



ACCESSIBILITY

for Public Charging Stations

Governing Standards

As municipalities and businesses install publically available plug-in electric vehicle (PEV) charging stations, an important design requirement is to ensure accessibility for disabled users. In the United States, the accessibility of public facilities is mandated by the Americans with Disabilities Act (ADA) and is generally governed by three standards:

- The International Building Code (IBC);
- The American National Standards Institute's (ANSI) Standard A117.1 "Accessible and Usable Buildings and Facilities;" and
- The U.S. Department of Justice (DOJ) 2010 ADA Standards for Accessible Design.

ADA Guidance in North Carolina

Conversations with North Carolina city and county officials, as well as with accessibility code consultants at the North Carolina Department of Insurance (NC DOI), which is responsible for interpretation of North Carolina's building and related codes, have assisted in the development of the following guidelines. This is the best known guidance at this time for local officials and property owners who are preparing to install charging stations.

Public and private entities intending to install charging stations for public use have one major challenge: governing codes and standards do not yet specifically address PEV charging stations.

Some generic accessibility requirements for public infrastructure or services are easily assessed (for example, reach ranges for operable controls). However, the most common type of public charging is currently provided by adding charging hardware to an existing parking space. In many cases these new charging spaces are restricted for use by PEV owners.



As a result, the primary purpose of the space becomes fueling instead of parking. This can create confusion as to which accessibility requirements should apply and how they should be interpreted. While several requirements are simply undefined at this time, there are existing accessibility requirements for parking facilities that can be used as a guide.

Applicable Codes

The codes and standards governing accessibility at a given facility can vary depending on which codes have been adopted by the applicable state or local jurisdiction and by the type of facility. Title II facilities are state or local government facilities, and Title III facilities are public accommodations and commercial facilities.

In North Carolina, the local Authority Having Jurisdiction (AHJ) is responsible for enforcement of the applicable requirements¹:

- Title II facilities must comply with the U.S. DOJ 2010 ADA Standards² AND the 2012 NC Building Code³, Chapter 11, which references the 2009 ANSI A117.1 Standard.
- Title III facilities must comply with the 2012 NC Building Code, Chapter 11, which references the 2009 ANSI A117.1 Standard.



¹ NC Department of Insurance Access Update Newsletter, Vol. 3 Issue 2, August 2012

² Note that the ADA Standards may also be enforced by the US DOJ.

³ The 2012 NC Building Code is the 2009 International Building Code with NC amendments

