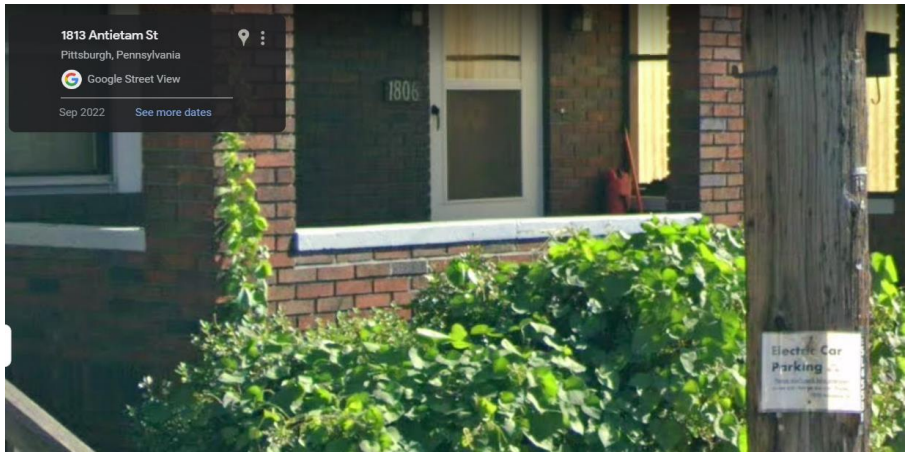
Equitably Empowering EV Ownership in the City of Pittsburgh through Community Charging Infrastructure

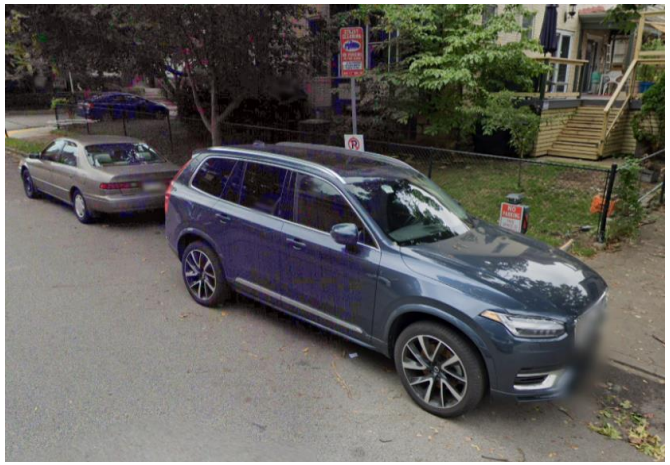
Public Art and Civic Design Commission

What Pittsburgh is doing in the EV space

- EV Charging Strategic plan (2021)
- EV readiness ordinance - *"new and renovated City-owned facilities will now have electrical capacity and equipment installed simultaneously with construction to develop the necessary infrastructure to support both the City fleet's EVs and encourage public charging on City property."* Source
- City Fleet vehicles: 174 vehicles are electric, representing 12.56% of the total fleet.
- Community charging: Awarded CFI (Charging and Fueling Infrastructure) grant
- Learning from national and international best practices to help planning will be paired to center around equitable access, pricing and long term maintenance of EVSE.
- Participating in the conversation – conferences, community meetings, webinars, public engagement events.

Why? Residents are already doing some creative yet unsafe methods of charging their EV in the ROW.





