5 BEST PRACTICES FOR DEPLOYING EV FLEET CHARGING INFRASTRUCTURE

Expert guidance from Camber's fleet depot design specialists

Transitioning a fleet to electric vehicles is one of the most impactful sustainability decisions an organization can make — but the long-term success of any EV program depends heavily on how well the charging infrastructure is designed and deployed. Drawing on Camber's hands-on experience delivering and maintaining fleet charging depots across transit, school, commercial, and public sectors, this guide outlines the five most critical best practices every fleet operator should follow before, during, and after installation.

Best Practice 1: Match Charger Power to Your Vehicles & Schedule

The most fundamental design decision in any EV depot is matching charger power output to each vehicle's battery size, maximum charge rate, and the available dwell time at the depot. Oversizing chargers adds unnecessary capital cost; undersizing them risks vehicles failing to complete a full charge before returning to service.

Before specifying any hardware, answer these questions for every vehicle type in the fleet:

- How many hours per day can each vehicle remain plugged in?
- What is the vehicle's maximum DC charge rate (kW) and battery capacity (kWh)?
- Does the vehicle's charge curve taper significantly before reaching full — and at what state of charge?
- Can charging be spread across off-peak utility hours to reduce demand charges?

For overnight depot charging — the most common pattern for transit, school, and commercial fleets — lower-power chargers (60–180 kW) are often entirely sufficient and significantly more cost-effective than high-power alternatives. For opportunity charging during short dwell windows (under 3 hours), higher-power options (240–400 kW) ensure vehicles return to service with adequate charge. The key is calculating required energy delivery per session, not defaulting to the highest available power level.

RULE OF THUMB

Divide the vehicle's usable battery capacity (kWh) by the available charge window (hours) to determine the minimum kW needed per port. Add a 20% buffer to account for charge curve tapering near full charge.

Best Practice 2: Plan Your Connector-to-Vehicle Ratio Strategically

A 1:1 ratio of charger connectors to vehicles is the standard approach for depots where the entire fleet charges simultaneously — such as overnight depot charging where all vehicles return and plug in at the same time. However, fleets with staggered shifts or independent charging windows can often achieve full operational coverage with fewer connectors, meaningfully reducing capital costs.

Use these guidelines to determine the right ratio for your operation:

- Install 1:1 when vehicles share a fixed overnight charge window and arrive simultaneously
- Consider a reduced ratio when vehicles charge on rotating, independent schedules
- For commuter or school bus fleets with two shifts per day, model both the midday and overnight windows separately
- Always add 10–15% connector redundancy to maintain operations during charger maintenance or failure
- For tandem (nose-to-tail) parking layouts, prioritize power delivery to front-lane chargers via software controls or unequal power sharing configurations — vehicles in the back cannot move until the front vehicle does

Camber's experience shows that most customers settle on a 1:1 ratio for operational simplicity and peace of mind, but running a charge schedule analysis before finalizing the design can identify opportunities to reduce the port count — and the associated infrastructure cost — without any operational impact.

Best Practice 3: Select the Right Connector Type & Cable Configuration

Connector and cable selection directly determines the maximum achievable charge rate at the vehicle. A mismatch between the charger's cable amperage and the vehicle's charge port rating will cap performance regardless of how powerful the cabinet behind it is. Getting this right upfront avoids costly cable replacements later.

Match cable amperage to your target charge rate based on the vehicle's battery voltage:

- 250A cable › up to 200 kW on an 800V vehicle
- 375A cable › up to 300 kW on an 800V vehicle
- 500A cable or pantograph connector › up to 400–500 kW

For connector type, all recent EVs support plug-in connectors using either the CCS1 or NACS DC standard. U.S. OEMs plan to transition new vehicles to NACS starting in 2026, so mixed fleets may require adapters or dual-head cables. Some new Class 8 vehicles are beginning to support the MCS standard, though these remain rare on the road today.

Heavy-duty transit buses may benefit from pantograph charging, which eliminates manual cable handling entirely and supports up to 500A. Pantograph systems require precise vehicle parking alignment beneath the overhead assembly, so parking layout and curb positioning are critical design constraints when this option is selected. Camber has validated pantograph systems from Schunk with Power Electronics and ABB chargers.

CABLE LENGTH MATTERS TOO

Standard cables are 18 feet; 25-foot cables are available for long vehicles with side-mounted charge ports or overhead installations. Longer cables add weight and increase wear risk — always pair them with an appropriate cable management system (articulating arm, nylon cord reel, or spring assembly) to extend cable life and reduce operator strain.

