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Carolinas Parking & Mobility Association

Electric Vehicle (“EV”) Sales Outlook EV Charging Stations (“EVCS”) New Build Decisions ADA Compliance Issues

CAROLINAS PARKING & MOBILITY ASSOCIATION
Quarterly Education Webinar – April 4, 2023





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- 01** **EV Sales Trends and Outlook**
- 02** **EV Charging Stations**
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- 04** **ADA Compliance Issues**

Recent Auto Sales and Trends



Per Cox Automotive (KBB):
Total EV Sales topped 800,000.
Sales expected at more than 1M in 2023.
Tesla is losing market share, down to 58%.

Per USA Today:
Tesla cuts sales price ~ 20% in January and 4-9% in March.

In the third quarter of 2022, fully-electric vehicles (BEVs) held steady at 5.5% of new sales market share in the United States. 187,526 of the estimated 3.4 million new vehicles sold were fully electric.

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022
Battery Electric Vehicles (BEV)	2.5%	2.7%	3.1%	4.5%	5.3%	5.6%	5.5%
Electrified (Hybrid + PHEV + BEV)	7.8%	8.5%	10.4%	11.5%	12.4%	12.6%	TBD

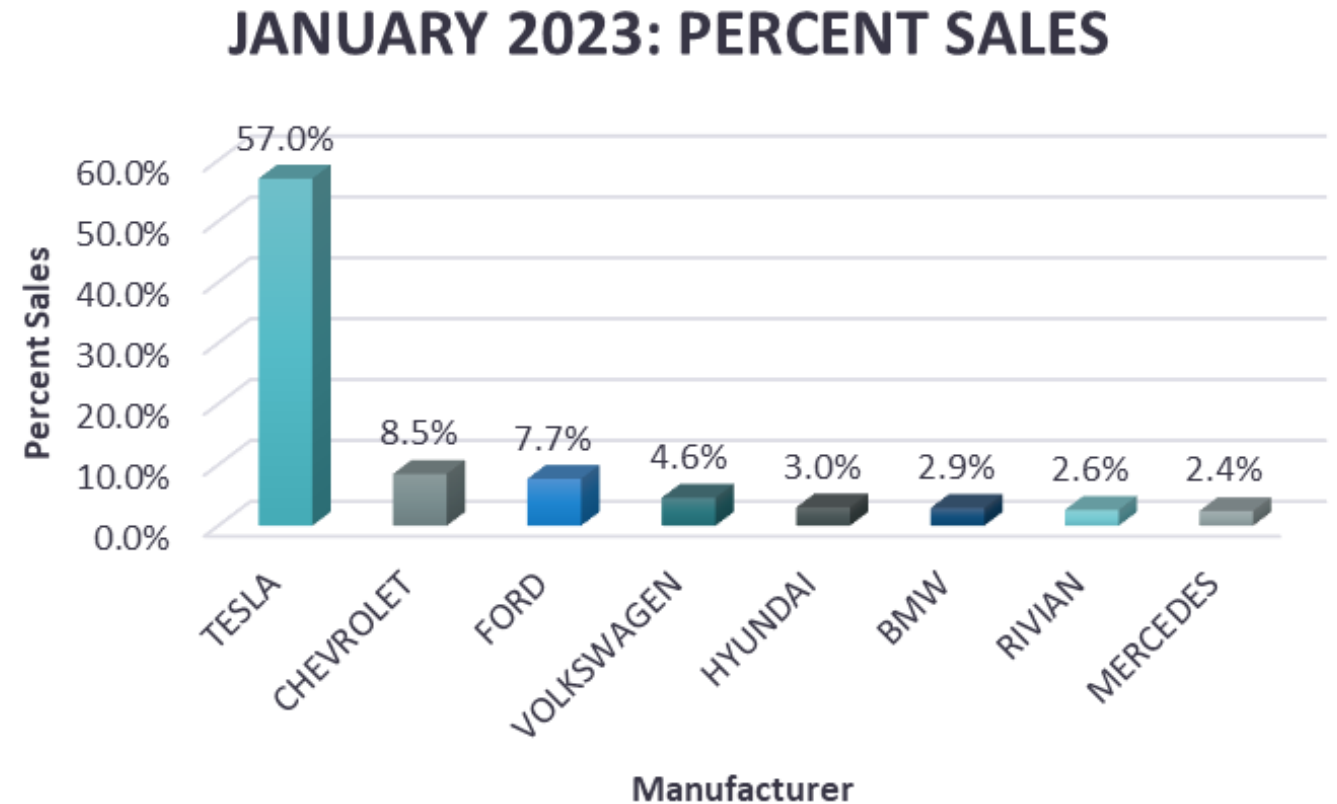
According to analyses by Automotive News, Tesla sales accounted for 60% of all EVs sold in the US in Q3 of 2022. In Q1 2022, Tesla had a 75% EV market share in America.

Source: www.CarEdge.com/guides/electric-vehicle-market-share-and-sales

January 2023 Registrations

BEV registrations (select brands)