Google map from 2021: issue since resolved through courts

Source: Philadelphia Inquirer

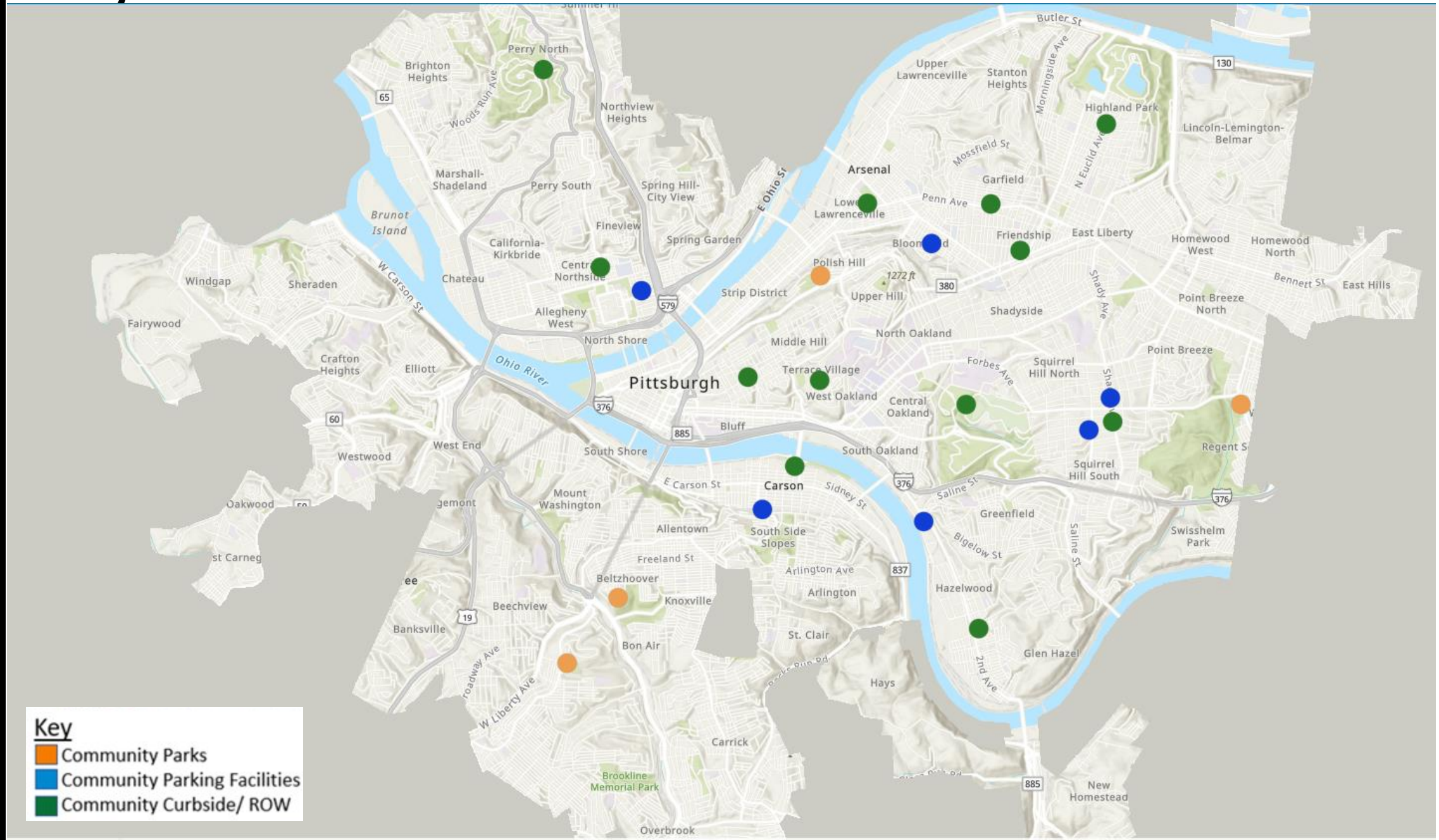
City Public Charging Goals

Table 1: 2025 Capacity Targets and Benchmarks

	Baseline in 2020	New Public Level 2 Charging Plugs	New DC Fast Charging Plugs
City Targets	35	180	20
Citywide Planning Benchmarks	280	1,860	515

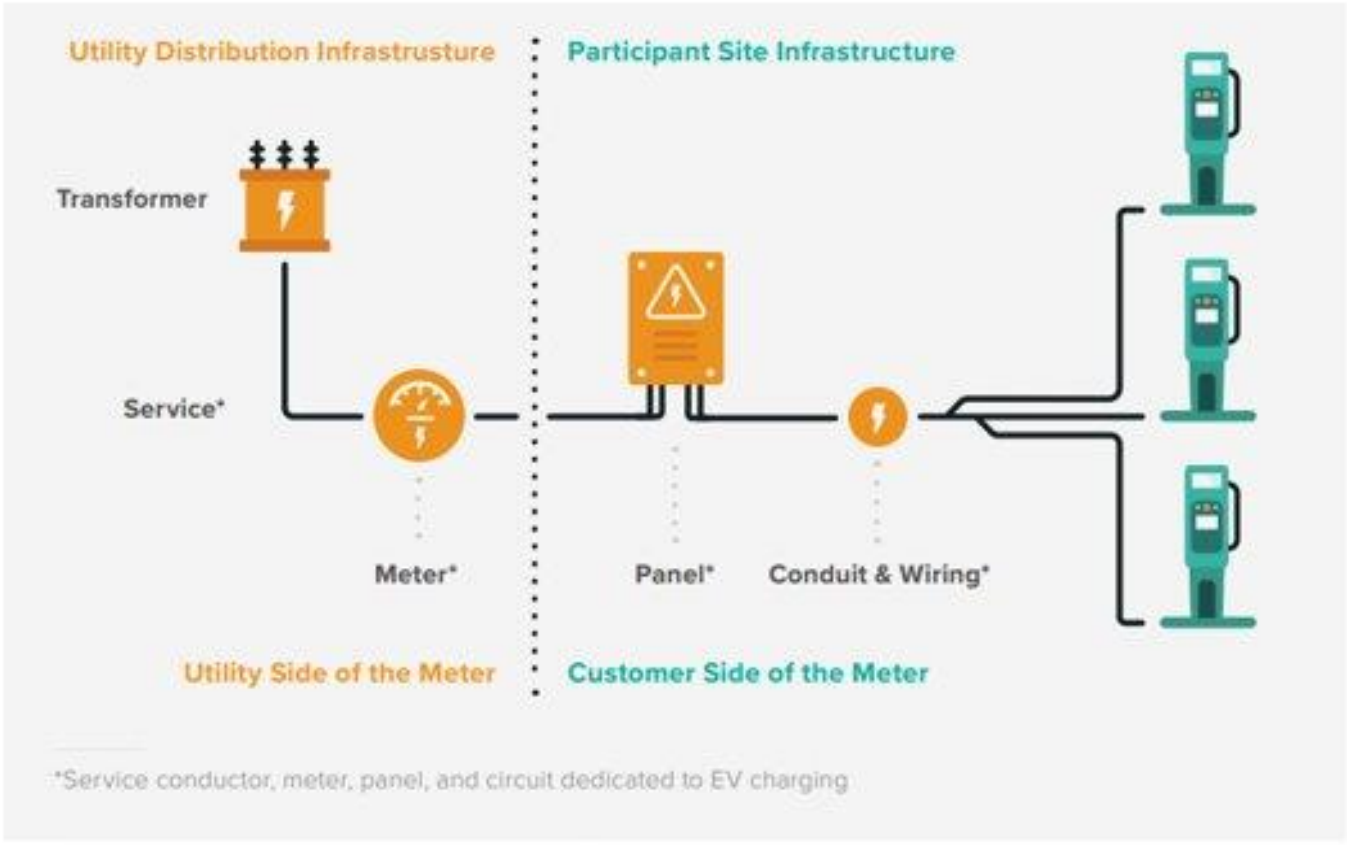
CFI GRANT ENABLES	Number of Sites	Number of Ports
Phase 1: Community Parks	4	16
Community Parking Facilities	5	36
Phase 2: Community Curbside	12	48
TOTAL	**21**	**100**

City CFI Grant Locations



City CFI Grant

Leveraging our close working relationship with DLC and their Make Ready Program.



Covered by DLC Program **Covered by Customer**

EV SERVICE CONNECTION

DLC completes distribution service upgrades as needed. In some cases, customers may be required to contribute cost share to the upgrade. Your DLC EV Specialist will help you identify these costs upfront.

EV MAKE-READY

DLC will design, build, maintain, and cover costs for the EV make-ready infrastructure from your meter to your charging station equipment such as the panel, conduit, and wiring.

CHARGING EQUIPMENT

Customer procures, installs, maintains, and operates the charging station equipment. Your DLC EV Specialist will help you identify if your project is eligible for state and DLC rebates on your charging equipment.