Best Practice 4: Design the Physical Layout with Future Scale in Mind

Charging infrastructure must coexist with vehicle traffic flows, parking lanes, building access, and utility entry points. A poorly planned physical layout creates safety hazards, accelerates cable damage, and — critically — can prevent the site from expanding capacity as the fleet grows.

Physical layout best practices:

- Use split systems (separate power cabinet + dispenser) to position heavy power cabinets away from traffic lanes, freeing up valuable parking area real estate for dispensers with smaller footprints
- Verify cable reach from each charger position to the charge port location on every vehicle model in the fleet — charge port location varies significantly across makes and models
- For overhead-mounted dispensers, integrate spring-loaded or motorized cable reels to keep cables clear of vehicle travel lanes when not in use
- Confirm all required equipment clearances per manufacturer specifications: door swing, cooling air intake, and heat exhaust — insufficient clearance affects both access and cooling performance
- For pad-mounted standalones above 60 kW, review structural carrying capacity of the mounting surface if the installation is on an elevated platform or interior floor
- Where space is constrained, evaluate the NB Station or large multi-dispenser configurations — these can deliver 8 or more charge ports with a significantly smaller combined footprint than individual standalone units

The most common and costly physical layout mistake is designing only for today's fleet size. Every depot design should include a documented expansion pathway: where additional dispensers would connect, where additional power cabinets could be sited, and whether the utility service can support additional load. Building conduit runs and electrical capacity for future ports — even if the dispensers are not yet installed — is almost always cheaper than retrofitting later.

Best Practice 5: Configure Power Sharing & Access Controls from Day One

How power is distributed across multiple dispensers, and how charging sessions are authorized, has a direct impact on whether vehicles are charged when needed and whether the depot operates efficiently. Misconfigured power sharing or access controls are among the most common causes of operational issues at newly commissioned depots.

Power sharing — choose the right model for your fleet profile:

- Equal sharing divides available cabinet power evenly across all active sessions, regardless of vehicle demand. It is predictable and simple — best for homogeneous fleets with similar charge curves — but can waste capacity if one vehicle is nearly full and pulling very little power
- Unequal sharing dynamically allocates power based on what each vehicle is actually requesting, shifting capacity to the vehicle with the greatest demand. It is ideal for mixed fleets or high-utilization depots where maximizing throughput matters
- Sequential charging routes full cabinet power to one dispenser at a time, transitioning to the next when a configurable state of charge threshold is reached — useful for low-utilization depots, but requires careful vehicle SOC behavior analysis to avoid session lock-out scenarios

Access controls — define the authorization model before hardware is ordered:

- Private depots typically use Freevend or ISO 15118 Autocharge for a seamless plug-and-charge experience with no driver action required
- Semi-public and shared depots should require RFID card authorization or mobile app initiation to prevent unauthorized use
- Public charging deployments require payment capability — most chargers support integrated credit card readers (including NFC/tap), and CMS platforms can handle pricing, payment, and receipt delivery
- For California deployments, chargers must be CTEP certified and include a display and credit card reader to meet consumer protection requirements; an enhanced meter is required when quoting Power Electronics hardware in this configuration

COMPLIANCE CHECKPOINT

Most incentive-funded projects require chargers to appear on the EPRI Approved Product List (epri.com/vpl). Federal funding programs — including many NEVI and IRA-backed grants — require Buy America Build America (BABA) compliance, which mandates at least 55% U.S. component content. Verify compliance requirements before finalizing hardware selection to avoid disqualification from incentive programs.

SITE DESIGN QUICK-REFERENCE CHECKLIST	
Map charge windows	Hours available per vehicle per day, by shift or route schedule
Confirm vehicle specs	Battery capacity (kWh), max DC charge rate (kW), connector type
Determine connector ratio	1:1 or reduced ratio based on charge schedule overlap analysis
Match cable amperage	250A / 375A / 500A aligned to vehicle voltage and target kW
Specify connector type	CCS1, NACS, pantograph — including future vehicle models
Review layout	Clearances, cable reach to charge port, traffic flow, expansion space
Determine power sharing	Equal, unequal, or sequential based on fleet profile
Define access controls	Freevend, Autocharge, RFID, mobile app, or payment terminal
Verify compliance	EPRI list, CTEP (CA), BABA (federal funding), UL/CSA certification
Design for scale	Future dispenser connections, conduit runs, utility capacity

READY TO DESIGN YOUR EV CHARGING DEPOT?

Camber's solutions engineers work alongside your team to assess site requirements, model charge scenarios, and recommend the right hardware — so your fleet transition goes smoothly from day one.

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