Anticipating Code Updates

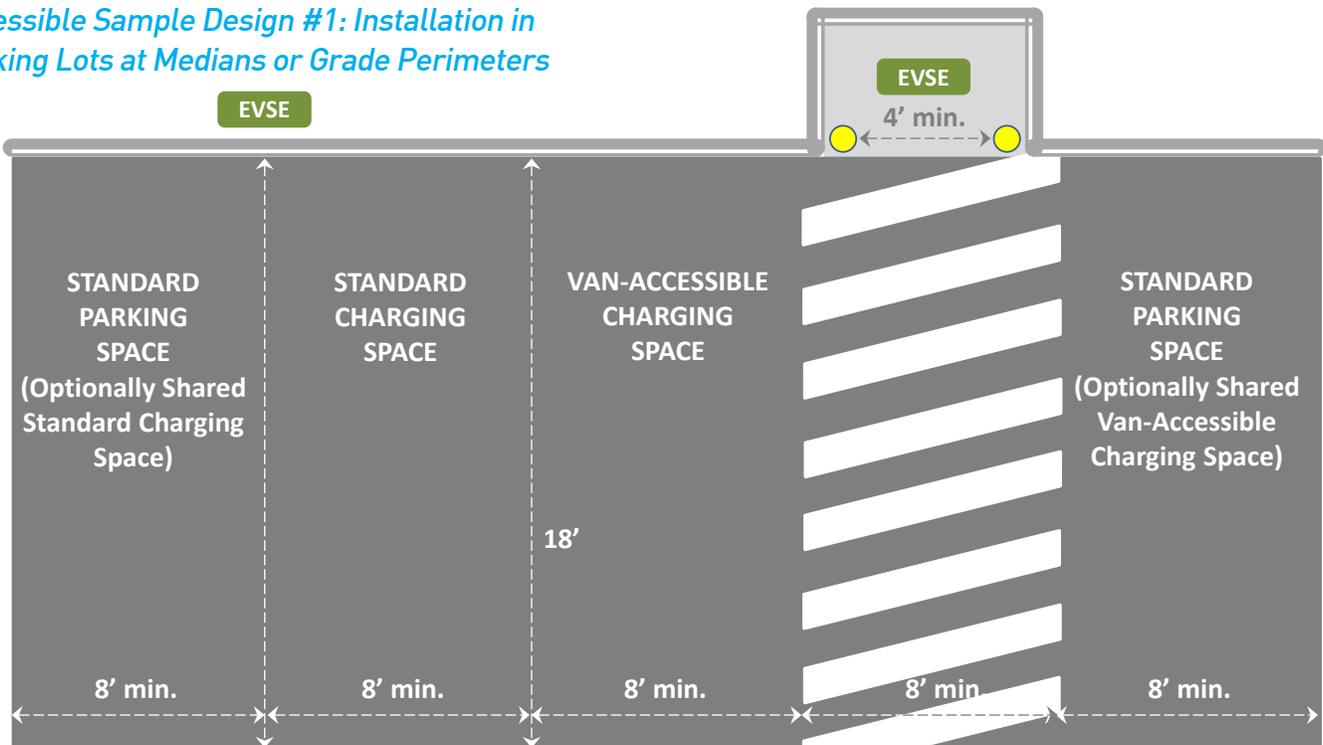
Site owners must keep in mind that the accessibility code does not function in the same manner as most other codes with regard to updates. Construction that pre-dates a building code revision is typically “grandfathered” in compliance with the code that was in effect at the time of construction. Instead, as the accessibility code is updated, facilities are generally required to upgrade to the current standard. It may be more cost effective to proactively provide charging station accessibility because doing so may reduce future legal liability, and future retrofits could cost significantly more than enhanced construction in the present.

The requirements and recommendations described herein are provided as guidance only – official compliance for any electric vehicle

Charging station installations may also be governed by regulations found in a local zoning ordinance or unified development ordinance.

charging station is subject to the code enforcement of the local AHJ, which may be supported by a formal interpretation from the NC DOI. Where available, specific code references are provided.

Accessible Sample Design #1: Installation in Parking Lots at Medians or Grade Perimeters



● Optional protective bollard **EVSE** EV Supply Equipment (charging hardware) may be oriented as appropriate

Site Design

Electric vehicle charging hardware is technically referred to as “electric vehicle supply equipment,” or EVSE. For simplicity this document refers to parking spaces served by EVSE as “charging spaces,” and uses “charging hardware” to refer specifically to the EVSE and not to the charging space as a whole.

Number of Accessible Charging Spaces

On a given site the NC DOI views a contiguous group of charging spaces as a distinct parking facility, as described in NC Building Code (NCBC) 1106.1. Although there are no explicit requirements at this time for the number of charging spaces that must be accessible, it is recommended to follow the requirements for standard and van-accessible parking spaces presented in NCBC Table 1106.1 and Section 1106.5 (see Table 1).

Table 1.

Total Charging Spaces	Total Accessible Charging Spaces	Van-Accessible Charging Spaces
1-25	1	1
26-50	2	1
51-75	3	1
76-100	4	1
101-150	5	1
151-200	6	1
201-300	7	2

The first charging space that is installed should be sized for van-accessibility. A second accessible charging space is recommended when the 26th charging space is installed, and that second accessible charging space should be sized as a standard (non-van) accessible space. At least one space should be sized for van-accessibility out of every six accessible charging spaces that are present (1:6).

In some designs, a facility owner may install charging hardware such that it can be shared by a standard charging space and an accessible charging space. Such installations may be interpreted as satisfying the requirement for accessible charging spaces.