Qualified Charging Products

L2 Dual Port Pedestal Mount Chargers

ChargePoint 6000 Series

Specifications

Feature	Description
Connectivity	4G LTE with GSM as backup, Wi-Fi LAN
Interface	8" (inch) interactive display with full color, UV protection, gesture touch controls and multi-language support
Authentication	RFID, tap to charge (NFC), remote via mobile app or in vehicle
Payment	EMV contactless credit/debit reader -CHIP models also have an EMV chip reader
Connector	J1772, optional with Omni Port (J1772 and NACS)
ISO 15118 standard	Supported
Network communication protocol	OCPP 2.0.1
Certifications	CTEP/NTEP, UL Listed, Energy STAR Certified
Status indicators	Multi-color status LED

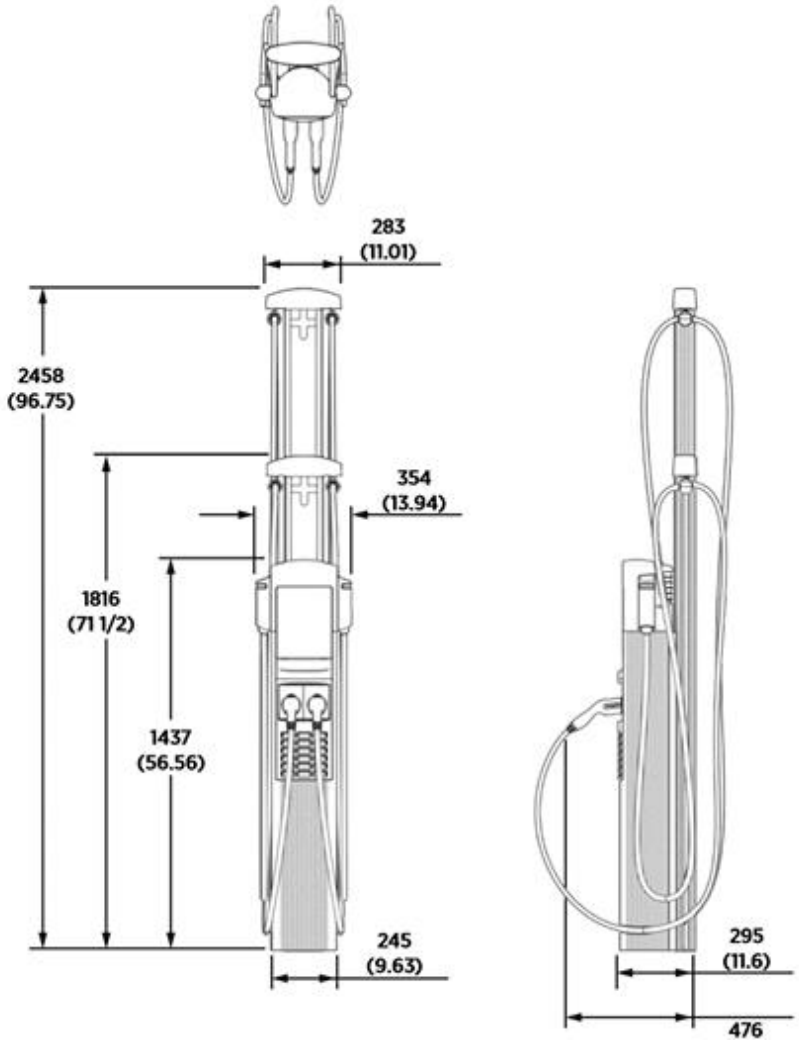
Configuration options

Feature	Description
Power	50A (up to 12kW), 80A (up to 19.2kW)
Number of ports	Single, dual
Mounting options	Pedestal, wall
Cable length	18', 23'
FHWA	Buy American compliant options available

* Energy Star Certified only applies to dual port versions of the CP6000 hardware.

Pedestal Mount with CMK

NOTE:
Images are not to scale. Measurements appear in metric units (mm) followed by imperial equivalents (inches).



Use the following guidance to design the civil and mechanical aspects of the site.

Each charging station can be installed attached to a wall or on a concrete pedestal with a Cable Management Kit (CMK). The pedestal can be mounted on a newly poured pad or an existing concrete surface.

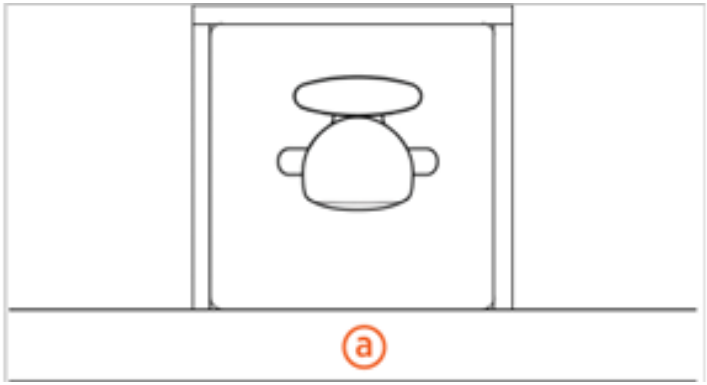
Component Dimensions and Weights

Each CP6000 charging station can be mounted on a pedestal or on a wall with a Cable Management Kit (CMK). The station is a vertical enclosure with the weights and dimensions shown as follows.

Station Configuration	Approximate Weight
Single port, wall	62 kg (136 lb)
Dual port, wall	68 kg (150 lb)
Single port, pedestal	71 kg (155 lb)
Dual port, pedestal	76 kg (168 lb)

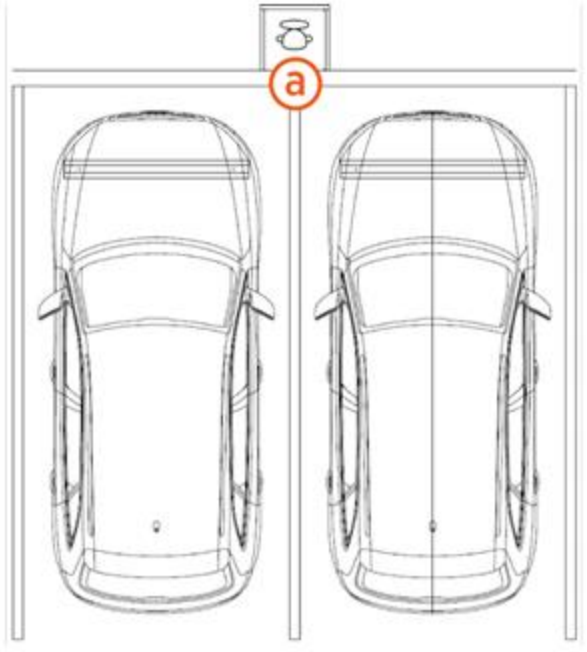
Pedestal Base Designs

- Behind a curb (a) in a planter or berm
  1350 mm (4 ft 5 in) on each side
  Area: 0.37 m^2 (4 ft^2)
  Volume: 0.23 m^3 (8 ft^3)

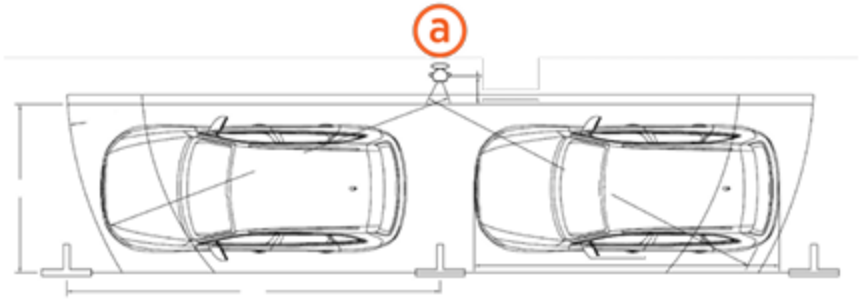


Pedestal Configurations for Different Parking Arrangements

- Place the station in a planter or berm between spaces with wheel stops 900 mm (3 ft) from the front of each stall or the curb **(a)**.