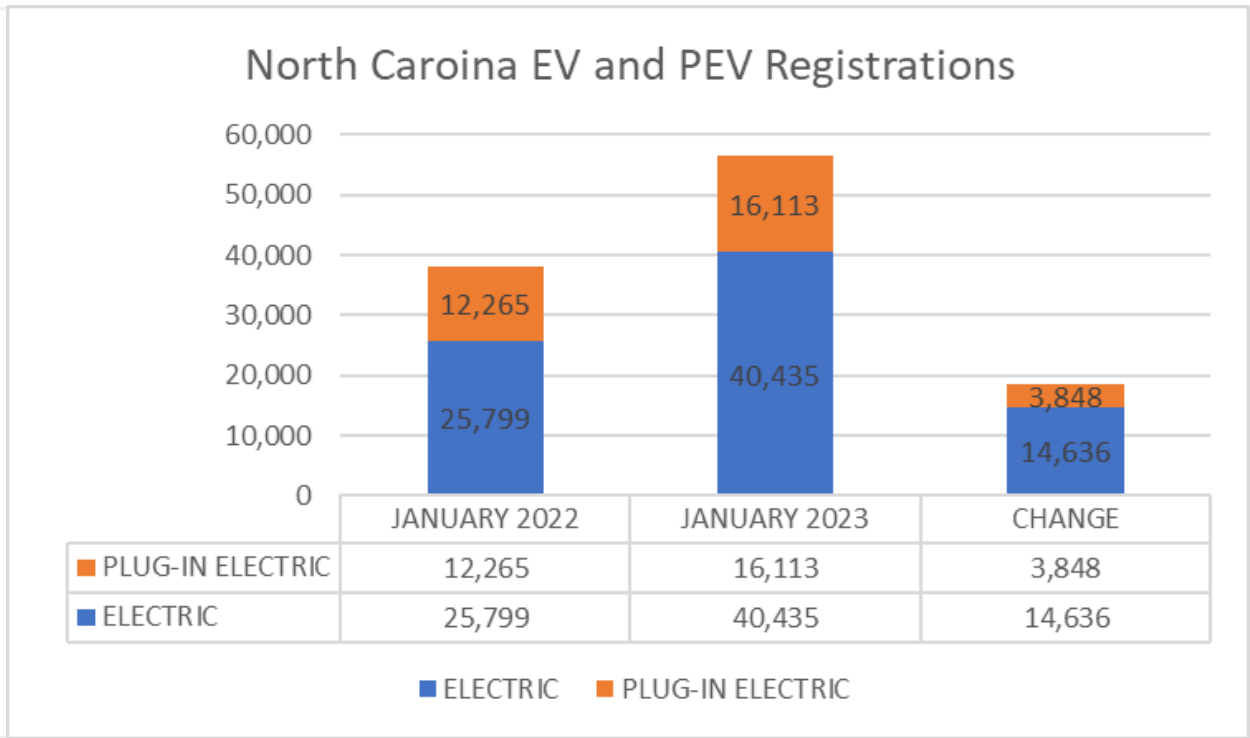
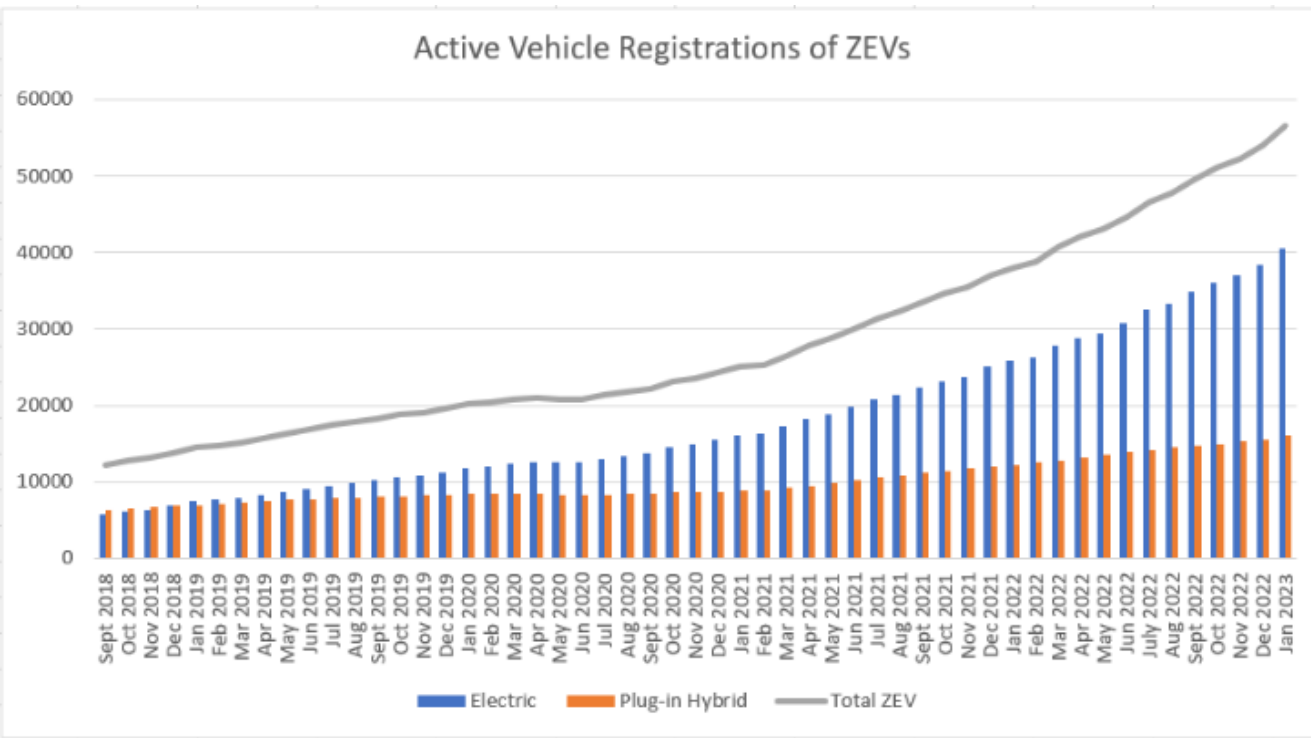
- Tesla - 49,917 sales: 57% share
- Chevrolet - 8.5% share
- Ford - 7.7% share
- Volkswagen - 4.6% share
- Hyundai - 3% share
- BMW - 2.9% share
- Rivian - 2.6% share
- Mercedes-Benz - 2.4% share



Source: www.OutsideEVs.com/news/657660



North Carolina Zero Emissions Vehicles Sales



Source: North Carolina Department of Transportation

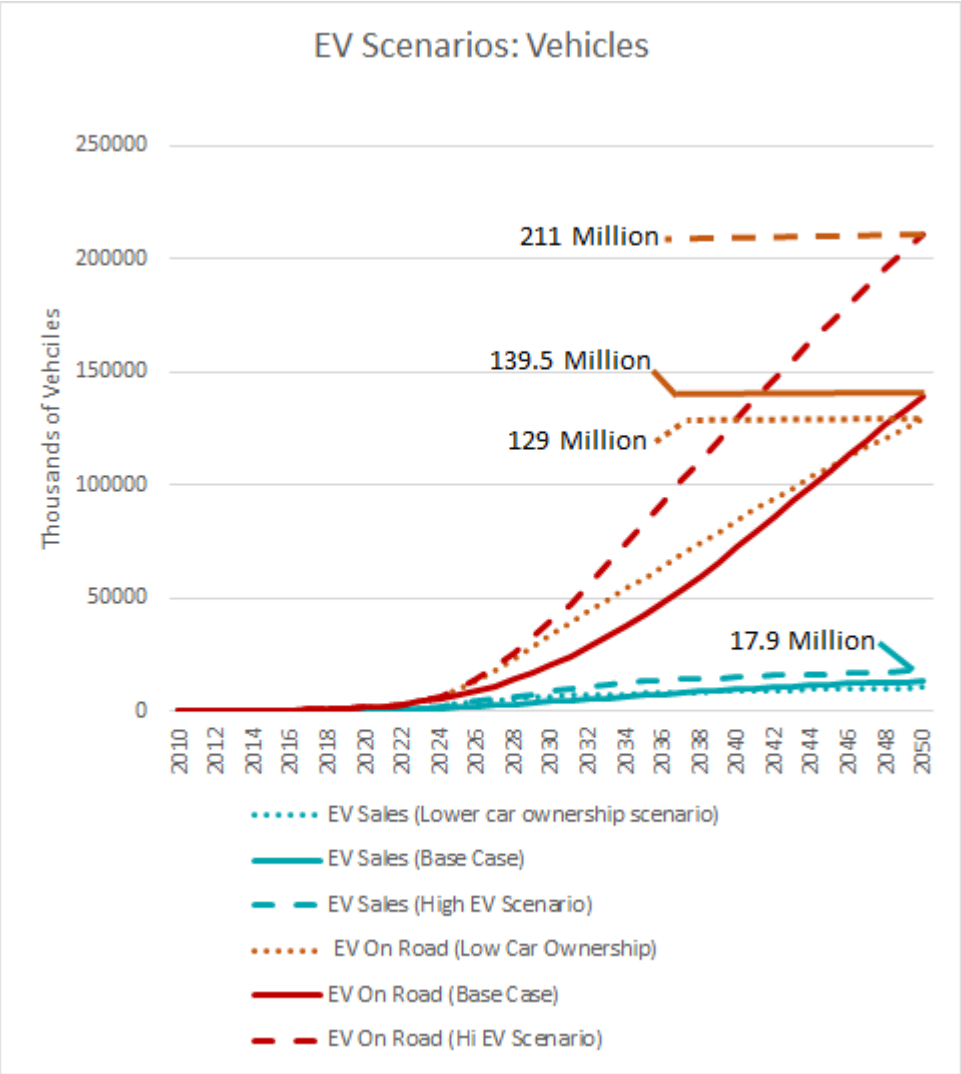
Electric increased 57%
Plug-in increased 31%
January 2022 to 2023

Walker’s Estimate of EV Cars on the Road

Projections have been made using a Walker Consultants’ model that projects car sales and vehicles on the road, and the impact of various scenarios for EV sales and ride-hailing impacts. The base and high scenarios for US sales employs the following PEV percentage of sales.

