

Arizona Interstate/Infrastructure Collaborative Advisory Group Meeting

I-10 Alternative Fuels Corridor Deployment Plan

March 27, 2020

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Air Quality Planning Coordinator



FHWA AFCDP Grant Partners:

- Pima Association of Governments (PAG), Arizona Department of Transportation (ADOT), Valley of the Sun Clean Cities Coalition (VSCCC)

AllC Advisory Group Invited Partners:

- Sulphur Springs Valley Electric Cooperative (SSVEC), Arizona Electric Power Cooperative (AEPC), Tucson Electric Power Company (TEP), Arizona Public Service (APS), Salt River Project (SRP), Southwest Gas Corporation (SWG), ChargePoint, Electrify America, Greenlots, Triullium CNG, CNG Services of Arizona, Willcox Truck Stop Plaza, TA Travel Centers of America, 4K Truck Stop (Petroleum Wholesale), Pilot Company, Nikola Motor Company, Arizona Trucking Association (ATA), Arizona State University (ASU), Arizona Department of Environmental Quality (ADEQ), Arizona Department of Administration (ADOA) - Arizona Governor's Office

Fixing America's Surface Transportation (FAST) Act - December 4, 2015

- o Designate corridors to improve mobility of passenger and commercial vehicles that employ electric, hydrogen fuel cell, propane, and natural gas fueling technologies across the U.S.

FHWA – Designations of Alternative Fuel Corridors

- 2016, 2017, 2018; Rounds 1, 2, 3
- 79 Nominations in 46 states plus DC
- 135,000 miles of National Highway System
- 2019 Round 4
- AFCDP grants awarded to 5 organizations

Arizona Corridors

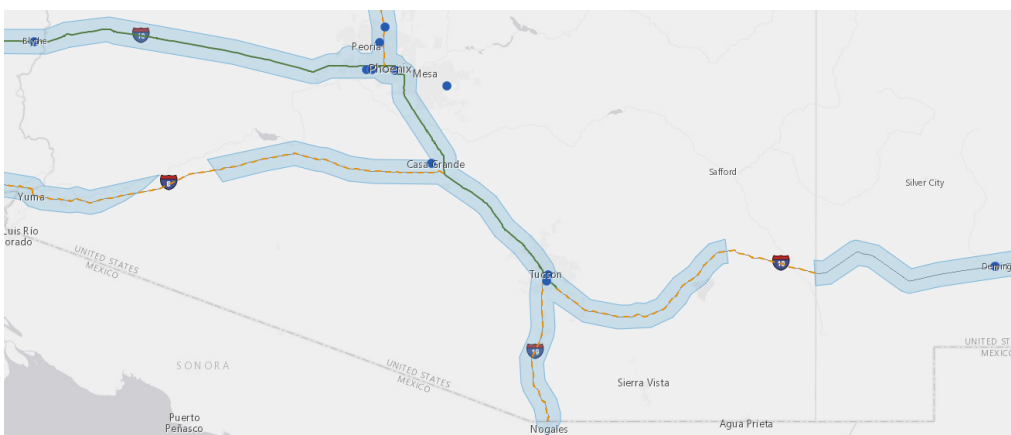
- I-10, I-8, I-17, I-19, I-40
- EV, CNG, LNG, LPG

EV	CNG
DCFC only	150 miles between stations
50 miles between stations	5 miles from highway
5 miles from highway	Public stations only
Public stations only (no Tesla)	Fast fill, 3,600 psi

Electric Vehicle (DCFC) Charging



Compressed Natural Gas (CNG) Fueling



I-10 Arizona AFCDP Goals & Objectives:

- Transition Phoenix to California section from EV Pending to EV Ready with 2 additional DCFC sites
- Transition Tucson to New Mexico section from EV Pending to EV Ready with 2 additional DCFC sites
- Transition Tucson to New Mexico section from CNG Pending to CNG Ready with 1 additional fast fill site
- Consider REVWEST voluntary minimum station standards for the Intermountain West EV Corridor
- Develop Final Deployment Plan by November 30, 2020

Alternative Fuels Data Center

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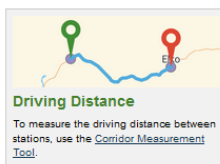
Station Data for Nominating Alternative Fuel Corridors