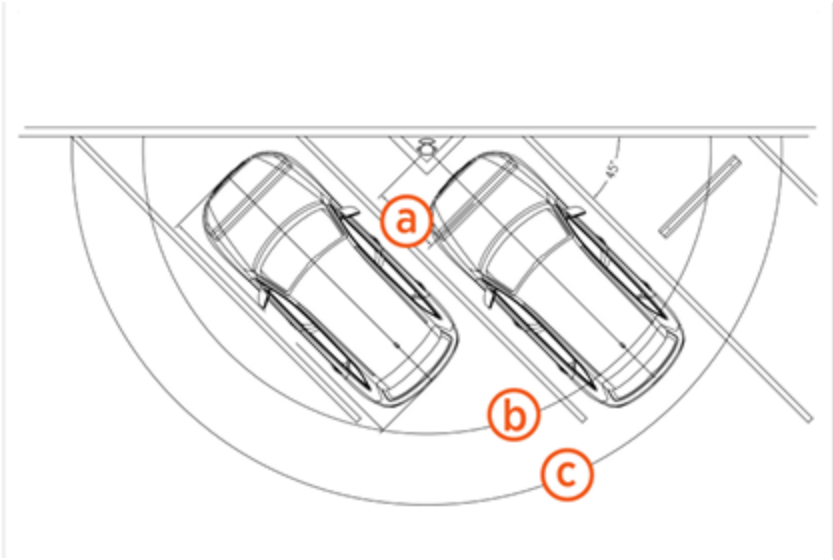
- Place a dual holster station centered between two parallel parking spaces, each 6 m (20 ft) long. Place the station **(a)** 450 mm (18 in) from the curb. A 7 m (23 ft) charging cable is recommended.



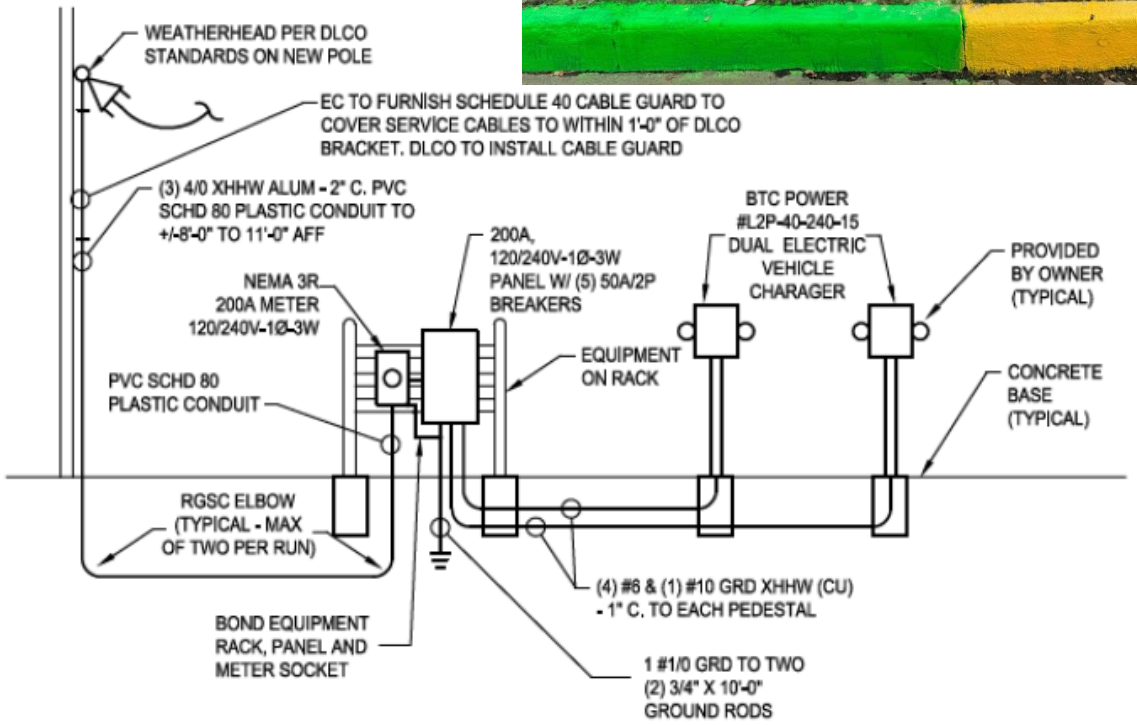
- When placing a dual holster station centered on the right space, the charging cables can reach two vehicles. Place a wheel stop 1220 mm (4 ft) **(a)** from the center of the charging station.

  Note the following details for this arrangement:

  - The arc shows the usable reach of the two charging cable lengths available: 5.5 m (18 ft) **(b)** and 7 m (23 ft) **(c)**.
  - The 7 m (23 ft) cord option is recommended for this configuration.
  - The base of the charging station can be flush with the parking spaces or at curb level.
  - Ensure to install 'EV Charging Station' signs on both spaces.

