EV Charging Infrastructure

Consultation Document

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Summary

As Australia develops a network of electric vehicle (EV) charging stations, it is imperative to include access for People with Disability (PWD) and comply with the Disability Discrimination Act 1992 (DDA). DDA requires non-discriminatory access to places that accommodate the general public. Therefore, it is required the Austroads members understand the opportunities and challenges LZEV charging infrastructure represents for PWD and based on this understanding, to update the current Austroads low and zero emission vehicles (LZEV) charging infrastructure guidelines (the Guidelines) to better facilitate accessibility and inclusiveness.

This report focuses on publicly accessible EV charging infrastructure (fast and slow) for passenger vehicles and aims to ensure that charging stations are designed to be inclusive for all users. The guidance in this report may also be useful to inform charging infrastructure for commercial light vehicles and privately owned chargers in some instances.

This report is organised from an end user perspective following the weakest link principle: a service is only as accessible as its weakest link; hence these guidelines include all steps from planning vehicle charging to final payment. For each of these steps, we explore the various challenges that people with disability may encounter.

This consultation invites your view on how this might be approached.

Acronyms

ADA	Americans With Disabilities Act
AFIR	Alternative Fuel Infrastructure
BSI	British Standards Institution
CAGR	Compound Annual Growth Rate
CI	Charging Infrastructure
CS	Charging Stations
DDA	Disability Discrimination Act 1992 (Australia)
DSAPT	Disability Standards for Accessible Public Transport 2002 (Transport Standards) (Australia)
EU	European Union
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
LZEV	Low And Zero Emission Vehicles
ANSR	National Electric Vehicle Strategy Report (Australia)
NFC	Near-Field Communication
NZRM	Electric Vehicle Charging Station Signs and Road Marking Guidance (New Zealand)
RAA	Royal Automobile Association
RADG	RAA Design Guidelines for Accessible EV Charging Stations (Australia)
RFID	Radio-Frequency Identification
IUDG	Universal Design Guidelines for Electric Vehicle Charging Infrastructure (Irish)
USAB	United States Access Board
USDR	USAB Design Recommendations for Accessible Electric Vehicle Charging Stations (US)
WCAG	Web Content Accessibility Guidelines

Definitions

Accessibility: The design of products, devices, services, or environments for people with disability, ensuring they can access, use, and benefit from them effectively.

Accessible: The quality of being easily reached, entered, or used by people, including those with disabilities. It emphasises the ease and possibility of access for all individuals.

Accessible charging space: An electric vehicle (EV) charging station or area that is designed to be easily usable by everyone, in particular for people with disability. This includes features like ample space for manoeuvring, appropriate height for charging equipment, clear signage, and minimal obstacles, ensuring ease of access and use for individuals regardless of their physical abilities.

Bollard: In this case, a post of minimum 1300mm height installed adjacent to a charge point to protect the charge point from vehicle collision.

Charging point (aka charge point, charging unit, electric vehicle supply equipment (EVSE), EV charger, or charger): A device or system with one or more charging ports and connectors that provides electrical power to recharge an EV.

Charging station: A location equipped with one or more chargers used to recharge EVs. These stations can vary in charging speed and capacity, ranging from slower, level 1 chargers suitable for overnight charging, to faster, level 3 chargers for rapid charging. Charging stations can be found in private settings, like homes or businesses, and public areas, such as shopping centres, parking lots, and dedicated charging parks.

Charging bay (aka charging space or charging spot): A parking spot that is associated with one or more chargers used to recharge EVs. A space to park a vehicle for charging. A charging bay can be a marked parking space or an unmarked area adjacent to an EV charger.

Clear zone: A well-defined space, free from obstacles, with a minimum width of 1540 mm, to allow circulation for a person using a wheelchair.

Connector (aka plug): A device that attaches EVs to charging ports to transfer electricity.

Contactless payment methods: A secure method for consumers to purchase services using a debit, credit, smartcard, or another payment device using radio frequency identification technology and near-field communication (NFC).

Electric Vehicle: An automotive vehicle that is either partially or fully powered by electricity.

Kerb Drop: A sloped area of the pavement at the edge of a sidewalk or pedestrian walkway that allows people with disability or mobility impairments to access the roadway safely and easily.

On/off-Street Charging: Electric vehicle charging infrastructure that is installed on public roads or streets, usually in the form of a roadside charging station. Off-street charging, on the other hand, refers to charging infrastructure that is located in areas such as car parks or garages.

Parallel on-street parking: Parking bays where vehicles are parked back to front with their orientation parallel to the kerb.

Perpendicular parking bays: Parking bays where vehicles are parked side by side with their orientation perpendicular to the kerb.

Shall: Indicates that a statement is mandatory.

Shared area: A space located next to a designated parking area, used for entering or exiting a parked vehicle. It can also be utilised for other purposes that only temporarily obstruct the area, such as a walkway, vehicle aisle, or combined use with another nearby designated space.

Should: Indicates a recommendation.

Socket: The place that a connector plugs into, whether it is on the charging point or on the vehicle.