The table below provides station data and shapefiles by state and fuel type. These datasets include public stations with the following filters applied to meet the criteria for nominating alternative fuel corridors:

- **EV charging** – only DC fast electric vehicle (EV) charging stations with both CHAdeMO and CCS connectors, excluding Tesla
- **Hydrogen** – only retail stations (Non-retail stations may be used in corridor nominations if the stations are compliant with SAE J2001 standards and meet all of the criteria for a hydrogen corridor.)
- **Propane** – only "primary" liquefied petroleum gas (LPG) stations, which have fuel for vehicles and vehicle-specific fueling services that are consistently offered during business hours
- **CNG** – only fast-fill compressed natural gas (CNG) stations that offer a fill pressure of 3,600 psi
- **LNG** – all liquefied natural gas (LNG) stations

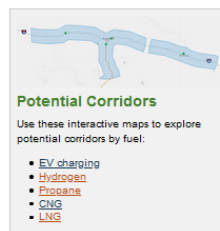
The data downloads are CSVs with current station data from the [Alternative Fueling Station Locator](#). The shapefiles are ZIP downloads with a static snapshot of the stations as of Oct. 13, 2019, including stations outside state borders within 25 miles.

Learn more about corridor designations from the [Federal Highway Administration](#).



Driving Distance









To measure the driving distance between stations, use the [Corridor Measurement Tool](#).



Potential Corridors

Use these interactive maps to explore potential corridors by fuel:

- [EV charging](#)
- [Hydrogen](#)
- [Propane](#)
- [CNG](#)
- [LNG](#)

Stations by State and Fuel Type					
State	EV Charging	Hydrogen	Propane	CNG	LNG
Alabama	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Alaska	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Arizona	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Arkansas	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
California	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Colorado	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Connecticut	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Delaware	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
District of Columbia	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Florida	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile
Georgia	 data shapefile	 data shapefile	 data shapefile	 data shapefile	 data shapefile

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Save ▾ Share Print ▾ Measure Bookmarks Find address or place

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☒ Electric Stations (10/13/2019)

☐ Electric Stations (09/05/2018)

☒ Alternative Fuel Corridors (10/13/2019)

☐ Alternative Fuel Corridors (09/10/2018)

☒ Potential Electric Corridors: Roads with enough stations to 1) Nominate a corridor or 2) Create or extend a corridor by adding a station

☐ Round 3 - Potential Electric Corridors: Roads with enough stations to 1) Nominate a corridor or 2) Create or extend a corridor by adding a station