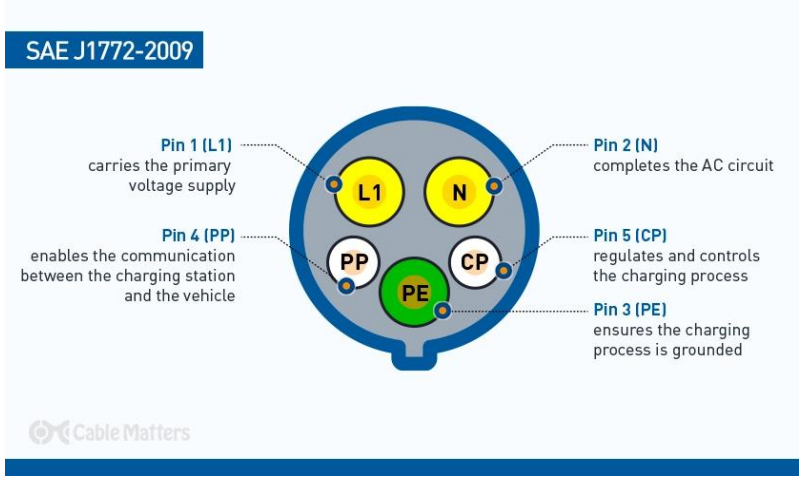


Backend Electrical Infrastructure



Overall Guidelines:

- Provide a Level 2 charging capacity (40 A to 80 A) or greater
- Comply with the relevant regional or local standard for electrical connectors, such as SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler or IEC 62196 of the International Electrotechnical Commission for cities outside the U.S
- Community engagement is required before deployment of chargers



J1772

NACS
(typically for Tesla)

Charging Station Placement

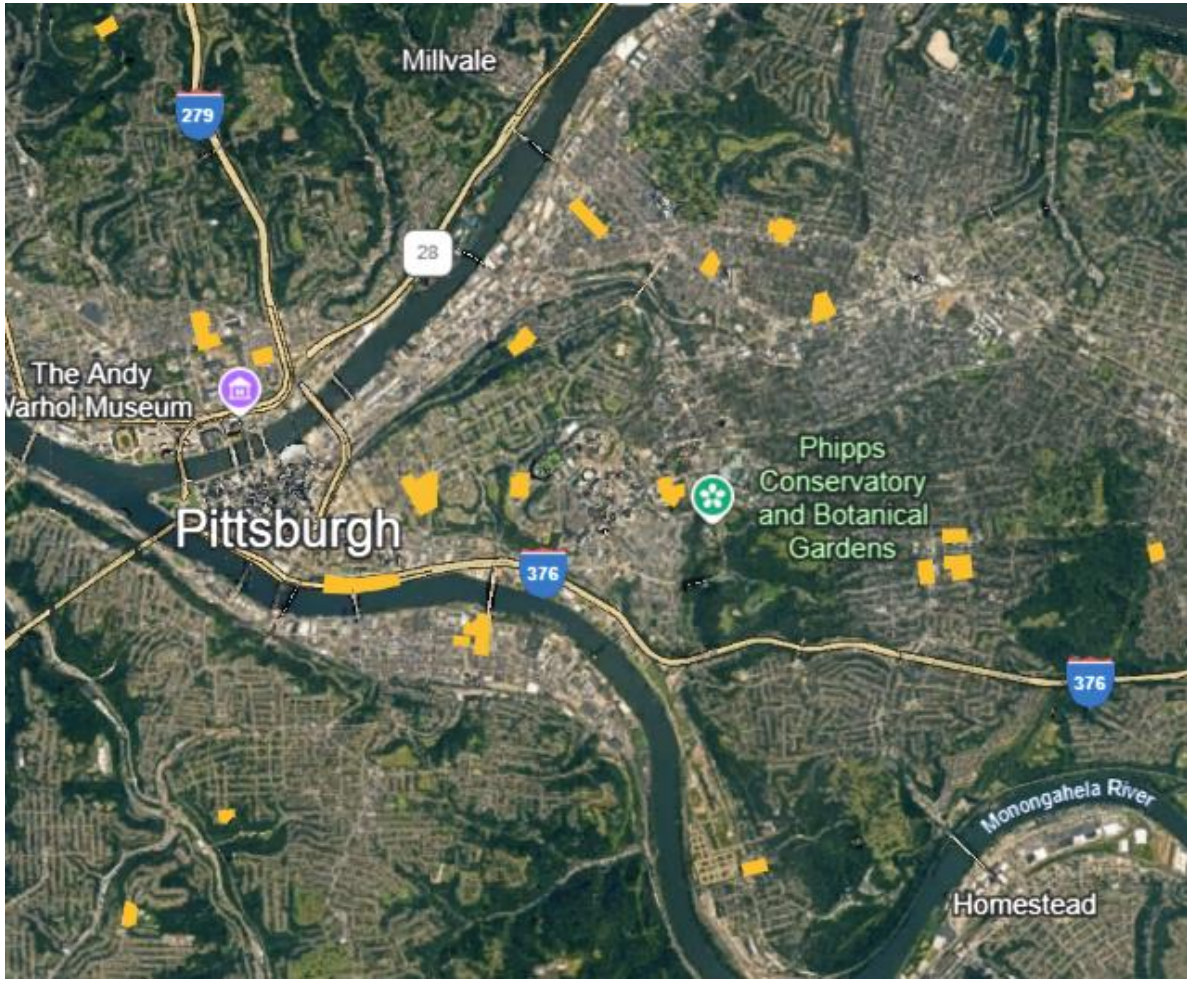
Layout Considerations:

- To help minimize costs, choose station locations that are as close as possible to the available electrical infrastructure
- Consider a layout to minimize electrical infrastructure costs to all proposed EV parking spaces
- Avoid or minimize trenching requirements
- Consider how easily drivers can find the stations they need to access
- Comply with regional accessibility laws, regulations, and ordinances. The charging station must not block ramps or pathways, and the height of the interactive display cannot exceed the maximum height as dictated by the local laws
- Ensure any slopes, walls, or fencing at the site do not trap water around the charging station installation site.
- Use dual-port pedestal mount stations where possible in open areas for adjacent parking or adjoining parking spaces
- For pedestal installations, the conduit stub-up must be a minimum of 230 mm (9 in) from any obstructions to the rear. This includes other charging stations

Location Guidelines:

General

- EV Chargers cannot interfere with any accommodations for people with disabilities, vaults, fire hydrants, or access to utilities.
- Permissible in legal parking areas, cannot be installed in loading zones or replace accessible parking.
- When installing 2 dual port chargers – ¼ charger spots must be ADA accessible.
- ADA – vehicle parking space at least 11x20', adjoining access aisle at least 5' wide, level ground, unobstructed side reach.
- Signage and pavement markings for EV-only parking, bollards to protect charging hardware where needed
- May only be installed in non-residential zoning.