Tethered/Non-Tethered Cables: Tethered cables are built-in charging cables that are permanently attached to the charging unit, allowing users to connect them directly to their EVs for charging. Non-tethered cables (user-owned) are charging cables that users bring with them and connect to the charging station's connector to charge their EVs.

Vehicle charging inlet: The inlet on a vehicle that a connector is plugged into. Also referred to as a charging port or charging door.

Universal Design: The design and composition of an environment, products, and services in a way that can be accessed, understood, and used by everyone, regardless of their age, size, or ability.

Wheel stop: An effective way to prevent vehicle overhangs from reducing clear widths of accessible paths and to assist attentive drivers when parking their vehicle.

Introduction

Electric vehicles (EVs) have many potential benefits including reduce greenhouse gas emissions, reducing fuel consumption, and improving air quality. EVs can also efficiently use homegrown, renewable energy resources rather than depending on fuel imports from other nations[1]. With transport set to become the highest emitting sector of the Australian economy by 2030, the transition of the vehicle fleet to electric and low emission technologies is of critical importance to Australia and New Zealand achieving Net Zero Emissions by 2050. The EV market has experienced notable growth between 2023 and 2024. In 2023, EV sales reached 87,430 units, accounting for approximately 7% of the total new vehicle market[2]. By the first half of 2024, EV sales increased to 50,918 units, representing 8% of new vehicle sales during that period[3].

The growth of EVs requires more public charging infrastructure, which is split into fast-charging (DC) and slow-charging (AC) networks. Fast-charging supports long trips with short charging times, while slow-charging, used for daily travel, includes private (home or work) and public charging. Public stations, located in places like parking areas, allow EV drivers to charge while doing other activities. To make these stations viable, they need to be placed in convenient locations and used frequently, or they risk becoming underutilised and costly.

The rapid growth in the number of EVs being purchased is accompanied by a push for the rapid rollout of charging infrastructure. This infrastructure is often retrofitted into the existing road and roadside environment without consideration of accessibility. However, the rollout of EV infrastructure, Australian Prime Minister Anthony Albanese said that "the chargers will be interoperable with all EVs and accessible by all motorists"[4], highlighting that the importance of considering accessibility in EV charging implementation.

Currently the implementation of charging infrastructure is conducted in a relatively ad hoc manner across national, state and territory governments, local councils, charging station operators, local businesses and individuals.

Austroads has developed guidelines (the Guidelines) to cover the installation of charging infrastructure for LZEV, including technology requirements, location, usability, and design. The Guidelines are designed to aid road managers and prompt consideration of planning and design issues. The document draws on work and guidance from the member states and New Zealand, and also includes international insights. As this is a relatively fast-moving area of interest, Austroads will continue to monitor and research developments to update these Guidelines regularly, the Guidelines were first published in 2022. The current Guideline did not provide adequate consideration or coverage of accessibility to aid in achieving inclusivity and accessibility of charging infrastructure.

As Australia develops a network of EV charging stations, we must include access for people with disability and comply with the Disability Discrimination Act 1992 (DDA). DDA requires non-discriminatory access to places that accommodate the general public. Commercial facilities that do not directly serve the public, like office facilities and warehouses, also must meet DDA

[1] David Mayfield, 2012, https://www.vacleancities.org/wp-content/uploads/EV-Charging-ADA-Version-1.0s.pdf

[2] Jesse Hyland, 2024, https://www.abc.net.au/news/2024-01-05/australia-ev-sales-doubled-electric-hybrid-vehicles/103284916

[3] Toby Hagon, 2024, https://evcentral.com.au/2024-electric-car-sales-in-australia-a-deep-dive-into-the-state-of-the-ev-market-led-by-tesla-and-byd

[4] Prime Minister, The Hon Anthony Albanese MP 2022, cited by the National Electric Vehicle Strategy https://www.dcceew.gov.au/sites/default/files/documents/national-electric-vehicle-strategy.pdf

requirements for new construction and alterations. Therefore, the EV charging experience should be a positive one for all users, including people with disability and impairments.

Purpose

Austroads would like to understand the opportunities and challenges LZEV charging infrastructure presents for people with disability. Based on this understanding, the current Austroads LZEV charging infrastructure guidelines can be updated or refined so that the guidelines also facilitate accessibility and inclusiveness.

Scope of work

This report aims to offer guidance to those engaged in the production, procurement, installation, and management of public charging infrastructure. They provide suggestions on the design of the charging stations, site accessibility, and the necessary information and communication to guide users before, during, and after charging.

The report's focus is on publicly accessible EV charging infrastructure (fast and slow) for passenger vehicles and aims to ensure that charging stations are designed to be inclusive for all users. this report may also be useful to inform charging infrastructure for commercial light vehicles and privately owned chargers.

The report is organised from an end user perspective, including all steps required to charge the vehicle. Within each of these steps, we explore the various challenges that people with disability may encounter and suggest guidance for addressing these challenges.