▸ ☒ National Highway Network

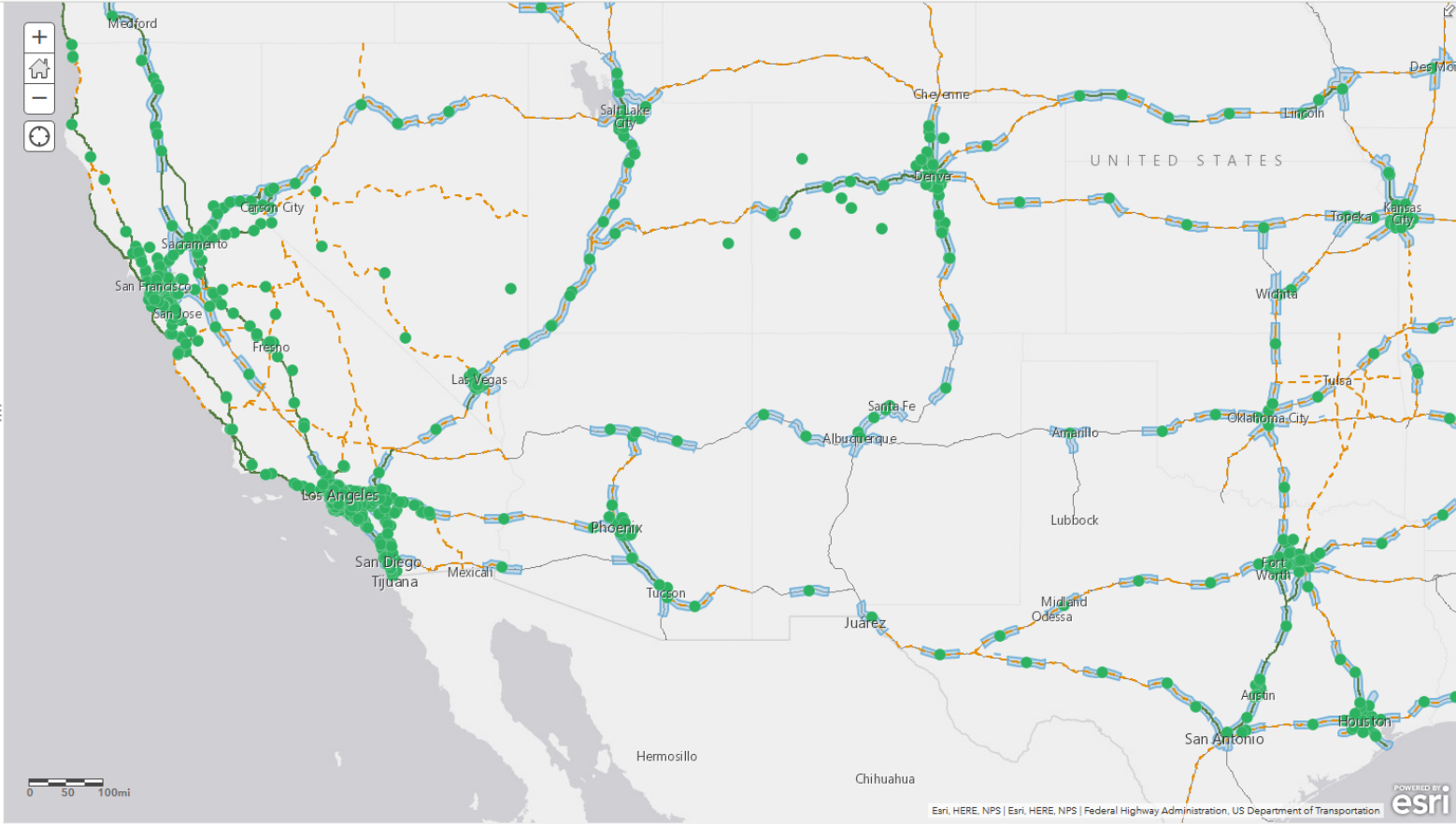
▸ ☒ Basemap

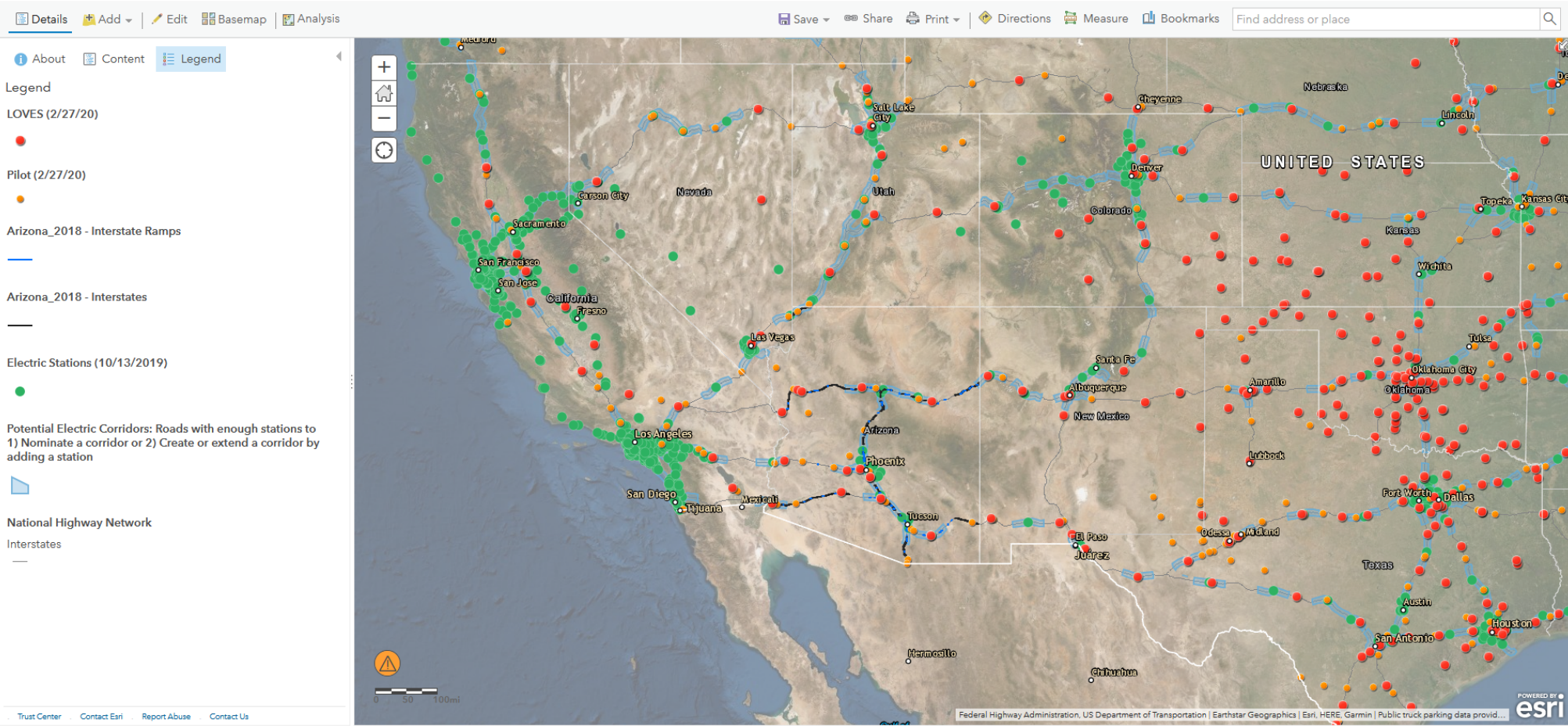
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Homeland Infrastructure Foundation-Level Data (HIFLD)