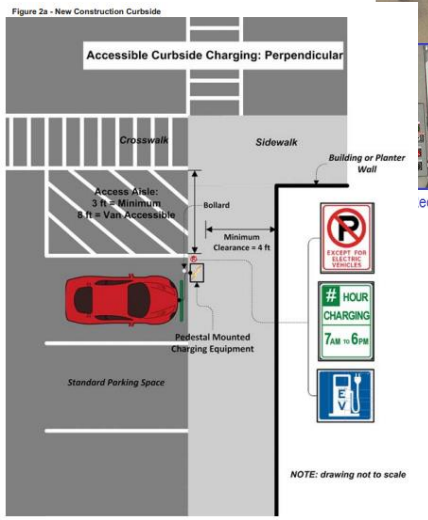


CFI Grant EV Charger Locations

Location Guidelines:

Sidewalk

- Sidewalk must be at least 6 feet wide to allow for ADA access
- Pad mount for charging station must be no wider than 2 feet to allow for ADA access
- Pad mount for charging station must be flush with back of curb



[California – EV Charger Accessibility Planning for Parking Lots]

General Information Signs, Alternative Fuels Corridors Signs (Chapter 2H, Section 2H

D9-17a (example)

General Service Signs (Chapter 2I)

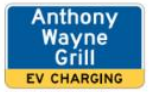
D9-11bp

D9-11b

Specific Service Signs (Chapter 2J)

OR

Business Identification Panel Arrangements on Specific Service Signs



D9-17a (example)

All signage should be **green and white** to ensure consistency with industry standards and clearly differentiate from the blue markings used for accessible parking. In addition, selecting **signage with EV imagery** will help customers who are not fluent in written English identify designated EV charging stalls. The example signage included in this document is representative of best practices in EV sign design but is not prescriptive.

[From NV Energy's EV Charging Site Signage & Branding Guidance (Nevada)]

Figure 6. Adaption of EV signage to reflect availability of specific alternating current (AC) charge levels (1 and/or 2) or direct current (DC) fast charging

[U.S. Federal Highway Administration signage] + [U.S. Department of Energy]

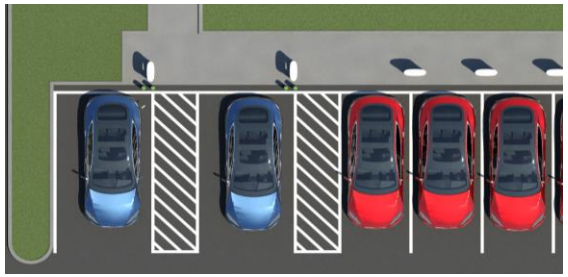
Salt Lake City example

Example **Signage** and **Other Indicators** For EV Charger-Only Spots

Rhode Island

Chargepoint

Crescent Shopping Center – Limerick, Ireland



Rendering – Solera Group

Example **Curb Paint**, and **Other Indicators** For EV Charger-Only Spots

Examples - EV Chargers in **Parks + General Surface Lots**

Yosemite National Park

Zion Canyon

Yellowstone National Park

Camp Round Meadow

Examples - EV Chargers in **the Right of Way**

[Right-of-way charging case study article]

Access-board.gov render example
(ADA charging site)

Berkeley, California

CASE STUDY

Los Angeles, California

For three years, the City of Los Angeles Bureau of Street Lighting has been installing networked low Level 2 charging stations on street lights that were upgraded to LEDs, thus providing excess electrical capacity. There are now more than 280 street light charging stations installed. The chargers are equally distributed in all 15 council districts.

Each street light has the capacity for a single charging station, and each charging station can reach a single parking spot. In the past year, an ordinance was passed that allows Los Angeles' parking enforcement officers to ticket gas vehicles or EVs that are not plugged in when they park at the charging spots.

[Design Recommendations for Accessible Electric Vehicle Charging Stations] - Access Board

Mississauga, Canada

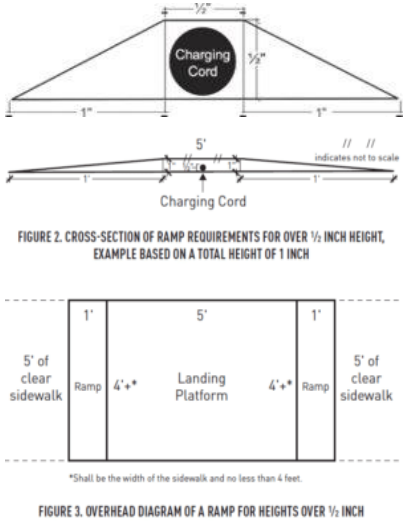


FIGURE 2. CROSS-SECTION OF RAMP REQUIREMENTS FOR OVER ½ INCH HEIGHT, EXAMPLE BASED ON A TOTAL HEIGHT OF 1 INCH

FIGURE 3. OVERHEAD DIAGRAM OF A RAMP FOR HEIGHTS OVER ½ INCH

Baltimore, Maryland

New York City, New York

Example Render – Curbside Chargepoint CT4021B
EV Charger on 480 Oak Hill Dr. With Signage + Indicator Paint

Case Studies - Los Angeles

- Electrifying vehicle fleets
- C40 City Case Studies and Business Models

a) Introduction

Los Angeles, California, stands out among US cities in deploying a variety of policies aimed at reversing the effects of urban sprawl and promoting sustainable urban mobility. Air pollution has been a major concern for decades in Los Angeles, the second-largest city in the United States. Selected areas in Los Angeles continue to struggle in terms of air quality, but political leadership and public attitudes about the environment have shaped policy in Los Angeles to have some of the most progressive air quality regulations in the United States.

At present, there are over 125,000 EVs on Los Angeles' streets, and over 20,000 public charging points throughout the city. These impressive figures have been the result of the city's comprehensive framework for EV policy and funding. The policy mix includes financial incentives, such as rebates, tax credits, and grants, available to EV buyers and businesses that install charging infrastructure. The city has also deployed EVCI directly through the Los Angeles Department of Water and Power (LADWP) and the Bureau of Street Lighting (LA Lights). Additionally, the city has streamlined the permitting process for charging station installations.

b) Policy Framework

EV volume target: Los Angeles' Green New Deal, a comprehensive urban sustainability plan adopted in 2019, proposes an increasing share of EVs in the city's total vehicle fleet, from 25% in 2025, to 80% by 2035, and to 100% by 2050.

EV demand generation: The California Air Resources Board (CARB) administers the Clean Vehicle Rebate Program (CVRP), which provides rebates for the purchase or lease of new electric vehicles by individuals, businesses, and government entities. Currently, the rebates for EVs range from US$2,000 to US$4,500 per vehicle. The CVRP has supported the commercialization of over 300,000 EVs since the program's inception in 2010.

The Inflation Reduction Act (IRA), passed by the U.S. Congress in 2022, features new incentives adding to the range of those already available to businesses and individuals in Los Angeles. Consumers will be able to receive up to $7,500 for every new electric vehicle purchased.