The scope of the research report goes beyond that of the Guidelines to provide a holistic evaluation that considers all the steps of charging. While this report will not update the Austroads Guidelines, it will provide the basis for a future update to the Guidelines.

Methodology

Development of the Guidelines

The development of this research report on accessible LZEV charging stations involved several key stages:

- Review of existing best practices: A literature review of various Australian standards, along with international and industry best practices from the UK, Ireland, the US, Europe and Germany, to inform the foundation of the guidelines.
- Assess known issues: Over a period of three days, in collaboration with the Australian Federation of Disability Organisations (AFDO), several people with disability visited various EV stations with the project team. This process helped to identify the challenges and barriers motorists face and assess their potential impacts. This activity involved hiring an EV car and accompanying each participant through the entire charging journey. This process covered planning (finding the charging station), driving to the charging station, parking, moving around the site, charging the vehicle, and paying for the service. Additionally, participants contacted the help centre, simulated an issue with the charging station and assessed the support offered and response time. Participants also reviewed the mobile applications of many of the current EV charging station manufactures, including Chargefox, Evie charging, BP Pulse, Chargepoint, Tesla, Ampol,

and Plugshare. Challenges were faced at each stage and suggested solutions from a disability perspective were documented.

- Drafting the report: The report and guidance were drafted based on the whole journey approach, from planning to charge through to payment. At each stage the identified challenges are outlined and recommendations provided to overcome these challenges, drawing on Australian standards and international best practices.
- Workshops with disability organisations: In collaboration with Physical Disability New South Wales (PDNSW), two workshops were organised. These workshops involved peak disability representative organisations, including those representing physical disabilities, cognitive disabilities, visual impairments, and carers of people with disability. Feedback collected from these sessions helped to identify additional challenges from a variety of disability perspectives.
- Industry and government collaboration: A workshop was organised in partnership with ITS Australia, involving representatives from state governments (Victoria, NSW, Queensland, and ACT) and EV charging manufacturers (including Evie Charging Station, and Chargefox). The feedback from this workshop helped assess the feasibility of implementing the proposed guidelines and provided additional insights to enhance station accessibility.

This report and its guidance serve to assist organisations in designing, installing, and managing infrastructure that is accessible to all. While it is impossible to anticipate every scenario, the recommendations should be utilised wherever feasible and modified as necessary.

It is intended that in all planning aspects, site selection, procurement, and installation of EV charging stations, these approaches will become second nature, delivering an easy and frictionless charging experience for everyone.

Sources

Australian

There are several pieces of Australian legislation and reference documents that have an impact on chargers and physical environment design and have informed this guidance. These include:

- *AS 1428.1 (2021) Design for access and mobility. Part 1* is a design standard that sets out the requirements for the access and mobility of people with disability in the built environment. It focuses on providing guidelines for safe and equitable access to buildings and facilities. It covers key areas such as doorways, ramps, stairways, and signage, aiming to remove barriers and promote inclusivity in both public and private spaces.
- *AS 1428.2 (1992) Design for Access and Mobility – Enhanced and additional requirements – Buildings and facilities* is part of the Australian Standard for accessibility. This standard builds on AS 1428.1, which provides basic requirements for access for people with disability. AS 1428.2 expands on these principles, introducing additional and enhanced guidelines to make buildings and facilities more accessible for people with various disabilities.
- *AS 1742.11 Manual of uniform traffic control devices - Part 11-Parking controls* provides standards for the design, application, and use of traffic control devices related to parking in Australia. This standard ensures consistency and uniformity across all parking-related signage, markings, and controls, improving road safety and clarity for road users.
- *AS 2890.6 Parking facilities. Part 6: Off-street car parking for people with disability* provides guidelines for the design and construction of parking spaces that are accessible to people with disability. The standard ensures that car parks, particularly off-street facilities, are designed to accommodate the specific needs of people with mobility impairments.
- *AS 4586* is the *Australian Standard for Slip Resistance Classification of New Pedestrian Surface Materials* provides guidelines and testing methods to determine the slip resistance of flooring materials to help reduce the risk of slips and falls in both public and private spaces.
- *AS EN 301 549 (2020) Accessibility requirements for ICT products and services* is an Australian standard that sets guidelines for making information and communication technology (ICT) products and services accessible to people with disability. This standard covers a broad range of ICT devices, services, and software, ensuring they are usable by people with various disabilities, including those related to vision, hearing, speech, and motor functions.
- *AS/NZS 3000 (2018) Australian/New Zealand Wiring Rules* is the standard that sets out the requirements for the design, construction, and verification of electrical installations in Australia and New Zealand.
- *Building Code of Australia (BCA)* provides a uniform set of guidelines ensuring the safety, health, amenity, and sustainability of buildings, addressing aspects such as structural integrity, fire protection, accessibility, energy efficiency, and more.
- *Design Guidelines for Accessible EV Charging Stations (RADG)* were developed through a trial conducted by the Royal Automobile Association (RAA) in South Australia, 2023. These guidelines aim to ensure that EV charging infrastructure is accessible for people with disability, particularly focusing on mobility challenges. The trial, done in partnership with

disability consultants such as Able Access Design, tested various aspects of accessibility at charging stations, including space for exiting vehicles, ease of reaching and using the chargers, and the ability to complete payments at unattended stations.