[DHS.GOV](#) [DHS.GIT](#) [FGDC.GOV](#) [HIFLD](#) [GEOPLATFORM](#)



HIFLD Open Data

This site provides National foundation-level geospatial data within the open public domain that can be useful to support community preparedness, resiliency, research, and more. The data is available for download as CSV, KML, Shapefile, and accessible via web services to support application development and data visualization.

For updates about HIFLD data, guidance on metadata, and known shapefile conversion issues, please access the HIFLD notifications page.



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Legend

Electric Stations (10/13/2019)

LOVES (2/27/20)

Pilot (2/27/20)

Truck Stop Parking (2015)

Arizona_2018 - Interstate Ramps

Arizona_2018 - Interstates

Potential Electric Corridors: Roads with enough stations to 1) Nominate a corridor or 2) Create or extend a corridor by adding a station

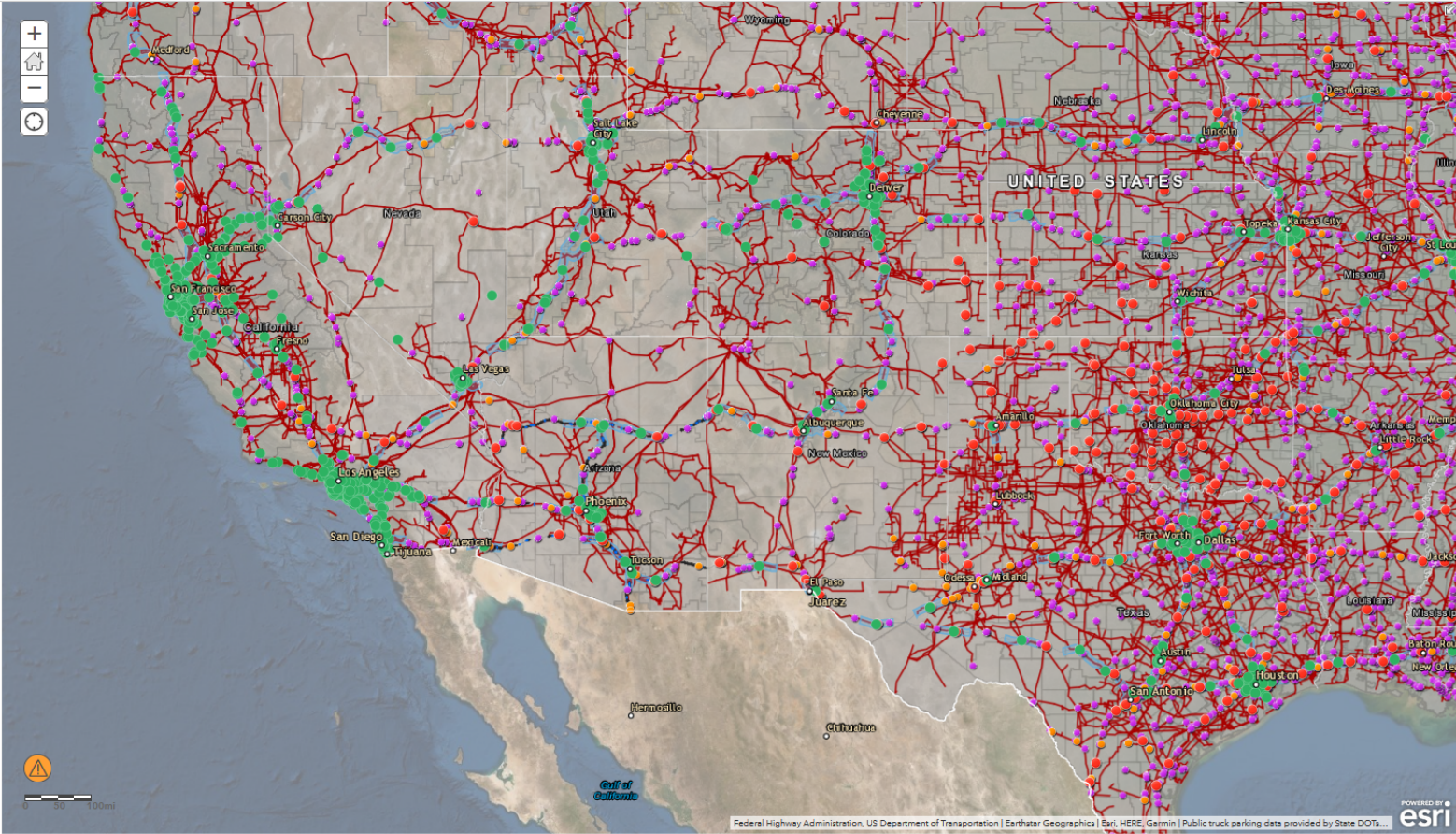
Electric_Power_Transmission_Lines - Transmission_Lines

Electric_Retail_Service_Territories - Retail_Service_Territories

National Highway Network

Interstates

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Electric Stations (10/13/2019)

LOVES (2/27/20)

Pilot (2/27/20)

Truck Stop Parking (2015)

Arizona_2018 - Interstate Ramps

Arizona_2018 - Interstates

ArizonaInventory

Potential Electric Corridors: Roads with enough stations to 1) Nominate a corridor or 2) Create or extend a corridor by adding a station

Electric_Power_Transmission_Lines - Transmission_Lines

Electric_Retail_Service_Territories - Retail_Service_Territories

National Highway Network

National Highway Network - Road Shields

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1 of 2

Retail_Service_Territories: SULPHUR SPRINGS VALLEY E C INC

ID18280

NAME

SULPHUR SPRINGS VALLEY E C INC

ADDRESS

NOT AVAILABLE

CITY

NOT AVAILABLE

STATE

AZ

ZIP

NOT AVAILABLE

TELEPHONE

NOT AVAILABLE

TYPE

COOPERATIVE

COUNTRY

USA

NAICS_CODE

2211

Zoom to

Get Directions

Federal Highway Administration, US Department of Transportation | Esri, HERE, Garmin | Public truck parking data provided by State DOTs...

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Level 1 Charging

2 to 5 miles of range per
1 hour of charging



J1772 charge port

Alternating Current (AC) Level 1 equipment (often referred to simply as Level 1) provides charging through a 120 volt (V) AC plug. Most, if not all, PEVs will come with a Level 1 cordset, so no additional charging equipment is required. On one end of the cord is a standard **NEMA** connector, (for example, a NEMA 5-15, which is a common three-prong household plug) and on the other end is an SAE J1772 standard connector (often referred to simply as J1772, shown in the above image). The J1772 connector plugs in to the car's J1772 charge port, and the **NEMA** connector plugs in to a standard **NEMA** wall outlet.