Zero-emission Area: A zero-emission area is being assessed for feasibility in Los Angeles, which would make it one of the first cities in the US to implement such a zone by 2030. In the neighboring city of Santa Monica, a pilot program for a voluntary zero-emission delivery zone is already underway, serving as a use case for the wider metropolitan area.

c) Los Angeles' EVCI funding and programs

Los Angeles has a comprehensive financial architecture in place to promote EV charging, which includes both federal and state funding, supporting its goal to reach 25,000 charging points by 2025 and 28,000 by 2028. The State of California provides significant resources to support EVCI development through various programs offered by California Air Resources Board (CARB) and the California Energy Commission (CEC), accessible by Los Angeles and other California cities on a competitive basis.

Combining state and city resources, Los Angeles has two main set-ups to promote EV charging:

Direct City Initiatives

- Firstly, there are programs with direct city investment in assets that are operated by private players. One such program is BlueLA, an EV car-sharing program that involved the deployment of 200 charging points, to be later expanded to 500 chargers by private company Blink.
- Finding room to install charging stations in the streetscape is a major challenge in large cities, not to mention the need to supply power to this new infrastructure. To address this, the Los Angeles Bureau of Public Lighting launched its curbside charging program in 2017, taking advantage of existing streetlight poles to wire charging units that are attached to the pole. This creative solution not only takes advantage of the existing infrastructure but also provides convenient and widespread access to charging stations, thanks to the extensive public lighting network.

This approach greatly expedited the deployment of Level 2 chargers along with savings in its associated implementation costs. This was possible by utilizing existing conduit and circuitry from streetlights that minimized the need for additional work and materials. Purpose-built chargers were developed by Quebec-based manufacturer and EMSP Flo, in alignment with the city's prerequisites of outdoor resistance, durability, and resistance to vandalism.

d) Charging developments

In addition, other incentive programs are operated directly by the State. The Southern California Incentive Program (SCIP), part of California Electric Vehicle Infrastructure Project (CALeVIP), provides rebates for DC fast charging (DCFC) installations ranging between US$40,000 to US$80,000 per charger, depending on project characteristics, with a focus on commercial and multi-dwelling locations.

Various private companies operating in the charging space have emerged with the support of public funding. These companies, including Blink, Chargepoint, EVCS, EVgo, Flo, Shell Recharge, and Tesla, leverage both their own funding and public funds, collaborate with real estate suppliers to expand their locations, and strive to attract EV users with appealing service offerings. Additionally, the city has established the Los Angeles Cleantech Incubator (LACI), which has supported startups operating in the charging space, with innovative value propositions ranging from fintech for charging services, charging service software solutions, EVSE maintenance services, fleet charging solutions, to storage systems for charging installations.

CPO	LA Bureau of Public Lighting (BPL): This entity provided the lighting poles, grid connections, and transformers. BPL procured the charging equipment from Flo and was responsible for the installation. The program funding was provided by the State of California's Energy Commission and CARB's Clean Transportation Program.
EMSP	Flo collects payment for the city and takes a small management fee. The service collects enough revenue to cover its operating budget. The user fee is US$2.00 per hour for the first 4 hours, increasing to US$4.00 per hour for longer stays.

	Business Model 1 Curbsite Streetlight Charging		Business Model 2 ChargeUP LA	
Funding & Incentive Mechanisms				
Funding	Public sector	California Energy Commission California Air Resources Board	Public sector	California Energy Commission California Air Resources Board
Rebate		N/A	Utility	Los Angeles Department of Water and Power (LADWP)
Incentives		N/A		N/A
CPO Functions				
Real Estate	Public sector	LA Bureau of Public Lighting (LABPL)	Private sector	Semi-public location owners
EPC	Public sector	LABPL	Private sector	Charging operator Electric works installer
EVSE supply	Public sector	EVSE (FLO) Procurement by LABPL	Private sector	Charging operator
O&M	Public sector	LABPL		
Power supply	Utility	LADWP	Utility	LADWP
EMSP Functions				
Customer service Fare collection	Private sector	Charging operator (FLO)	Private sector	Charging operator
Inter-operability available		Yes, selected charging operators		Yes, selected charging operators

Public sector Private sector Utility

Figure 9. Los Angeles' Business Models

Case Studies - Boston

- Equity Guide to EV Chargers in Massachusetts
- Boston EV readiness policies (2020)
- Incentives and grants
  - MassEVIP, Eversource, and more offer up to 100% cost coverage
- Zero Emission Vehicle Program
- Ranked 1st in U.S. for EV charger density

CURRENT POLICIES, PROGRAMS, AND INITIATIVES

The chart below details the ways in which the Commonwealth, City of Boston, and electric utility Eversource are currently participating in and supporting EV adoption.

OUTREACH	STATE	CITY	UTILITY	NOT OCCURRING
OUTREACH EVENTS	•		•	
PUBLIC CHARGER PROMOTION	•	•	•	
INFORMATIONAL MATERIALS & HOW-TO GUIDES	•	•	•	
DEALERSHIP ENGAGEMENT PROGRAM				•*
EXPANDING ACCESS TO CHARGING INFRASTRUCTURE				
EV READY BUILDING CODE	•	•		
RIGHT TO CHARGE - CONDO	•	•		
RIGHT TO CHARGE - APARTMENT				•
PUBLIC CHARGING INFRASTRUCTURE	•	•	•	
CURBSIDE CHARGING STRATEGY				•
EXPEDITED PERMITTING PROCESS				•
MONETARY				
EV PURCHASE INCENTIVE*	•			
COMMUTER TAX BENEFIT				•
PARKING BENEFIT				•
FLEET PURCHASING BENEFIT	•			
FEE REDUCTION, TESTING EXEMPTION, + NO ANNUAL EV FEE	•			
CHARGER PURCHASING INCENTIVE	•		•	
HOV LANE ACCESS/TOLL DISCOUNT PROGRAM				•
INCREASED EVSE INCENTIVE FOR LOW-INCOME COMMUNITIES			•	
MANUFACTURING INCENTIVES				•
PREFERENTIAL EV CHARGING RATES				•
CASH FOR CLUNKERS EV PROGRAM				•
IDLE REDUCTION WEIGHT EXEMPTION				•
OTHER EFFORTS				
ZEV PROGRAM AND STRATEGY	•	•	•	
ELECTRIC CAR SHARING PROGRAM				•
ELECTRIC TNC PROGRAM				•
LOW CARBON FUEL POLICY				•
OEM SALES REQUIREMENTS	•			

*EV purchase incentives are also occurring at the federal level, which is not captured in this table.