- *Disability Discrimination Act 1992 (DDA)* is an Australian law that seeks to eliminate discrimination against people with disability in various aspects of public life. It aims to ensure equal rights and opportunities for people with disability in areas such as employment, education, access to premises, and the provision of goods and services.
- *Disability Standards for Accessible Public Transport (DSAPT)* were established under the Disability Discrimination Act 1992 (DDA) in Australia to ensure that public transport systems are accessible to people with disability. The DSAPT sets out minimum accessibility requirements for various public transport modes, including buses, trains, ferries, taxis, and related infrastructure such as stations and stops.
- *Electric Vehicle Charging Station Signs and Road Marking Guidance NZRM)* provides detailed recommendations for the layout, signage, and road surface markings for EV charging stations in New Zealand. It aims to standardise how EV charging spaces are marked and signed to improve the ease of identification and use for EV drivers. Key aspects include providing accessible spaces for drivers with disabilities, marking clear parking restrictions for EV charging, and ensuring that road markings comply with local regulations to facilitate enforcement and support increased EV uptake.
- *National Electric Vehicle Strategy* is a framework developed by the Australian government to accelerate the transition to EVs, aiming to reduce emissions, lower costs for Australians, and create job opportunities. The strategy focuses on improving EV supply through a fuel efficiency standard, supporting the expansion of charging infrastructure, encouraging EV demand, and fostering local manufacturing and recycling industries. It also promotes collaboration with states, territories, and industries to facilitate the adoption of EVs while aligning with Australia's climate goals for 2030 and 2050.
- *Web Content Accessibility Guidelines (WCAG) 2.1* are a set of recommendations developed by the World Wide Web Consortium (W3C) to make web content more accessible to a wider range of people with disability, including those with visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities.

Global

In terms of a global review of existing guidance for accessible EV charging, we reviewed the following documents to inform this guidance:

- *Accessibility and Signage for Plug-In Electric Vehicle Charging Infrastructure* was developed by the California Plug-In Electric Vehicle (PEV) Collaborative in 2012. It provides recommendations and guidelines to ensure that EV charging stations are accessible to all users, including people with disability. The guidelines cover accessible EV parking, installation at new and existing facilities, card readers, and standardised signage for EV charging stations. The goal is to support the efficient and accessible expansion of EV infrastructure across California, aligning with the Americans with Disability Act and California Building Code requirements.
- *Americans with Disabilities Act (ADA) Accessibility Standards* are regulations designed to ensure that public spaces, facilities, and transportation in the United States are accessible to individuals with disabilities. Enforced under the Americans with Disabilities Act of 1990,

these standards apply to a wide range of public and commercial buildings, including restaurants, offices, parks, schools, and public transportation systems.

- *Design Guidance: Accessible EV Charging by Designability (hereafter "Designability")*, published in November 2022, provides design guidelines to make EV charging stations accessible for people with disability. These guidelines were created in partnership with the charity Motability and over 200 Motability Scheme customers. It offers practical advice for manufacturers, installers, and providers of public EV charging infrastructure, focusing on making charging stations more inclusive.
- *The United States Access Board (USAB)* develops built environment design standards that promote equality for people with disability. Their *Design Recommendations for Accessible Electric Vehicle Charging Stations (USDR)* states the following:
    - If provided, accessible EV charging spaces cannot count towards the minimum requirement for accessible parking spaces at a facility.
    - Provide an access aisle on both sides of the EV charging space and between the space and charge point for easier access.
    - Vehicle space must be at least 3m – 4m wide with a minimum 1m wide access aisle.
    - The International Symbol of Accessibility must be used on bays for people with disability.
- *North Carolina PEV Taskforce – Plug-In Electric Vehicle (PEV) Roadmap For North Carolina* was published in 2014 to address EV adoption and identified challenges with accessible charging infrastructure. The report outlines the need for funding and state-level coordination to identify ideal locations for accessible charging infrastructure and ensure that EV charging technology is both feasible and accessible as early as possible.
- *PAS 1899:2022* is a standard aimed at enhancing the inclusivity of public EV charging points for people with accessibility needs. It provides essential specifications for designers, procurers, and installers on creating accessible public charge points. The standard addresses various aspects including the physical environment around fixed charge points, such as kerb height and ground type, and the location, placement, and spacing of charge points. It also covers details like the height of charge points, cable management, and the use of colours on screens to ensure ease of use.
- *Swedish Accessible Charging Station manual* provides guidelines for creating EV charging stations that are accessible to everyone, particularly people with disability. It emphasises selecting inclusive locations, ensuring clear signage, avoiding surface level differences, and maintaining adequate space around chargers for wheelchair users. The guide also covers choosing equipment with accessible controls, such as low screens, easily operated handles, and colour-blind-friendly indicators. The recommendations aim to promote equal access to EV charging infrastructure.
- *Universal Design Guidelines for Electric Vehicle Charging Infrastructure (IUDG)* is a document developed by the Irish government to ensure that EV charging stations are accessible and user-friendly for everyone, including people with disability. Recognising that there were no specific guidelines in Ireland for accessible EV charging, these guidelines aim to fill that gap and promote the deployment of easy-to-use charging infrastructure across the country.