	Base Sales	High Sales
2025:	10%	23%
2030:	25%	52%
2035:	40%	75%
2040:	55%	85%
2045:	65%	90%
2050:	70%	95%

Local areas will vary substantially but market share of EVs is generally much higher in urban areas than exurban areas.



Federal Tax Credit \$7,500 – on or after April 18, 2023 (tax day)

1. Personal use, not for resale, new vehicle only
2. Use in United States
3. Income limits \$300K M, \$225K HH, \$150K S
4. Minimum 7 kWh battery
5. Weight less than 14K lbs.
6. MSRP \$80K SUV, Pickup, \$55K Car
7. List of Qualified Manufacturers (and models)
8. FINAL ASSEMBLY IN NORTH AMERICA

Index to Manufacturers

+ American Honda Motor Co., Inc

+ Audi of America, LLC

+ BMW of North America, LLC

+ Ford Motor Company (Including Ford and Lincoln brands)

+ General Motors LLC (Including GMC, Chevrolet, Buick, Cadillac brands)

+ Hyundai Motor America (Including Genesis)

+ Jaguar Land Rover Ltd

+ Kia America Inc.

+ Mazda Motor of America Inc.

+ Mercedes-Benz USA, LLC

+ Mitsubishi Motors North America, Inc

+ Nissan North America

+ Polestar Automotive USA Inc

+ Porsche Cars North America, Inc. (Porsche AG)

+ Rivian Automotive, LLC

+ Stellantis N.V. (Including Chrysler and Jeep brands)

+ Subaru of America Inc.

+ Tesla Inc.

+ Toyota Motor Sales, U.S.A., Inc

+ Volkswagen Group of America

+ Volvo Car North America, LLC

<https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after>



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Vehicle Types

ICE: Internal Combustion Engine Vehicle.

- Traditional liquid fuel (e.g., gasoline, diesel, ethanol) powered vehicle



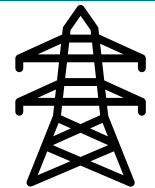
HEV: Hybrid Electric Vehicle

- Has traditional ICE for most propulsion
- Regenerative braking with battery storage
- Can fully propel and supplement propulsion with stored electric power
- No plug-in capability



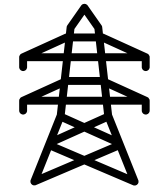
PHEV: Plug-in Hybrid Electric Vehicle

- Like HEV but with larger battery
- Can be plugged in to add charge
- Greater capability to propel using stored electricity



BEV: Battery Electric Vehicle

- No ICE
- Solely receives power from grid
- Most likely by far to want to charge at a parking facility



EV Charging Types

Level 1:

- 120V, 12A, 1.4KW, 3 MPH, 15A circuit
- Uses the Vehicle’s AC-DC Rectifier

Level 2:

- 208V (three phase) or 240V (single phase)
- Specification allows for ~ 3kw – 19kw maximum power (limited by vehicle)
- Commercial “sweet spot” often seems to be 208V, 32A, 6.6KW, 14MPH, 40A circuit
- Uses the Vehicle’s AC-DC Rectifier

Level 3: DC Fast Charger

- Equipment provides rectified DC power
- 50kW – 350kW, 100 – 700MPH

Key Point:

Available Power =
Circuit Size * 80%

DC FAST is expensive
and may consume some
available parking stalls.



Howard 19kW

The Howard charger is the fastest Level 2 charger on the market, working with every electric vehicle on the market and can deliver up to 70 miles* per hour of charge.

Excellent for apartments, hotels, workplaces, and parking operators.



Installation Resources and more information can be found at EVPassport.com

Image courtesy of EV Passport

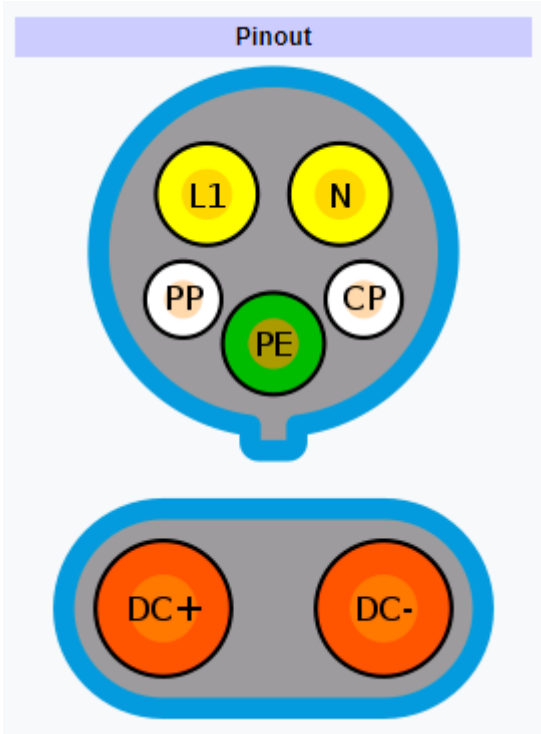
Charge method	Voltage, AC (V)	Phase	Max. current, continuous (A)	Branch circuit breaker rating (A) ^[a]	Max. power (kW)
AC Level 1	120	1-phase	12 or 16	15 or 20	1.44 or 1.92
AC Level 2	208 or 240	1-phase	24–80	30–100	5.0–19.2
AC Level 3 ^[b]	208–600	3-phase	63–160	80-200	22.7–166
Charge method	EVSE DC output voltage (V)	Max. current (A)		Max. power (kW)	
DC Level 1	50 to 1000	80		80	
DC Level 2	50 to 1000	400		400	

Image courtesy of Car and Driver

How the Vehicle Connects



Charging Options	Level 1 (120V)	Level 2 (240V)	Direct-current (DC) Fast Charging
What does the charge port on the vehicle look like?	 J1772	 J1772	CCS CHAdeMO Tesla Combo



L1 = A/C “Live Wire”
N/L2 = A/C “Neutral” or “Line 2” for 240V
PE = Protective Earth (Ground Wire)
PP = Proximity Pilot aka “Plug Present”
CP = Control Pilot
DC +, DC- = Direct Current Ports

Emerging Trend: Self Identifying EV Charging – Plug & Charge

- Tesla has had a proprietary version for 10+ Years
- Plug & Charge is being rolled out by other manufacturers
- Requires registration but eliminates QR codes, passwords, POS payments, etc.
- Greatly increases convenience
- Must be present on both the vehicle and the charger
- Charger must be tied to network for authentication
- Uses ISO 15118 communication protocol



Image courtesy of Car and Driver





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Reasons to Install EV Chargers in a Parking Facility

Compliance:

- Must not miss a have-to.