In multi-level parking structures, all charging spaces may be allowed to be located on one level. In parking facilities for buildings with multiple accessible entrances, charging spaces are not required to be dispersed. However, if charging spaces are provided in multiple locations for buildings with multiple accessible entrances, then accessible charging spaces must be provided at each location.

There is an exception to NCBC 1106.1 for certain types of fleet vehicle and motor pool parking facilities where lots accessed by the public are provided with an accessible passenger loading zone. Accessible passenger loading zones are addressed in NCBC 1106.7 and ANSI 503, where the basic requirements include a pull-up space that is a minimum eight feet wide by 20 feet long with an adjacent access aisle that is a minimum five feet wide by 20 feet long, marked so as to discourage parking in the aisle.

Layout of Accessible Charging Spaces

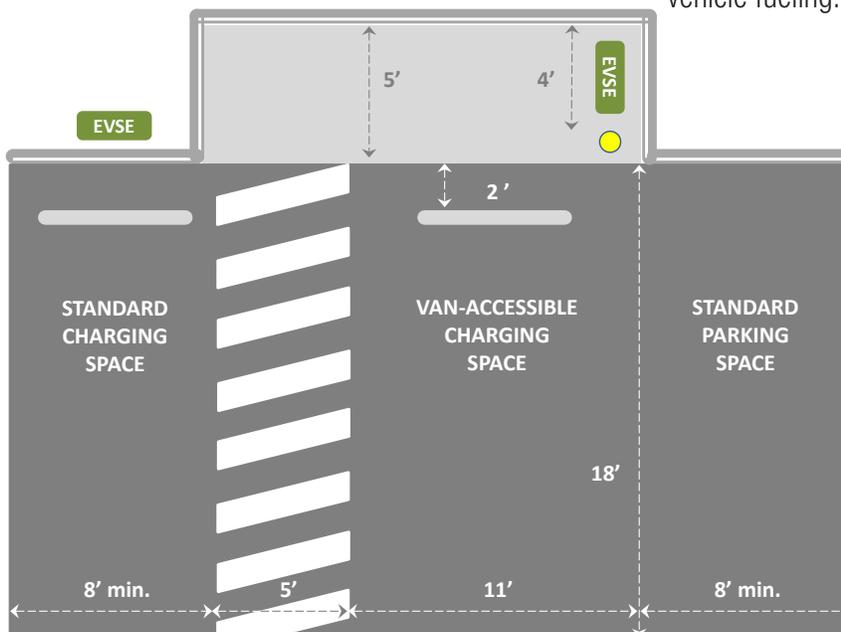
Layout and dimensions of accessible parking spaces are defined in ANSI 502. Accessible charging spaces should follow the same guidelines, namely that the first charging space, sized for van-accessibility, be a minimum 11 feet wide with an adjacent access aisle that is a minimum five feet wide. Alternately, the van-accessible parking space may be eight feet wide if the adjacent access aisle is at least eight feet wide, but the standard 11 foot width is preferred to provide more flexibility to the driver for positioning of the vehicle.

Any standard (non-van) accessible stalls must be a minimum eight feet wide with an adjacent access aisle that is at least five feet wide. In both cases, the minimum length of the parking spaces should be 18 feet. Note that local ordinances may require a longer space.

Accessible Routes

While the primary purpose of a charging space is vehicle fueling, it is also reasonable to expect that drivers may want to use a particular charging station due to its association with a specific building on a site. NCBC 1104.2 requires that at least one accessible route connect accessible buildings and other accessible elements or spaces that are on the same site.