15 BOSTON TRANSPORTATION DEPARTMENT

Expanded Funding

Today's funding announcement is a critical step toward addressing these gaps and significantly expanding access to EV charging statewide consistent with the findings of the EVICC Assessment, with a particular focus on improving air quality in environmental justice communities. This funding will be made available both through the scaling up of existing successful programs and the creation of new grant opportunities.

The grant funding will support approximately:

- $16 million in grant funding to support the purchase and installation of EV charging infrastructure across workplaces, fleets, multi-unit dwellings, educational campuses, and public access locations.
- $30 million in grant funding for medium- and heavy-duty charging at strategically located hubs, chargers along secondary corridors to support light- and medium-duty EVs, and other opportunities.

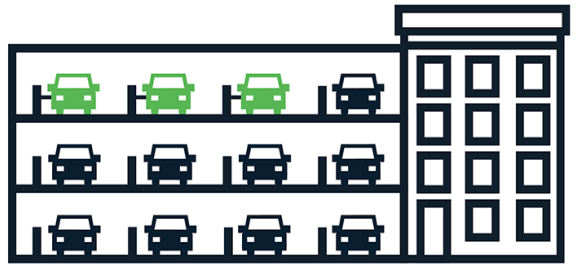
Together, the strategic actions included in the EVICC Assessment and today's funding announcement, will enhance affordability by further leveraging existing funding sources, accelerate charger deployment in the areas of greatest need, and give Massachusetts drivers confidence in making the switch to EVs.

How were the sites for the City-owned and operated curbside locations selected?

The City of Boston aims to have all residents within a 5-minute walk from an electric vehicle charger by 2030.

The installation of electric vehicle charging stations supports the following specific goals in addition to the broader agenda set forth by the City's electric vehicle program, Recharge Boston, and the 2019 Climate Action Plan Update:

- *Ensure **equitable access to EV charging benefits** within Boston's environmental justice communities (including cleaner air, lower long-term vehicle costs.)*
- *Evaluate the **appropriate balance of LVII and LVIII** charging infrastructure needed to meet Boston's charging demand, given existing infrastructure, available space, and funding opportunities and constraints.*
- *Demonstrate near-term action through the construction of demonstration projects that are **operational in multiple neighborhoods before the end of 2024**.*
- *Position Boston for **scaled deployment** of a publicly-accessible EV charging network through the deployment of these near-term demonstration projects and the preparation of additional shovel-ready future project sites eligible for federal funding.*
- ***Understand public attitudes** towards dedicating space for EVs in public space, acceptable levels of convenience, and consumer preferences between different EV charging ownership models.*



EV CHARGING STATIONS EV READY CHARGING STATIONS

*Large project review developments must equip **25%** of their total parking spaces to be EVSE (electric vehicle supply equipment) installed and the remaining **75%** of the total spaces to be EV (electric vehicle) ready.*

Case Studies - Barcelona

- EV master plan in Barcelona
- C40 City Case Studies and Business Models
- MetroCharge – uses energy captured from subway train breaks
- Testing a mobile EV charging station (ZiGGY)

Advantages of having an electric car in Barcelona

- 75% rebate on the mechanically powered vehicle tax.
- Exemption from payment of registration tax (no registration fee).
- Free to use VAO lanes.
- 75% discount on tolls with a prior proof of cancellation for a vehicle older than ten years, and that the price of a "light vehicle" does not exceed 40,000 euros (excluding VAT). More info at ecoviaT website.
- Parking with a 50% discount on Blue area places, keeping to the maximum parking times and regulated hours. Except for residents' parking spaces and reserved spaces (people with reduced mobility, administration, bus, police, etc.).

	Business Model Endolla
Funding & Incentive Mechanisms	
Funding	City of Barcelona EU Funds
Rebate	N/A
Incentives	N/A
CPO Functions	
Real Estate	City of Barcelona: street space Barcelona Municipal Services (B:SM):city-managed parking
EPC EVSE supply O&M	B:SM Charging operator (with a city concession when on public areas) / Endolla
Power supply	Endesa
EMSP Functions	
Customer service Fare collection	B:SM Charging operator
Inter-operability available	Yes

Public sector Private sector Utility

Figure 6. Barcelona's Business Model

[12]Interview with Redha Zetchi Fouchane, Sustainable Mobility Director, Barcelona Serveis Municipals (Feb 13th,2023).

a) Introduction

Barcelona has set ambitious goals towards lowering transport emissions, reducing transport's climate impact, and catalyzing EV adoption. Aware of its urban context, being a compact, and dense city government has promoted public charging not only as a convenience, but also as a necessity to reach citywide EV adoption.

b) Policy Framework

Barcelona is moving towards electromobility because of a strong and consistent effort from the national government and national policies aimed to reduce transport emissions, with instruments such as MOVELE project (2011-2012), LIVE Consortium (2011), MOVES I (2019), MOVES II (2020), and MOVES (2021).

EV volume target: The City Council of Barcelona developed an Electromobility Strategy (2018-2024), aimed to reducing local air pollution, reducing emissions of global greenhouse gasses (GHG), decreasing noise pollution, and facilitating energy self-sufficiency and diversifying energy resources[10]. At present, there are 711 charging points (7.1 points/km2) in Barcelona and the city's goal by the end of 2023 is to have 1,000 public charging points[11]. As of 2024, the EV charging infrastructure deployment will be carried out based on EV demand.

EV demand generation: Municipal Services of Barcelona (B:SM, city-owned company) is responsible for building and providing O&M for public charging points through the Endolla brand, which has carried out the deployment of charging infrastructure in the city. Endolla's purpose is to promote the adoption of electric vehicles through the electrical infrastructure, placing the user at the center of decisions, using the "Business to Society" model, as stated by Barcelona public officials. The charging infrastructure deployment strategy focuses on 4 main elements: 1) catalysts in the adoption of electric vehicles; 2) innovation in public-private collaboration; 3) renewable energy and smart energy management; and 4) communication.

[10]Barcelona City Council. Estratègia de mobilitat elèctrica: mesura de govern. [Online]: https://bcnroc.ajuntament.barcelona.cat/jspui/handle/11703/109244
[11]Endolla Barcelona. Endolla Barcelona closes out 2022 with 60% more recharges and over 16,000 users. [Online]: https://www.endolla.barcelona/en/news/endolla-service/endolla-barcelona-closes-out-2022-60-more-recharges-and-over-16000-users

Thank You!

WE APPRECIATE YOUR TIME

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