Level 1 charging is typically used when there is only a 120V outlet available, such as while charging at home, but can easily provide charging for all of a driver's needs. For example, 8 hours of charging at 120V can replenish about 40 miles of electric range for a mid-size PEV. As of 2019, **less than 5% of public charging outlets in the United States were Level 1.**

Level 2 Charging

10 to 20 miles of range per
1 hour of charging



J1772 charge port

AC Level 2 equipment (often referred to simply as Level 2) offers charging through 240V (typical in residential applications) or 208V (typical in commercial applications) electrical service. Most homes have 240V service available, and because Level 2 equipment can charge a typical PEV battery overnight, it is commonly installed at PEV owners' homes for **home charging**. Level 2 equipment is also commonly used for **public and workplace charging**. This charging option can operate at up to 80 amperes (Amp) and 19.2 kW. However, most residential Level 2 equipment operates at lower power. Many of these units operate at up to 30 Amps, delivering 7.2 kW of power. These units require a dedicated 40-Amp circuit. As of 2019, **over 80% of public outlets in the United States were Level 2.**

Level 2 charging equipment uses the same J1772 connector and charge port that Level 1 equipment uses. All commercially available PEVs have the ability to charge using Level 1 and Level 2 charging equipment. Although Tesla vehicles do not have a J1772 charge port, Tesla does sell an adapter.

DC Fast Charging

60 to 80 miles of range per
20 minutes of charging



CCS charge
port



CHAdeMO



Tesla

Direct-current (DC) fast charging equipment (typically 208/480V AC three-phase input), enables rapid charging along heavy traffic corridors at installed stations. As of 2019, **about 15% of charging outlets in the United States were DC fast chargers.** There are three types of DC fast charging systems, depending on the type of charge port on the vehicle: SAE Combined Charging System (CCS), CHAdeMO, or Tesla.

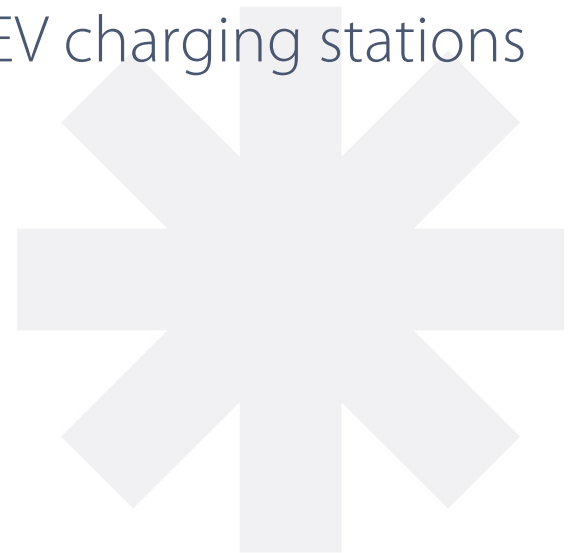
The **CCS** (also known as J1772 combo) connector is unique because a driver can use the same charge port when charging with Level 1, 2, or DC fast equipment. The only difference is that the DC fast charge connector has two additional bottom pins. The CCS connector is used by Chevrolet and BMW PEVs, for example

The **CHAdeMO** connector is the most common of the three connector types and is used by Nissan, Mitsubishi, and Toyota PEVs, for example.

Tesla vehicles have a unique charge port and connector that works for all their charging options including their fast charging option, called a supercharger.

Utility Partner Discussion: SSVEC, AEPCO, TEP, SWG

- Electric and gas service availability
- Potential costs to owners / operators of EV charging stations / CNG stations
- Other considerations



Site Host Partner Discussion:

TA Travel Centers, Willcox Truck Stop Plaza, 4K
Truck Stop – Petroleum Wholesale, Loves,
Arizona Trucking Association

- Costs / benefits
- Owning / leasing contracts
- Parking spaces / logistics
- Other considerations





Greenlots



Electrify America, Lordsburg, NM Chevron



Electrify America, CCS & CHAdeMO

ChargePoint and NATSO Launch Collaborative to Significantly Expand EV Charging Along Nation's Highways and in Rural Communities



ChargePoint's new CPE250 fast charger, similar to the type that will be deployed as part of the National Highway Charging Collaborative, at a plaza in Southern California.

Photo Credit: Maria Hedrick

The partnership will increase access to charging nationwide at more than 4,000 travel plazas and fuel stops by 2030

Alexandria, Va. and Campbell, Calif. – February 6, 2020 – [ChargePoint](#), the world's largest electric vehicle (EV) charging network, and NATSO, which represents America's travel plazas and truckstops, today announced a landmark partnership to create a National Highway Charging Collaborative to extend EV charging to every corner of the nation. Over the next decade, the Collaborative will leverage \$1 billion in capital to deploy charging at more than 4,000 travel plazas and fuel stops that serve highway travelers and rural communities.