How to use this report

1. Read the introduction to this report for an overview of accessible EV charging infrastructure guidelines development.
2. This report follows an end-user perspective. Planning and deploying a site involves teamwork: this report does not prescribe responsibility to particular stakeholders for stages of the process, but rather provides guidance that will deliver a seamless experience overall and for everyone throughout the following stages:
    - Stage 1: Plan to charge vehicle
    - Stage 2: Drive to the charging station
    - Stage 3: Find an available charging bay
    - Stage 4: Charge the vehicle
    - Stage 5: Move around site peripherals
    - Stage 6: Complete and pay
3. Review the corresponding section for the stage that is of interest or responsibility. Each stage includes specific challenges and recommended guidance to overcome them, based on Australian standards, international best practices and user engagement feedback.

The report and guidance can be used as a checklist to guide you through the implementation of accessibility during the design or assessment of EV charging stations.

For some examples such as accessible parking spaces, utilise templates provided where applicable. The templates can be adapted if necessary.

References and sources of information are provided at the end of the document and at the end of each section where they have particular relevance.

Whole Journey Guide

1. Plan to charge vehicle

Planning to charge is the first step to charging an EV. It involves locating charging stations, gathering information, using mobile applications (apps) to discern the most appropriate charging station to use, and booking in a charging bay where possible. Some of the biggest challenges identified at this stage come from the absence of properly conveyed information, primarily relating to the app being inaccessible for people with disability and accessibility features (or lack thereof) not being communicated.

Challenges and suggested guidance

1.1. Information and communication

A lack of information and awareness about the availability and accessibility of public charging stations can pose challenges regarding how users will access those stations. People with disability may struggle to find up-to-date online information about the locations, accessibility features, and operation details of the charging infrastructure, leading to confusion about which stations are usable or unusable. Keeping data up to date and where possible, in real time is important, as charging stations occasionally break down.

Guidance

Providing clear and accessible information remotely (via the website and app) gives users greater confidence that they can access a charging station before driving to the location. Some key information to be provided could include:

- The accessibility of the charging station
- Nearby amenities
- Booking options and availability
- Operational status of the charging bay
- Charging type (DC vs AC)
- Charging price
- General additional information

Sources

- The AS EN 301 549 standard encourages that websites should use the accessibility design guideline provided in WCAG 2.1. This guideline includes the following principles: perceivable, operable, understandable, navigable, input modalities, predictable, and robust.
- Designability and PAS 1899:2022 suggest that the provision of data and information regarding the locations and the characteristics of public charging stations is essential for people with disability and those who travel with them and can prevent unnecessary time and effort being spent looking for suitable charging points.

1.2. Booking or reservation features

If charging stations cannot be reserved, people with disability may find it difficult to find available charging stations that fit their needs. An example of this is when people with disability arrive at a charging station and it is occupied/out of order, they may not have the flexibility to

simply ‘try another one’. The ability to book an EV charger allows people with a disability to plan their charging needs in advance.

Guidance

In the future, people with disability could have the option to book a charging spot in advance. This would provide assurance that they can go to their preferred charger with the certainty that it is available for them to use.

Sources

Suggestions from stakeholder workshops (see Methodology).

1.3. Mobile applications

Using mobile apps for EV charging stations can present challenges for people with disability. Even though these users can drive a car, the complexity and initial learning necessary to navigate apps can be a challenge, particularly if every app has a different and inconsistent layout. This problem underscores the need for more intuitive interfaces and the inclusion of tutorials to guide first-time users. Such features are essential for those with disability, as they may face additional hurdles in adapting to new technologies.

Guidance

Mobile apps should facilitate the charging process and enhance the user experience by offering information before, during and after the charging session, although this should not be strictly required. They should give reliable, accurate and real-time information about the availability of charging bays and the working status of each station.

Mobile applications should also be consistent in their user experience. For people with disability, this means users would only need to learn and use one app, making the experience easier to navigate no matter where they are or to which charging station they go.

The design of mobile applications should follow the WCAG 2.1.

Apps should also not be a requirement, as they may not work well in areas with a weak phone signal or for some users. A clear privacy policy also needs to be in place and communicated to address worries about personal information being shared with too many companies.

One positive example of this is the chargefox app, shown in Figure 1.1. Upon selection of one of the charging stations (shown via a pin), information is displayed about the location, such as the address, what connectors are available, the type of charging point, and a help link for assistance.