Promotion:

- Some facilities are competitive and EV charging may be an advantage

Good Will:

- For employees for instance looking to charge up while at work

Revenue:

- Charging can be free to the user or else require a payment.
 - Charge by time
 - Charge by electrical consumption
 - Charges tied through to the PARCS
 - 20% - 30% Revenue share to EV network provider



TERMINOLOGY – FACILITY INSTALLATION

1. EV-Capable

Install electrical panel capacity with a dedicated branch circuit and a continuous raceway from the panel to the future EV parking spot.

[Aspen, CO: 3% of parking is EV-Capable \(IBC\)](#)

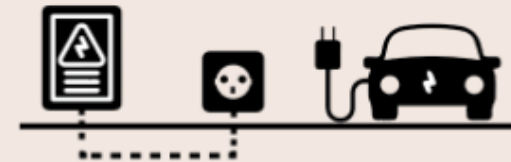
[Atlanta, GA: 20% is EV-Capable \(Ordinance\)](#)



2. EVSE-Ready Outlet

Install electrical panel capacity and raceway with conduit to terminate in a junction box or 240-volt charging outlet (typical clothing dryer outlet).

[Boulder, CO: 10% of parking is EV-Ready Outlet](#)



3. EVSE-Installed

Install a minimum number of Level 2 EV charging stations.

[Palo Alto, CA: 5-10% of parking is EV-Installed](#)



<https://www.swenergy.org/cracking-the-code-on-ev-ready-building-codes>

Must verify quantities of each with local jurisdiction



SO HOW MANY?

- For opening day, **minimum of 2x local % of EVs** on the road for destination charging.
 - Use higher percentages for smaller facilities, similar to ADA tables.
 - Allows for variations in demand at a time/place.
 - Add more as demand indicates
- Minimum EVCS in the table at right is for **average** PEVs on road in US, doubled.
- Residential is twice as many as destinations

“Power” is EV Capable, not EV Ready.

- For larger destination facilities, provide adequate power to charge a **maximum** of 10% of stalls at full power simultaneously, or 20% for Residential.

Total Parking Stalls	Residential		Workplace/Visitor	
	Power for		Power for	
	EVCS (stalls)	Min EVCS (stalls)	EVCS (stalls)	Min EVCS (stalls)
1 to 25	16	2	8	1
26 to 50	20	4	10	2
51 to 75	32	6	16	3
76 to 100	40	8	20	4
101 to 150	40%	10	20%	5
151 to 200	38%	12	19%	6
201 to 300	36%	14	18%	7
301 to 350	32%	16	16%	8
351 to 400	28%	18	14%	9
401 to 500	24%	20	12%	10
501 and over	20%	4%	10%	2%

Destination is anywhere that a person parks while in the destination, excluding residential.



Example Regulations for New Construction

Vary Widely. For example, Boston, Mass. has maybe the most extensive right now and possibly a sign of things to come.

Highlights(?!)

- 25% of stalls must have Level 1, or Level 2 (on a minimum 40A circuit)
- Stalls DO NOT need to be designated EV-only
- Remaining 75% must be EV-ready
 - Raceways for future conduits to all stalls
 - Adequate space in electrical panels
 - Adequate space in electrical rooms for future transformers to be labeled on plans
- A fee may optionally be collected for use of charging
- 3rd party monitoring required for at least 75% uptime of each charging station.
- 5% of all stalls must be ADA accessible though those above the normal limits need not be designated ADA

A few Loopholes

CATEGORY / NAME / OPTIONS	WEIGHTED POINTS (PER MITIGATION MEASURE)	RESTRICTION/RANGE
LEVEL 1 CHARGER	1	Only land uses classified as Residential and/or Office may offset with this option. Parking spaces must be assigned for residential.
LEVEL 2 CHARGER	1	
DCFC - 50KW	8	
DCFC - 125-150KW	24	
EV CARSHARE	19	
ELECTRIC BIKE PARKING	0.50	Maximum of 5 points.



Some Local Regulations for New Construction

Charlotte

- Instituted a tiered parking requirement system based on zoning with minimum and maximum parking requirements
- EV charging stations required for Multi-family stacked dwellings, residential portion of mixed-used developments, hotels, parking lots and structures as principal use
- 1 EVCS Installed (Charging station capable of providing minimum 32 amp, 7.2kW) 26 – 50 spaces, 2% EVCS more than 50 spaces
- 20% EV Capable (reserved space in electrical room for a panel and empty conduits to serve future EV spaces) over 10 spaces
- EV spaces shall only count toward a development's maximum if EV-Capable. EVSE do not count toward maximums
- If parking minimums, EVSE stations shall count as two spaces
- Any EVSE-Installed stations greater than required, may count toward EV-Capable requirement as EV-Capable station



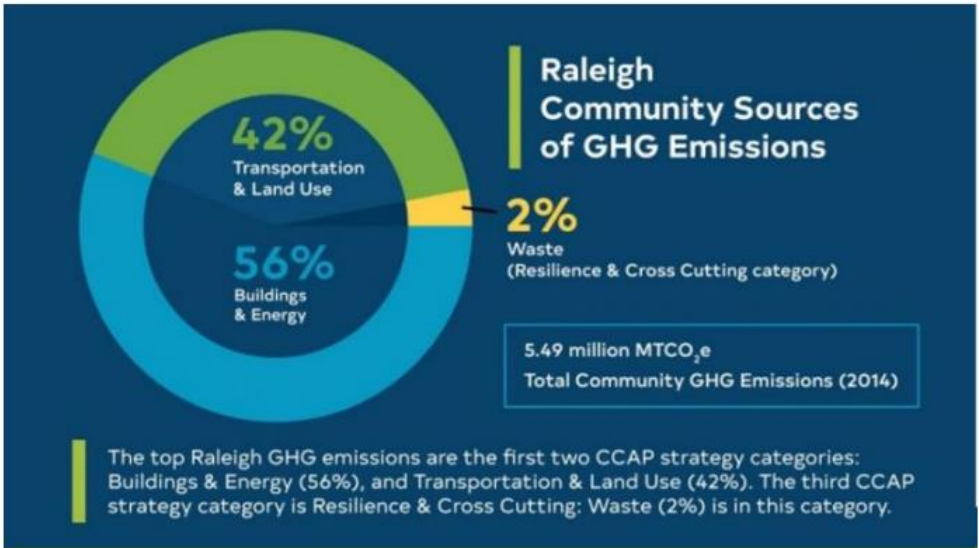
Raleigh: Community Climate Action Plan (“CCAP”)

Land Use:

- 1. Remove Parking Minimums
- 2. Transit Oriented Development Zoning
- 3. Carbon Emissions Rezoning

Transportation:

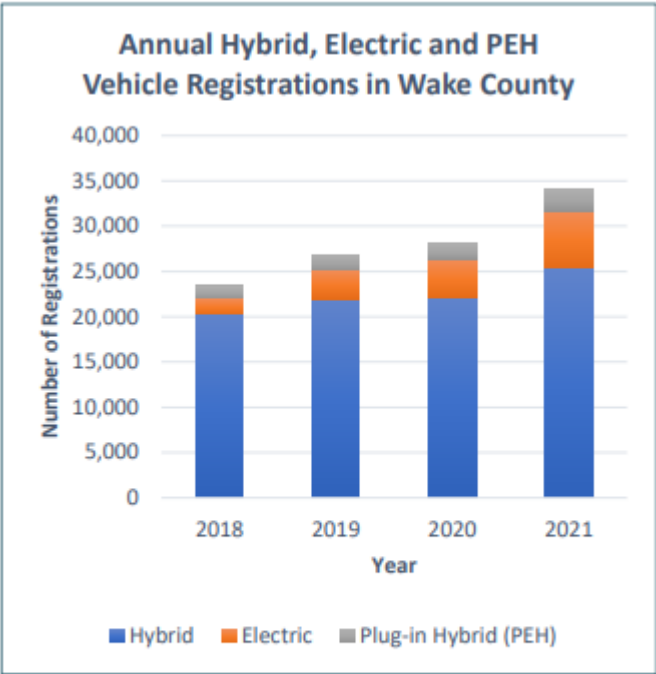
- 1. Reduce Vehicle Miles Traveled
- 2. “Complete Streets” safety, mobility, access
- 3. Traffic Calming improves safety
- 4. “Vision Zero” no traffic death is acceptable
- 5. **EV ORDINANCE – NEW DEVELOPMENT**



Source: City of Raleigh 2023 CCAP Implementation Report

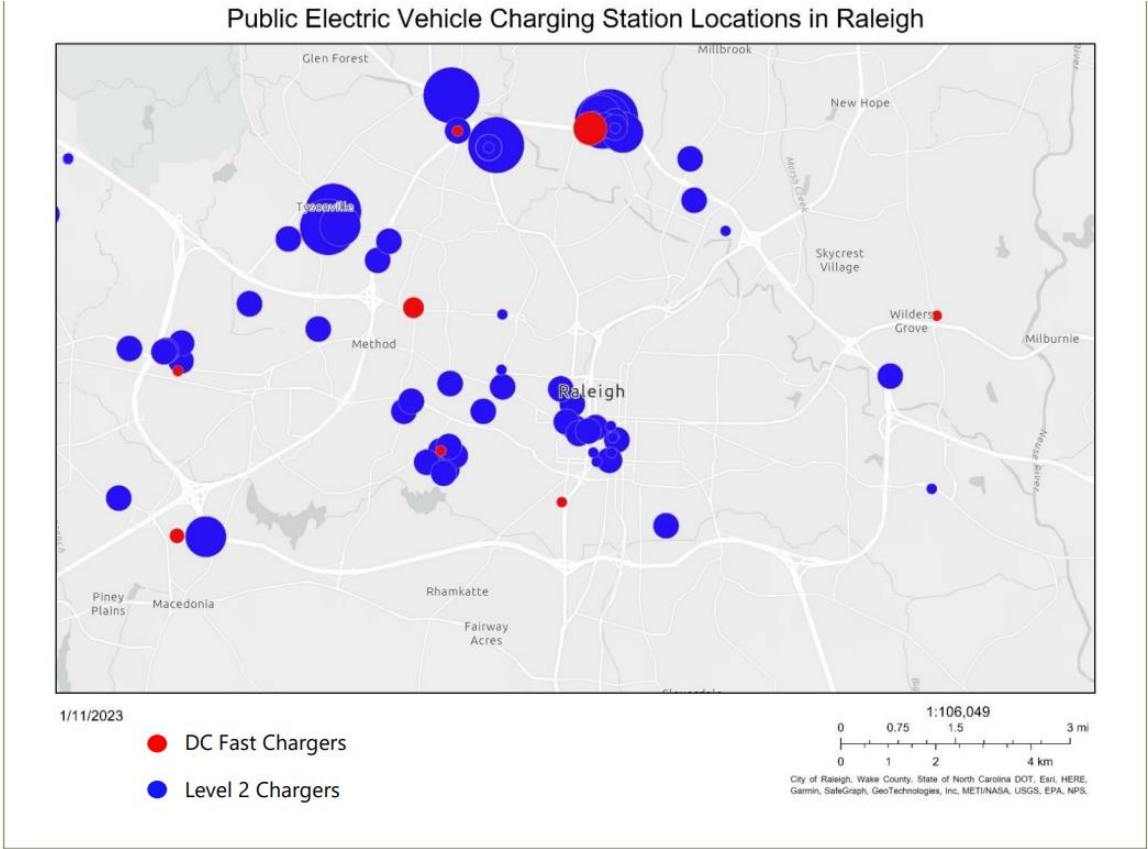
Graph 4: Means of travel to work (%) Raleigh, NC. Source: US Census

Raleigh: Community Climate Action Plan (“CCAP”) Continued



Graph 8: Electric, Hybrid, and Plug-in Hybrid Vehicles registered in Wake County (2018-2021) Source: NC Department of Transportation

“A proposed EV ordinance, which would require a percentage of parking spaces in new development include the electrical infrastructure to support charging, will be considered in 2023”



Map 3: Map of Public Electric Vehicle charging stations in Raleigh. The larger the dot size indicates a greater number of charging ports at that location. Source: NREL, USDOE