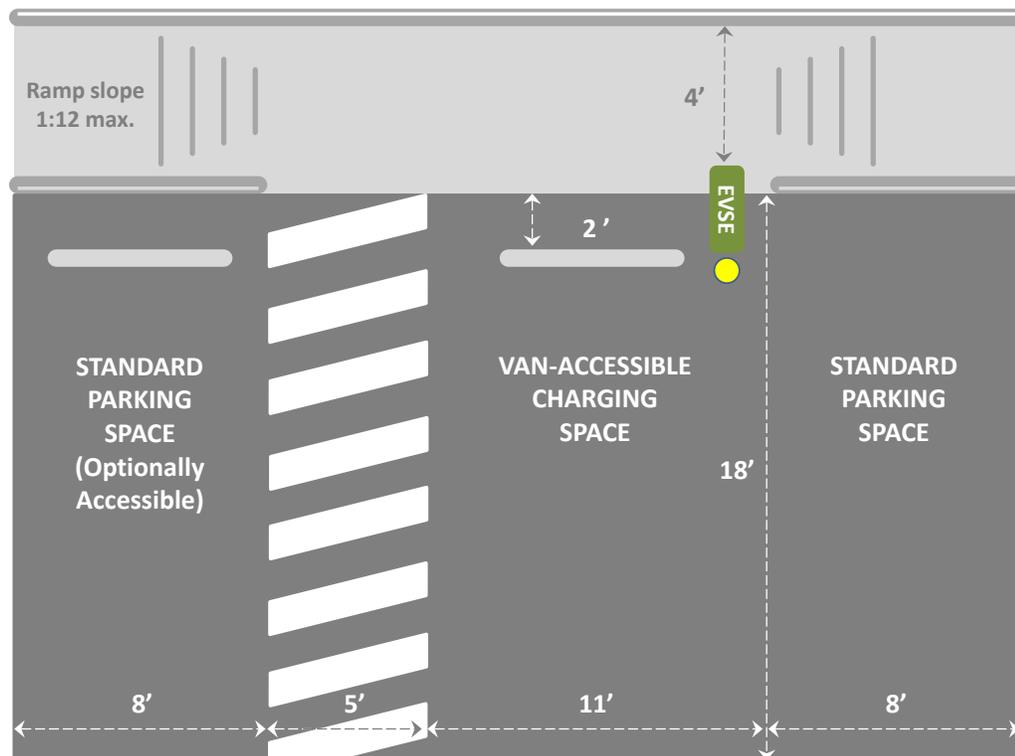
While accessible parking spaces must be on the shortest accessible route to the associated building entrance, accessible charging spaces may be on a longer route, because the primary purpose of the charging space is vehicle fueling.



*Accessible Sample Design #2:
Installation in Parking Lots at
Medians or Grade Perimeters*

● Optional protective bollard EVSE EV Supply Equipment (charging hardware) may be oriented as appropriate

Accessible Sample Design #3: Installation in Parking Lots at Sidewalk Boundaries



● Optional protective bollard **EVSE** EV Supply Equipment (charging hardware) may be oriented as appropriate

Note that NCBC 1104 requires an accessible route to be a fixed, firm, non-slip path of travel that is a minimum 48” wide, which exceeds the requirement in ANSI 403.5 for a 36” minimum width. Other key requirements for accessible routes include:

- A maximum running slope of 1:20 and maximum cross slope of 1:48, specified in ANSI 403.3.
- Any ramps or curb ramps present on an accessible route must comply with ANSI 405 and 406, respectively.

The addition of charging spaces to an existing parking facility will generally be interpreted as new construction, not an alteration. As a result, exceptions to the requirement for an accessible route due to disproportionality of costs are unlikely to be available unless they result from interpretation by the AHJ and/or NC DOI.

Parking facilities not associated with a specific building must provide an accessible route from the accessible charging space to an accessible pedestrian entrance to the parking facility per NCBC 1104.2.

While any requirement for an accessible route from an accessible charging space to an associated building may be subject to interpretation, it is clear that there must be an accessible route between the charging space and the charging hardware. The goal: ensure that once a PEV is maneuvered into the space, the driver can connect the charging cord to the vehicle charging inlet. It is acceptable for the driver to place the charging cord in or along that accessible route for the duration of the charging process.