This significant expansion will link America's drivers to a vast and growing charging network in all 50 states and the District of Columbia, significantly increasing access to charging as EV adoption accelerates. The effort will not only enable long distance electric travel along major routes but will also provide vital access to charging in rural communities.

EV Charging Partner Discussion:

ChargePoint, Electrify America, Greenlots

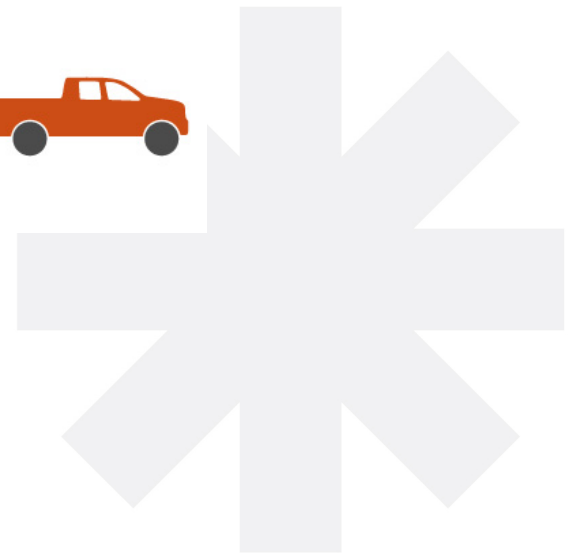
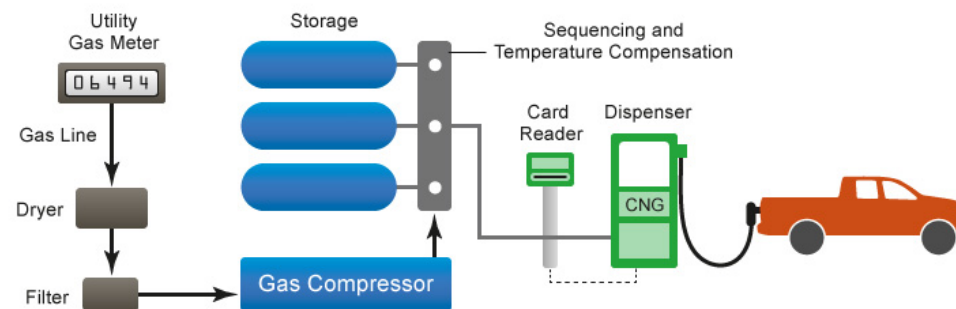
- Equipment options (minimum 1 J11772 combo (CCS) & 1 CHAdeMO connector)
- Costs / maintenance
- Permitting / installation timeframes
- Other considerations