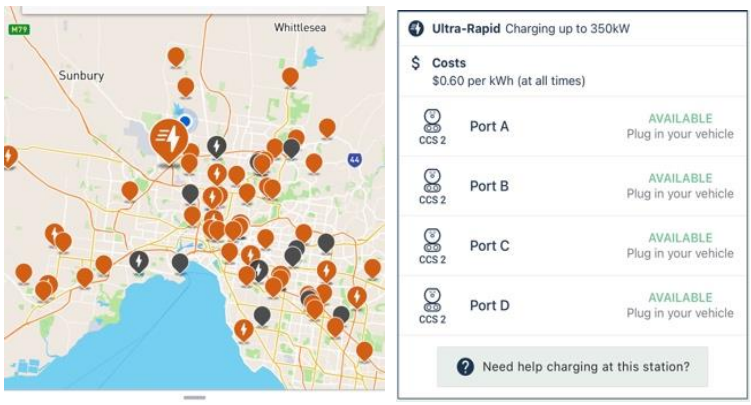

Figure 1.1: A screenshot from the chargefox app

Sources

- AS EN 301 549 standard encourages non-websites, like mobile applications, to comply with the accessibility design guideline provided in the WCAG 2.1. This guideline includes the following principles: perceivable, operable, understandable, navigable, input modalities, predictable, and robust.
- IUDG recommends that all information about public charging station locations, pricing, real-time availability, and accessibility should be available through mobile applications. In addition, the charger's functions (except the charging cable) should be controllable via a mobile application on a smartphone.

1.4. Operational charging stations

Given the additional requirements and features of accessible charging stations, uptime and consistent maintenance remain important aspects to be communicated for people with disability. If not properly done, it may take users significantly longer to find an operational charging point, negatively impacting their journey time and reducing confidence in the charging infrastructure.

Guidelines

It is recommended that priority be given to maintaining accessible charging stations to ensure availability. Where stations are out-of-order, this information should be clearly conveyed to users before they arrive (ideally online, see stage 1).

Sources

- IUDG recommends that charging station operators should ensure the proper condition and functionalities of EV charging infrastructure throughout its commercial lifetime.

2. Drive to the charging station

While driving to the charging station, the primary focus is on where stations are located (and how far apart they are), wayfinding and signage, and the environment surrounding the station (including what amenities are nearby and the general appearance of the EV charging station). Without these considerations, charging stations may be difficult to find and unattractive to users, meaning they are likely to be underutilised.

Challenges and suggested guidance

2.1. Distribution of charging stations

EV charging stations currently tend to be located less prominently than fuel stations. People with disability might encounter difficulties in locating accessible charging stations when traveling to unfamiliar areas. Such challenges can result in discomfort or fatigue, particularly for those with specific needs or limitations, and worse, if no accessible charging station can be found within the range of the vehicle.

Guidance

All EV drivers, including drivers with disability, should be able to travel safely and reliably throughout Australia (Figure 2.1). Charging stations should be strategically positioned across diverse settings, including residential areas, major highways, rural regions, and key points of interest. A person with disability should be able to travel to find charging stations with the same confidence as anybody else. Barriers or policies that prevent access to public charging stations at any particular time should be avoided.

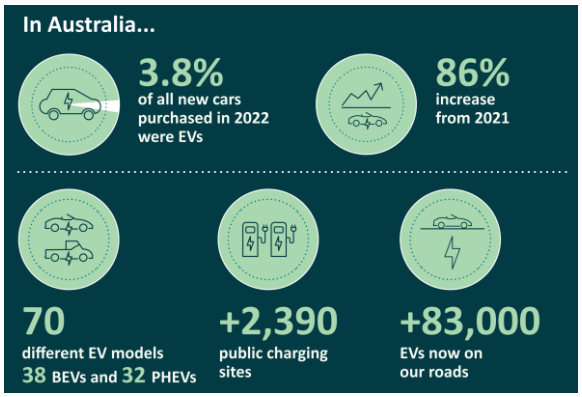

Figure 2.1: A screenshot taken from the National Electric Vehicle Strategy, published in 2023 showing the growth of the EV charging vehicle market and infrastructure around Australia.

Sources

- Government sector:
  - The recent National Electric Vehicle Strategy Report states that there are more than 4,900 public chargers located at over 2,390 sites around Australia. The Australian Government is partnering with the NRMA to install a backbone of fast-charging infrastructure - a network of 117 chargers located on major highways across the country at an average interval of 150 km.
  - The Irish guideline recommends that the majority of stations be accessible 24 hours per day, 7 days per week.
- Private sector:
  - Ampol will initially deliver around 360 fast charging bays at approximately 140 sites across New South Wales, Queensland, Victoria, and Western Australia.

- BP launched its electric vehicle charging brand bp pulse in Australia. The company has ambitions for around 600 ultra-fast charge points in Australia.
- In partnership with JOLT, Transport for NSW are delivering 50 new EV charging points to popular transport hubs around Sydney.

2.2. Signage and directions

The lack of proper signage and visible markers surrounding charging stations could create challenges for people with disability. This could also lead to increased anxiety or stress if a user is struggling to locate the facility.

Guidance

Clear, consistent navigation signage should be provided to indicate the site entrance and the way to the charging points, in compliance with Australian standards.