However, charging stations should be positioned in such a manner that their cords WILL NOT block any sidewalk or obstruct any other accessible route while the cord is connected to a vehicle. It is possible that designs may be required to prevent or restrict such an impediment, especially if the accessible route (or access aisle, if applicable) serves a function or pathway beyond access to the charging hardware itself, e.g. complementary access to a building entrance or to a public way.

Availability for Use

It is not recommended to mark accessible charging spaces for the use of only disabled-marked vehicles because:

- The primary purpose of charging spaces is vehicle fueling; and
- The installation of accessible charging spaces does not reduce the number of required accessible parking spaces at the same site.

This model is similar to the provision of accessible hotel rooms governed by NCBC 1107.6, where accommodation is available for, but not limited to, use by disabled patrons. Charging station owners may choose to install signage that indicates “accessible priority” at accessible charging spaces, guiding non-disabled users to park in any available standard charging space before using an accessible charging space. Should the owner decide to mark accessible charging stalls for the use of disabled-marked vehicles only, NCBC 1110 and ANSI 502.7 define the related requirements.

Charging station owners may or may not choose to restrict the use of charging spaces to specific types of vehicles (e.g. PEVs only). Municipal station owners may establish ordinances defining the legal use of public charging spaces as well as the potential penalties for improper use, and commercial owners may define similar policies that are enforced at their discretion.

Finally, a site owner may choose to install charging hardware at a marked-accessible parking space, or to install charging hardware such that it can be shared between a marked-accessible parking space and another charging space. In such cases, the primary purpose of the marked space would remain the parking of disabled-marked vehicles. Such installations may be interpreted as satisfying the requirement for accessible charging spaces. In such cases, the NC DOI recommends that signage be provided to clarify that charging is not required in order to use the space. For example, “Accessible Parking. EV Charging is an Accessory Use” Or “EV Charging Optional.”

Charging Station Installation

Mounting Surface

The charging hardware may be mounted on a pedestal or attached to a pole, a wall or another vertical surface. Regardless of mounting style, the base should be at the same elevation as the parking surface, i.e. at street level. This significantly improves the ability to establish an accessible route from the hardware to the vehicle.

Consider alternatives for the orientation of the charging hardware. Depending on the charging space layout, the location of the access aisle and the associated accessible route, achieving accessibility may be more feasible by orienting the charging hardware at 45, 90 or 180 degrees to the charging space.

Operational Standards

Fuel dispensers are required to comply with ANSI 309 “Operable Parts” which includes three key elements:

1. Charging hardware must be installed with a clear floor space as defined in ANSI 305. A frontal approach on an accessible route will satisfy the typical clear floor space requirement (30” wide and 48” long), but the dimensions will vary if the approach is from the side (parallel), if the hardware is in an alcove, or if there are surrounding obstructions.

2. Operable parts must comply with the reach ranges specified in ANSI 308. The default unobstructed range of 15" minimum to 48" maximum applies to the charging connector at the end of the cord as well as to other operable controls on the charging hardware. Note that the 2011 National Electrical Code (NEC) Section 625 "Electric Vehicle Supply Equipment" requires minimum connector heights of 18" for indoor installations and 24" for outdoor installations, so compliance with the NEC should satisfy the minimum reach requirement for accessibility. The NEC maximum allowed height for the connector is also 48". When hardware controls include the use of a display screen it is recommended that owners assess the visibility of the display from a wheelchair seated position. ANSI 707.7 addresses display screens for Automatic Teller Machines and Fare Machines by requiring that the screen be visible from a point located 40" above the center of the clear floor space in front of the machine. That specification could be used as a model for assessing display screens on charging hardware if desired.
3. Gas pump nozzles are explicitly exempted from the maximum activating force requirement. This exemption may be interpreted to apply to electric charging connectors as well. This will likely only be a concern for high-power charging equipment.

Note that ANSI 707 "Automatic Teller Machines (ATMs) and Fare Machines) may apply to charging stations if they incorporate hardware and controls for assessing fees for the use of the charging space.

