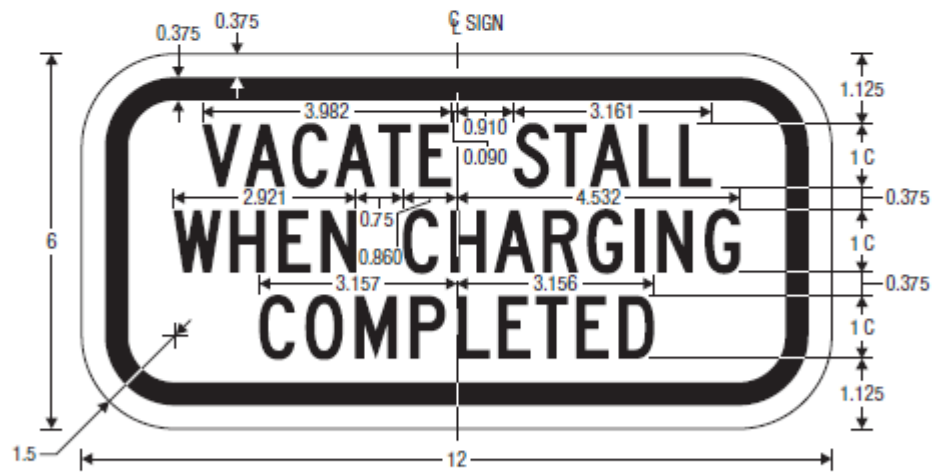   BACKGROUND   — WHITE (RETROREFLECTIVE)

R7-113aP
VEHICLE MUST BE PLUGGED IN (Plaque)

R7-113bP
VACATE STALL WHEN CHARGING COMPLETED (Plaque)

COLORS: LEGEND, BORDER — BLACK (RETROREFLECTIVE)
BACKGROUND — WHITE (RETROREFLECTIVE)