Source: City of Raleigh 2023 CCAP Implementation Report



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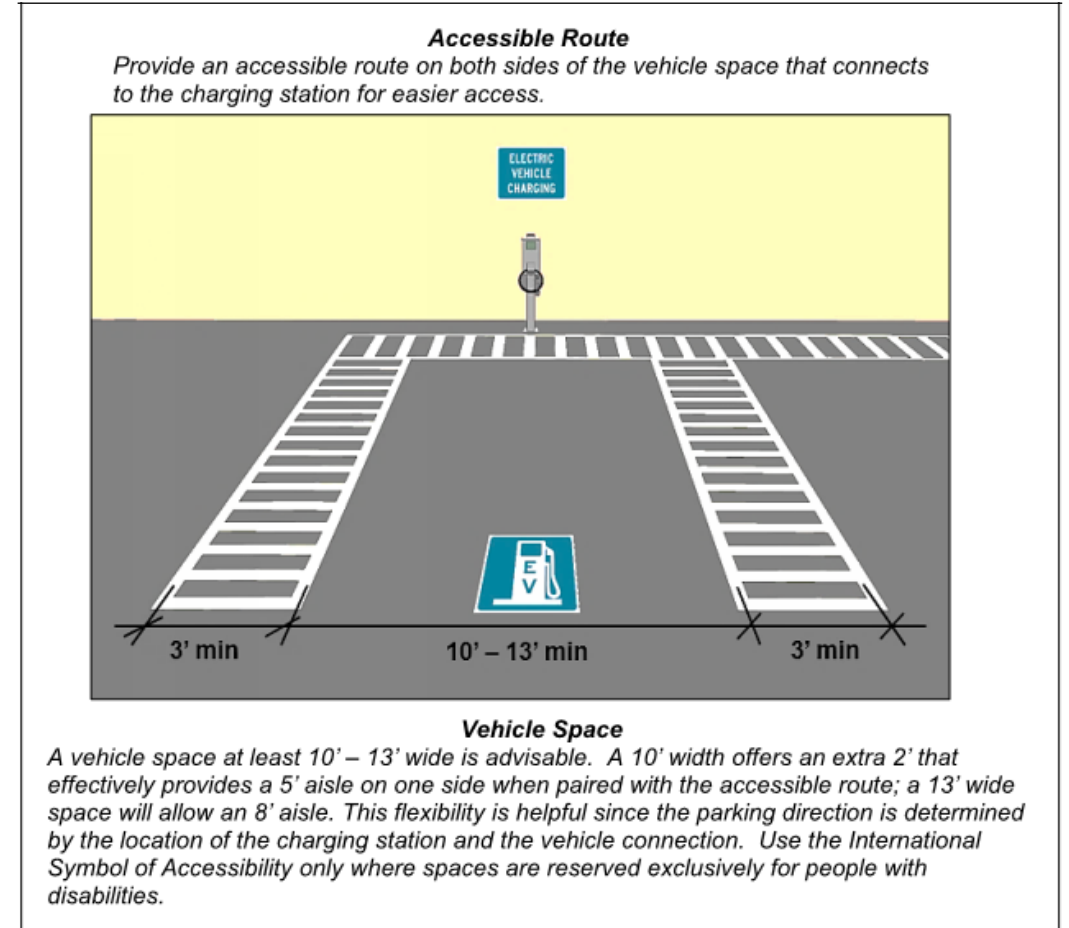
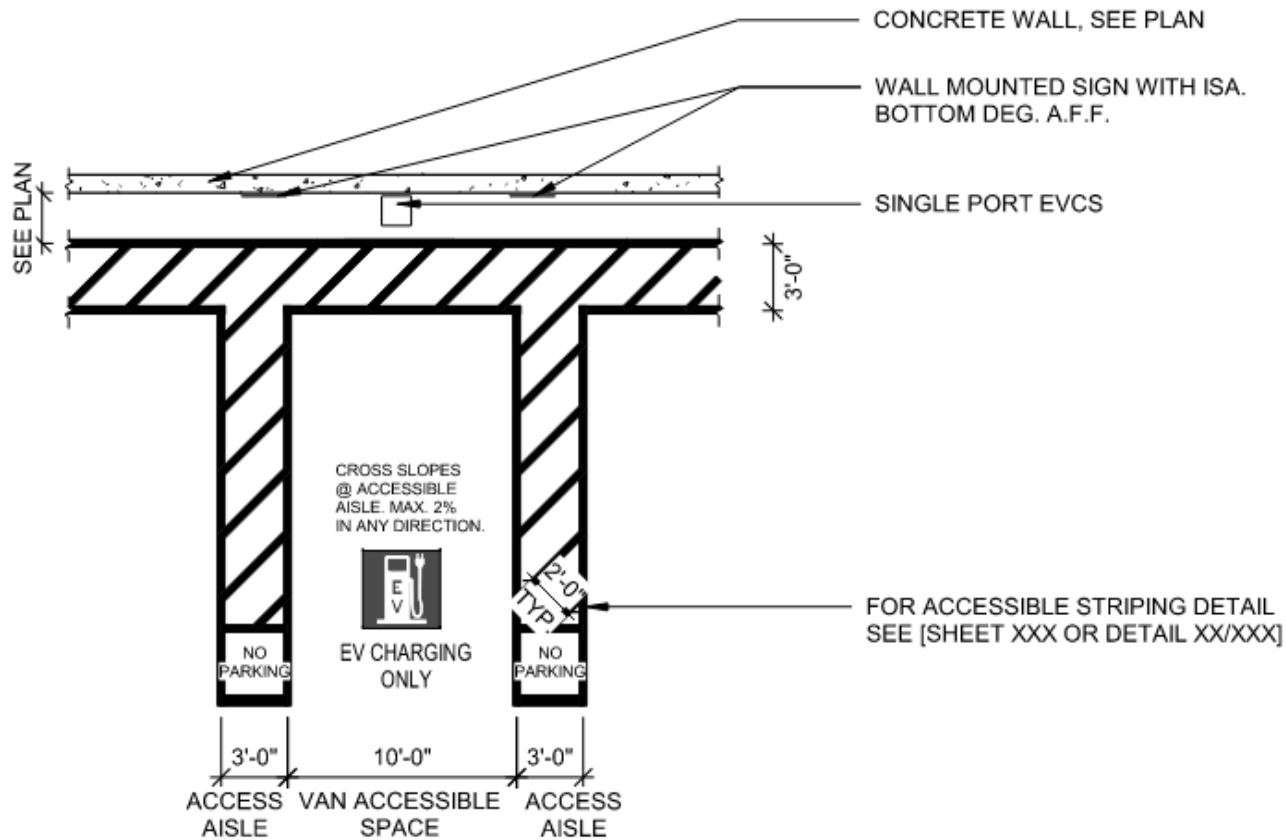
ADA considerations

You must provide accessible EVCS if you provide any EVCS.

- ADA is a civil rights law. You can't deny charging to disabled person by not providing accessible charging units.
- There is no design guideline in DOJ 2010 Standards for making EVCS accessible today.
- In 2012 Walker prepared white paper (posted on NPA website). It was vetted by an ADA consultant and discussed with Access Board.
- In 2016 Access Board issued guidance for ADA parking compliance that included guidelines for accessible charging. Not adopted by DOJ, but best available reference.
 - Rather consistent with Walker guidance.
- If less than 4 **total** EVCS, provide 1 that is van accessible sized, BUT you do not have to sign it.
- In existing, check path of travel from EVCS to pedestrian portals, as installing EVCS is an alteration and triggers requirement for path of travel improvements.
- For employees, owners should have a policy that if an employee with a disability has an EV, they will work with employee to meet specific needs. (Title I of ADA).