The charging stations should be easy for drivers to detect by ensuring adequate indicators are in place, such as lighting, tactile elements, and different surfaces around the charging station. The use of consistent and contrasting colours for the charging station, its components and the surrounding environment can enhance user friendliness. Any parts that may protrude should be clearly demarcated. For people with visual impairment, these stations can act as a guide in large open parking spaces. Ideally, charging station locations should be integrated into digital navigation aids.

Parking bays inside the charging station should also be close to accessible parking spaces and entrances, so that they are easily identifiable and locatable.

Sources

- AS 1428.1, particularly section 5, provides examples of different signage.
- AS 2890.6 requires that direction signage be provided. Further examples are given in section 3.2 Station signage and markings.
- RADG suggests different signs should be displayed in EV charging stations.
- Designability recommends providing clear, consistent navigation signage from a site entrance to charging stations.
- IUDG suggests that appropriate signposting is deployed in parking and rest areas on the road network where EV charging infrastructure is installed.

2.3. Welcoming appearance

People with disability can encounter heightened safety challenges at EV charging stations. Those with mobility challenges are more vulnerable in dimly lit or isolated areas. People with visual impairment might struggle to assess their surroundings, and those with hearing issues could miss crucial alarms or warnings. Hence, this could result in people with disability avoiding these EV charging stations due to feeling unsafe.

Guidance

Charging stations should be a safe setting for everyone. Clearly placed security cameras that cover the charging areas are advised and encouraged to discourage criminal activity. These security cameras should be clearly visible to users. The charging equipment should be situated close to amenities, and ideally, charging spots should be in busy areas of a parking lot to naturally monitor activity and enhance users' sense of security.

Light spill should be considered, potentially through the use of smart lighting to enhance users' sense of security.

Sources

- PAS 1899:2022 recommends placing security cameras near public charging stations, especially those near accessible parking spots.
- IUDG suggests installing surveillance systems and an emergency button for immediate contact with local emergency services.

3. Find an available charging bay

Once EV drivers have arrived at the charging station, they need to park their vehicle in a charging bay. Accessible charging stations need to be clearly labelled, easy to find and available for use for people with disability, with potential safeguards in place to help drivers park their vehicle in a specific spot without risk of damage.

Challenges and suggested guidance

3.1. Availability of dedicated charging spaces

There may be a limited or insufficient number of charging spaces with accessibility features (like those with adjoining aisles or wider clearances). This could result in a person with disability being unable to charge their vehicle. The accessible charging bay may also be in use by others who do not need accessible features.

Guidance

At a current level of uptake of EVs, EV charging stations should utilise the 'use last' policy (Figure 3.1) to ensure EV charging spaces can be designed with accessible mobility features but do not require that charging spaces be reserved exclusively for Australian Disability Parking permit holders. This ensures that utilisation of charging spaces is maximised.

Figure 3.1: Use Last signage designed by RADG

The 'use last' policy should be reconsidered once there are a sufficient number of EV charging stations to enable the provision accessible charging spaces with exclusive access for people with disability.

Sources

- AS 2890.6 suggests signage for space reservation be provided where necessary, including "permit must be displayed" text.
- RADG suggests utilising the 'use last' approach.
- USDR recommends the 'use last' approach in relation to EV chargers with accessible mobility features.

3.2. Station signage and markings

The lack of clear signage and visible markings directing users to and around accessible charging bays may lead to confusion and difficulty in identifying charging bays designated for people with disability.

Guidance

To ensure users are adequately informed, signs at the charging bay need to provide detailed information about the charger. This should cover aspects such as which vehicles can use the charger (for instance, electric or hybrid) and other pertinent details such as charging fees and how to pay. The signs should be placed at a suitable height and be accompanied by road markings.

Type 2 signage (Figure 3.2) should be located in front of each charging bay with the bottom of the sign located no less than 2200mm above the ground surface. Signs that overhang a footpath or cycle path should be placed no less than 2500mm above the level of the footpath or cycle path.

A universal design of EV charging signage across Australia is recommended. There should be a visual contrast between the signage colour and the background, and a visual difference should be created by referencing the surface light reflectance values.

Figure 3.2: Example of type 2 signage, adapted from the RADG

Road markings should indicate the boundaries of both on-street and off-street charging bays. Each charging bay should be identified on the ground surface by means of type 1 signage (Figure 3.3).

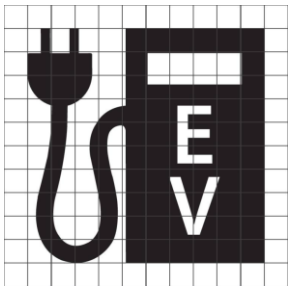

Figure 3.3: Example of type 1 signage, adapted from NZRM.

To differentiate a charging bay from a regular parking bay, the standardised type 1 symbol should be prominently displayed. The surrounding access zone should be hatched (Figure 3.4).