Protection

Curbs, bollards and wheel stops may be used to protect the charging hardware and/or delineate an accessible route. However, any of these protection devices may also obstruct access, introduce a trip hazard or make it more difficult to establish an accessible route from the charging space to the charging hardware.

It is recommended to simply install the minimum protection required.

Examples

Accessible Parking at a Public Library



Figure 1. Accessible public charging station at the Durham County Main Library, Durham, NC.

Several key design features are visible in Figure 1, which is a photograph of public charging stations at a county library:

- Provision of a van-accessible charging space (eight foot wide space with adjacent access aisle greater than eight feet wide)
- Provision of an accessible route from the parking space to the charging hardware that is greater than 48" in width
- Mounting of the charging hardware at street level and set back from the original curb line
- Mounting of the charging hardware such that it is not in the direct line of vehicle travel to reduce the need for protection by bollards
- Installation of bollards no closer than four feet to each other to avoid obstructing the accessible route
- Connection to an accessible route, from the charging space to the nearest entrance of the library, which is approximately 50 feet longer than the route from the farthest existing ADA-marked parking space at the site

Wheel stops were placed four feet from the curb to indicate an accessible route to the front of a parked vehicle. In retrospect, these wheel stops may be unnecessary, with omission providing drivers greater flexibility for vehicle positioning.

Accessible Parking at a Human Services Facility



Figure 2. Charging stations at the Durham County Human Services Complex, Durham, NC

Figure 2 shows the side view across charging spaces at a county human services facility. This installation uses the same design shown in Sample Design #1. While wheel stops can preserve an accessible route at the front of the charging space, note that omitting them gives drivers more flexibility in the ideal positioning of their vehicle.

Over-Protection Should be Avoided



Figure 3. Over-protection can hinder accessibility of charging stations.

Figure 3 shows charging hardware that has been installed with a two foot curb extension, protective bollards and wheel stops. Despite the adjoining access aisle and the sidewalk's generous width of nearly six feet, this charging hardware may not be deemed accessible due to the protective elements creating obstruction to the space. Furthermore, the space length has been reduced to less than 13 feet from the wheel stop to the end of the stripe, which may only accommodate compact vehicles.

On-Street Accessible Parking is Challenging



Figure 4. On-street van-accessible parking requires lots of adjacent space.

Figure 4 shows an example of van-accessible on-street parking. This space does not include PEV charging at this time, and would likely require additional curb removal at the front of the space to accommodate access to the charging hardware. Figure 4 illustrates the large amount of adjacent space required for an access aisle in this configuration. Typical adjoining sidewalks on existing streets may not be wide enough to accommodate this type of installation.



References

The national accessibility standards may be found online in several formats:

- [ANSI Standard A117.1-2009 “Accessible and Usable Buildings and Facilities”](#)
 - Viewable online (with no fee) at: http://publicecodes.cyberregs.com/icc/ansi/2009/a117p1/icc_ansi_2009_a117p1_cover.htm?bu=IC-P-2009-000025
 - Available for purchase in pdf, CD-ROM or soft cover format at: <http://www.iccsafe.org/Store/Pages/Product.aspx?id=9033S09>
- [DOJ 2010 ADA Standards for Accessible Design](#)
 - Available for download in pdf or html formats, along with companion guidance manual, at: http://www.ada.gov/2010ADASTandards_index.htm

Advanced Energy performed a national survey of EVSE-related accessibility guidelines and regulations as part of the research and discussion to establish requirements and recommendations for North Carolina. Two references stand out as key sources of information for any entity intending to address accessibility:

- [“EV Project: Accessibility at Public EV Charging Locations”](#)
 - Available at [http://www.theevproject.com/downloads/documents/EV Project - Accessibility at Public EV Charging Locations \(97\).pdf](http://www.theevproject.com/downloads/documents/EV%20Project%20-%20Accessibility%20at%20Public%20EV%20Charging%20Locations%20(97).pdf)
- [“Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State”](#)
 - Available at <http://www.commerce.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=8851&Mid=863&wversion=Staging>



www.NCPEVTaskforce.org



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