Love's Trillium CNG Fast Fill

Fast-Fill Station



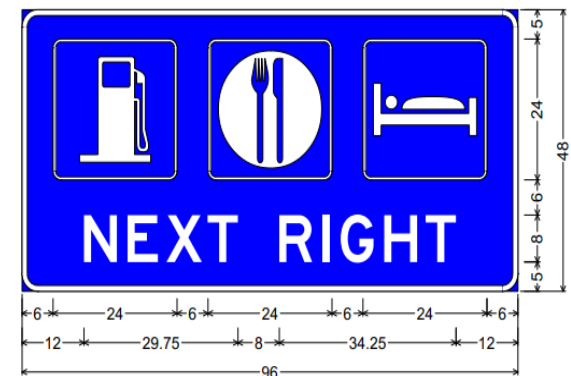
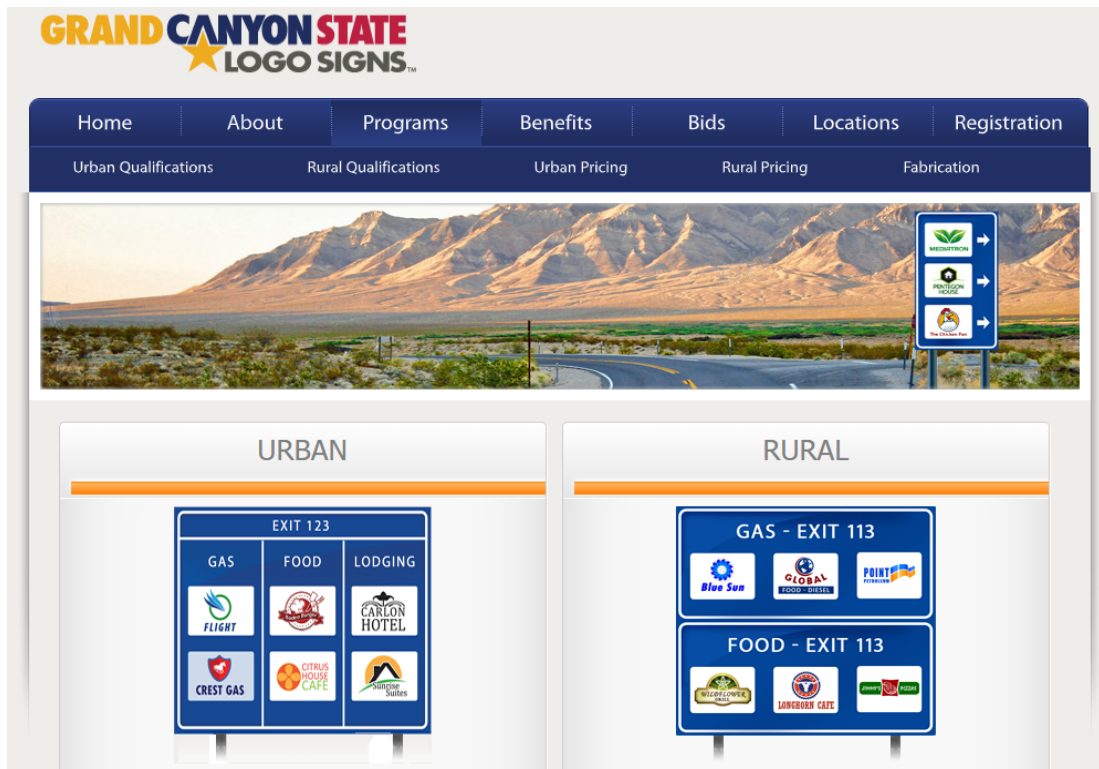
CNG Fueling Partner Discussion:

Trillium, CNG Services of Arizona

- Capacity
- Costs / maintenance
- Permitting / installation timeframes
- Other considerations



I-10 Signage for EV Charging / CNG Fueling Stations



Manual on Uniform Traffic Control Devices for Streets and Highways

2009 Edition Chapter 2I. General Service Signs

Section 2I.03 General Service Signs for Freeways and Expressways

Guidance: 06 Only services that fulfill the needs of the road user should be displayed on General Service signs. If State or local agencies elect to provide General Service signing, there should be a statewide policy for such signing and criteria for the availability of the various types of services. The criteria should consider the following:

- A. Gas, Diesel, LP Gas, EV Charging, and/or other alternative fuels if all of the following are available:
 - 1. Vehicle services such as gas, oil, and water;
 - 2. Modern sanitary facilities and drinking water;
 - 3. Continuous operations at least 16 hours per day, 7 days per week; and
 - 4. Public telephone.



U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION:** MUTCD — Interim
Approval for Optional Use of an
Alternative Electric Vehicle Charging
General Service Symbol Sign

Date: April 1, 2011

From: Jeffrey A. Lindley
Associate Administrator for Operations

In Reply
Refer HOTO-1
To:

To: Federal Lands Highway Division Engineers
Division Administrators

Purpose: The purpose of this memorandum is to issue an Interim Approval for the optional use of a General Service symbol sign that provides road users direction to electric vehicle charging facilities that are open to the public. Interim Approval allows interim use, pending official rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic control device, or a provision not specifically described in the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).



ADOT & Partner Discussion:

- Technical requirements – Permitting, placement, maintenance, etc.
- MUTCD Section 2I.03 requirements / ADOT General Service vs Logo Sign
- Funding options – Public, private; agreements / contracts / fees
- Other considerations



Roundtable – Questions/Input/Future Agenda Items

Next Meetings:

Tucson - August 14, 2020

Phoenix - May 29, 2020 & October 16, 2020

10:00 am – 12:00 pm MST

Email correspondence to: Dfitzpatrick@PAGregion.com