Functional – ADA Details – Access Board



Access Board Recommended EVCS Striping Detail

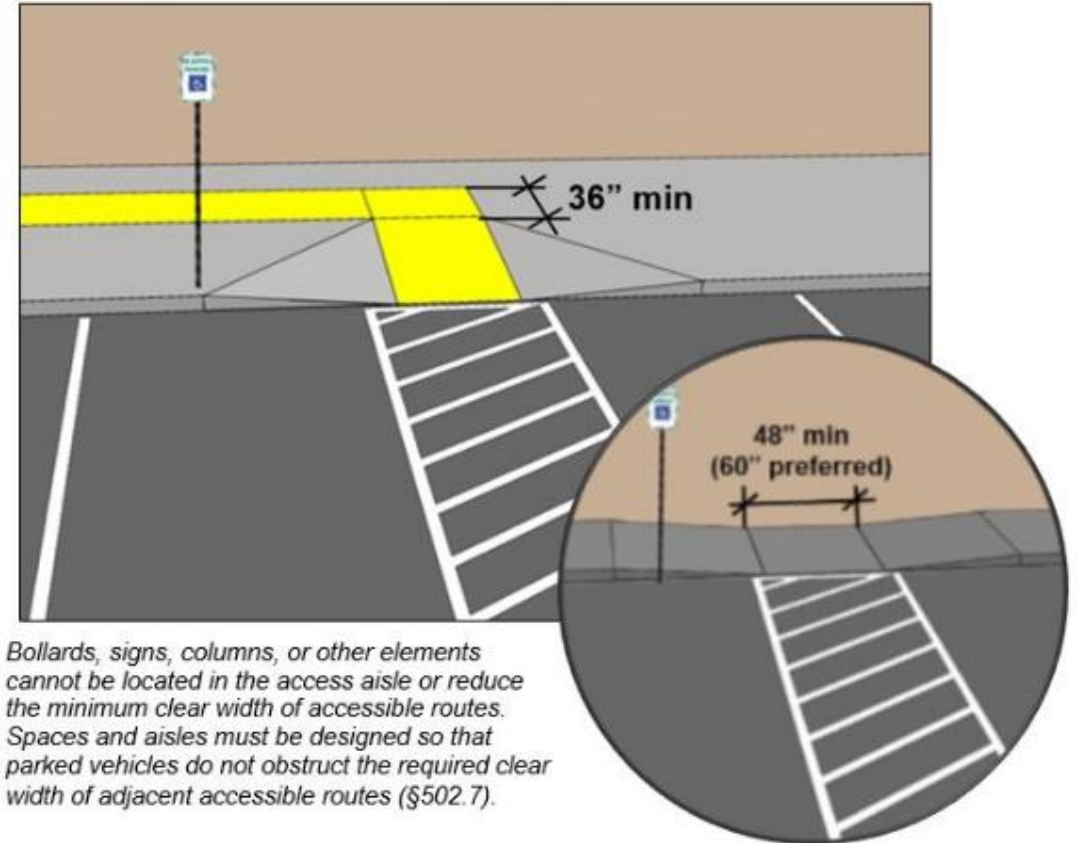
<https://www.access-board.gov/ada/guides/chapter-5-parking/>



Encroachment on ADA spaces



Accessible routes must connect directly to access aisles. Curb ramps, where provided, cannot protrude into access aisles (which cannot slope more than 1:48 max.) to accommodate wheelchair transfers and vehicle ramps or lifts (§502.4). A landing at least 36" deep is required at the top of curb ramps; in alterations where space for this landing is unavailable, curb ramps must have side flares with a 1:12 max. slope (§406.4).



Bollards, signs, columns, or other elements cannot be located in the access aisle or reduce the minimum clear width of accessible routes. Spaces and aisles must be designed so that parked vehicles do not obstruct the required clear width of adjacent accessible routes (§502.7).

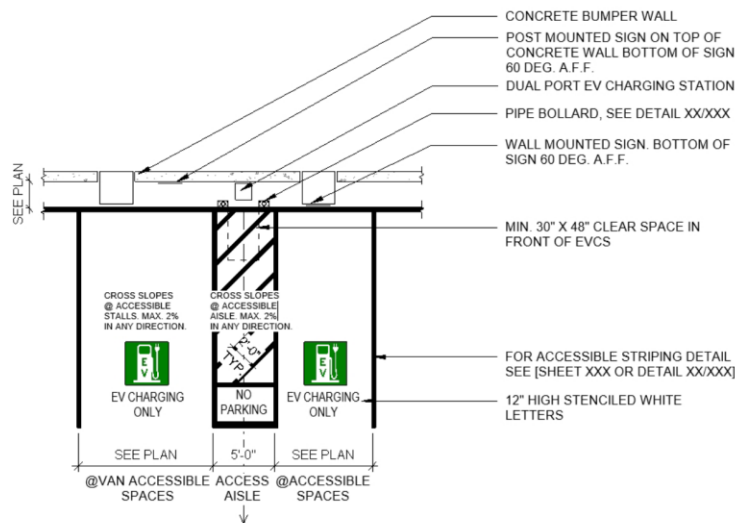
Where space for curb ramps is limited, including in alterations, parallel ramps can provide an alternative.



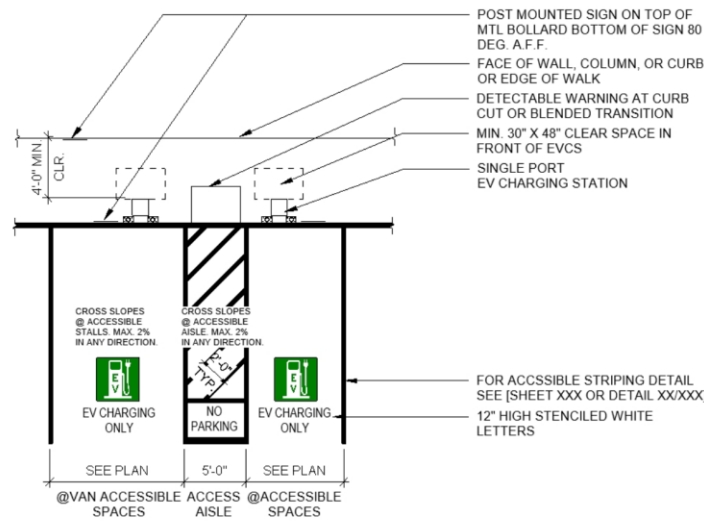
Images courtesy of The Harmon Group and Walker Consultants

<https://www.access-board.gov/ada/guides/chapter-5-parking/>

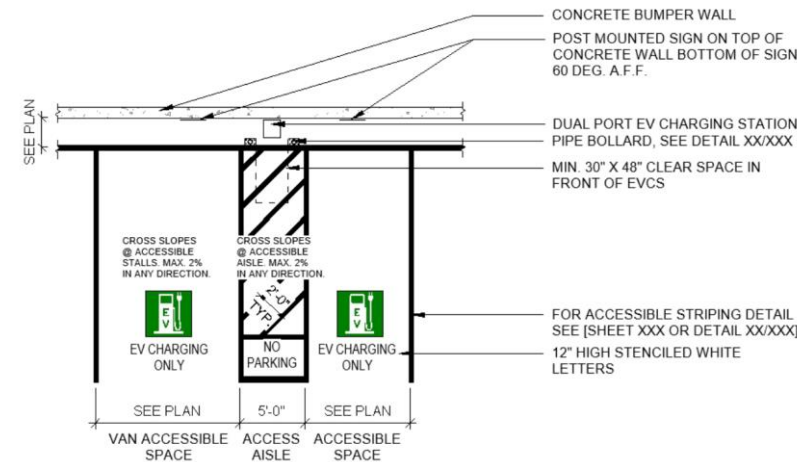
Functional – ADA Details – Add'l room behind Spaces



EVCS mounted between column encroachment with dual head charging station.



EVCS mounted on walkway at the head of each space with single head charging stations.

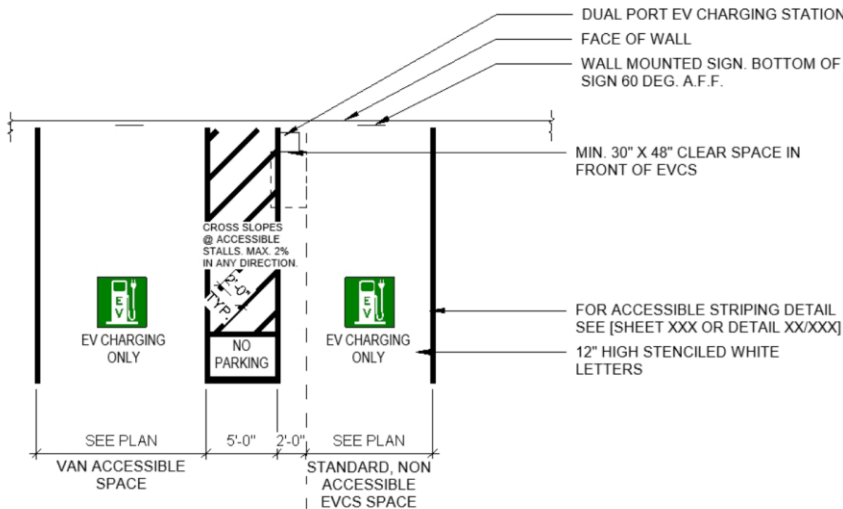


Spaces pulled off the wall charging station mounted outside of the spaces and accessible aisle with a dual head charging station.

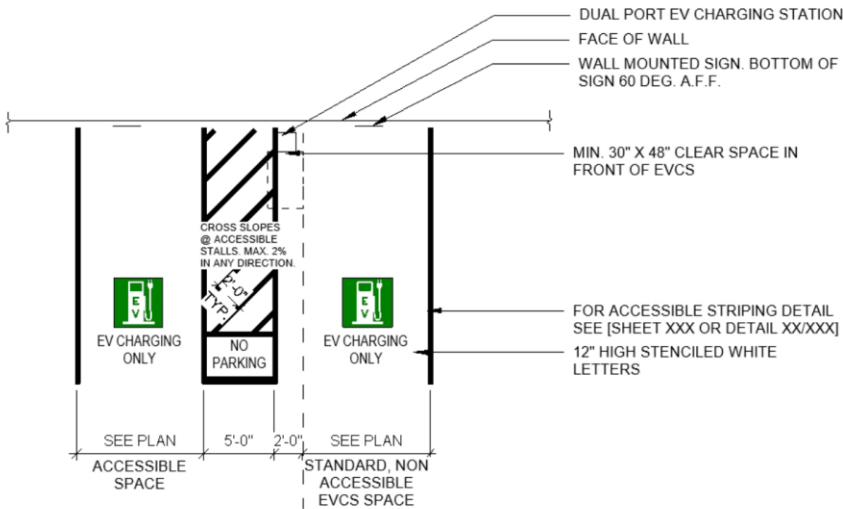
Adjacent EVCS Van Space and Standard EVCS Accessible Space



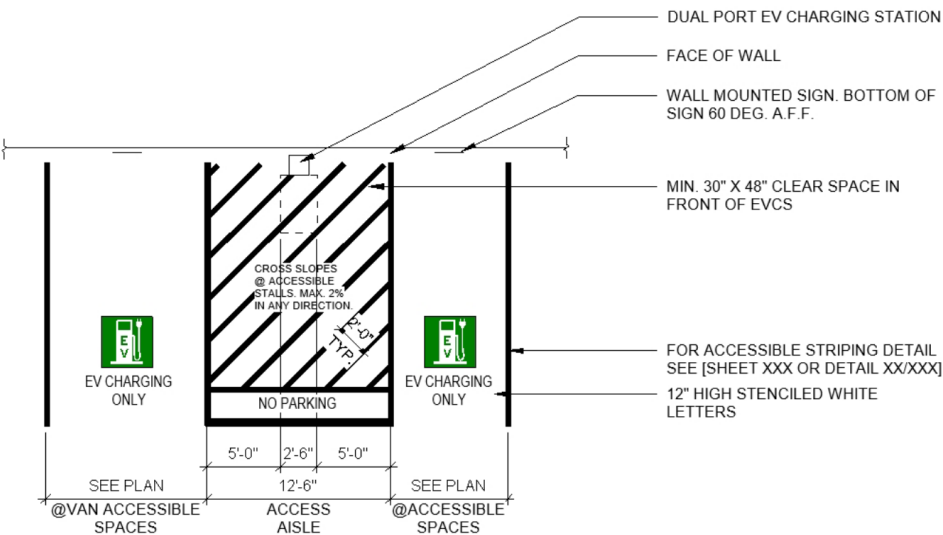
Functional – ADA Details – No extra room behind spaces



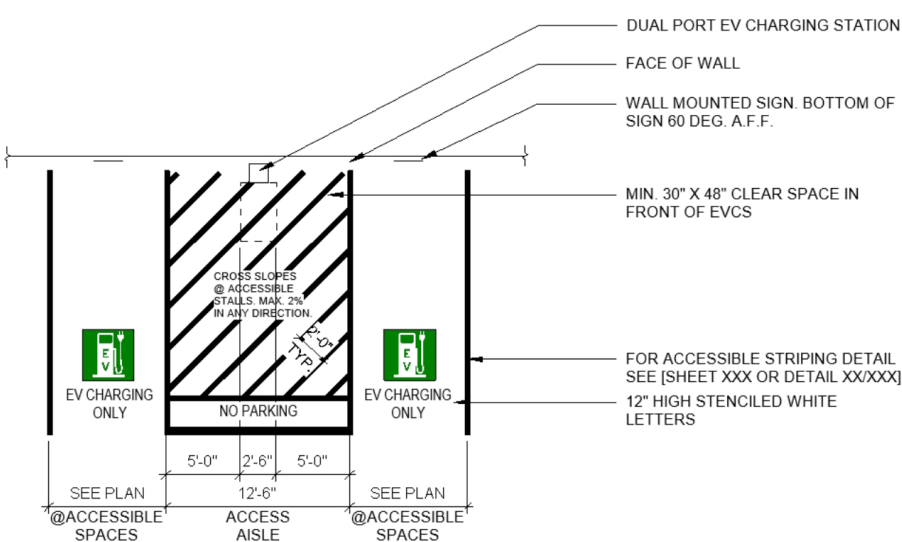
EVCS VAN Space adjacent to a standard EVCS space (non-ADA).



EVCS Standard Accessible Space adjacent to a standard EVCS space (non-ADA).



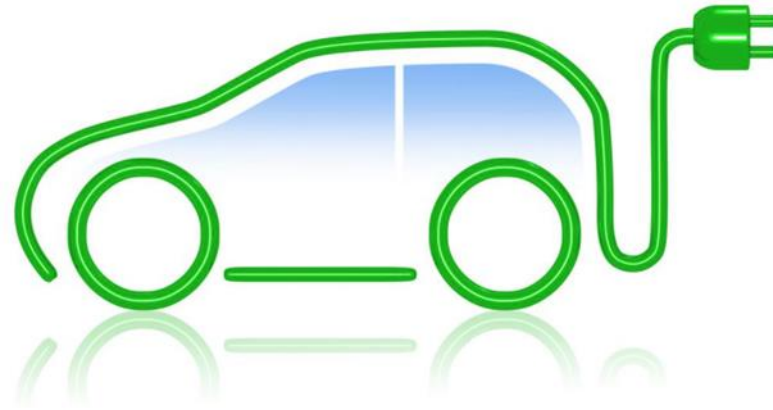
EVCS VAN Space adjacent to a EVCS Standard Accessible Space.



EVCS Standard Accessible space adjacent to a EVCS Standard Accessible Space.



QUESTIONS?



THANK YOU!



Geoffrey Posluszny, CPP, CAPP
Charlotte, NC office
704.999.7727
GPosluszny@WalkerConsultants.com