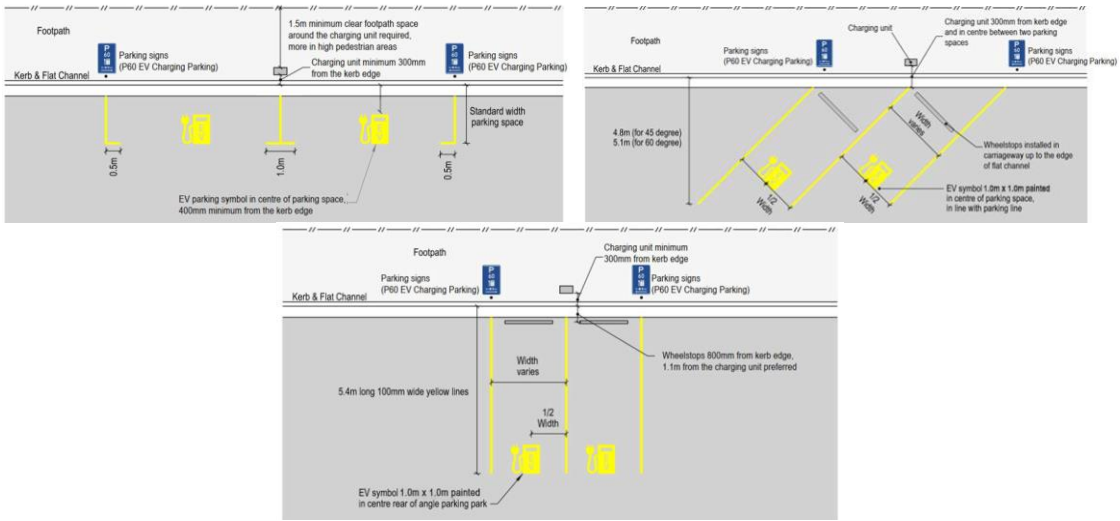

Figure 3.4: Line marking and symbols for parallel parking, 45° parking, and 90° parking, respectively. Diagrams are adapted from NZRM

Sources

- AS 1742.11 provides guidelines for signage design, which should extend to EV charging signage.

- Designability, pg. 12-14, has a section on signage and suggestions for details around design, included information, and placement.
- PAS 1899:2022, Appendix A.3 Signage provision local to charge points, gives guidelines on details surrounding signage for a variety of environments, and figures B.1 show road markings.
- AS 1428.1 provides guidance for road markings.
- Based on Irish EV charging infrastructure: universal design guidelines and road markings should indicate the boundaries of both on-street and off-street parking bays. The parking bay should be clearly identified, with the words Electric Vehicle Charging or EV Charging written on the roadway in letters at least 0.35 metres in height. To differentiate a charging space from a regular parking bay, the standardised white EV symbol on a green or blue background should be prominently displayed. The surrounding access zone should be hatched in yellow.

3.3. Charging point placement

The placement and design of EV charging points can present significant challenges for people with disability. For example, placing chargers on kerb extensions might make it hard for someone in a wheelchair to get past. Also, if a charging point is in the middle of several parking spots, it might block the way for with a person with disability.

Guidance

Charging points should be positioned so they do not block the drivers' view and can be used safely. They should also consider the various sizes and types of vehicles, causing minimal disruption to other road users. To give drivers flexibility in how they park, charging points should be set up in different spots for various parking styles. For on-street locations, charging points should be placed on kerb extensions to avoid obstructing footpaths. For enroute fast charging stations, a side-on layout similar to that of existing petrol stations may be considered to accommodate longer vehicles. If there is a charging station that serves multiple charging bays, it should be located in the middle between these bays.

Sources

- PAS 1899:2022 recommends that the placement of a public charging station, in combination with other existing furniture, should not further compromise the accessibility of the surrounding environment.
- The Swedish Accessible Charging Station manual suggests that positioning the charging station similar to a traditional petrol station makes it easy to exit after charging and makes it easier for longer vehicles and vehicles with trailers to charge.

3.4. Parking barriers

The charging station should have a protection barrier around it to prevent cars from driving too far forward, ensuring safety and proper alignment. This can help people who may struggle to park their vehicle and provide additional safety protections against damages to the vehicle or charging point.

Guidance

Bollards should have an installed height of a minimum 1350mm above the car park floor, with a minimum 300mm retro-reflective coloured band, located at a minimum 900mm in height above the car park floor.

Any protective elements should be visually distinguishable from the surrounding environment to prevent light reflection.

Sources

- PAS 1899:2022 recommends the distance between any impact protection barriers and a public charging station should not exceed 0.22 metres. The height of impact protections barriers should not exceed 0.6 metres.
- PAS 1899:2022 recommends bollards should have a diameter not exceeding 0.1 metres and they should be at least 1 metre above ground level. The minimum distance between bollard centres should be 1.4 metres. The bollards should be located no more than 0.3 metres away from the charging station (either forward or to the side).
- PAS 1899:2022 recommends where a wheel stop is installed within a designated accessible off-street parking bay, the installation of the wheel stop is provided with a minimum clearance of 0.9 metres from the front of the parking space to the wheel stop (not including the access zone), and with a wheel stop of a maximum width of 1.8 metres.

4. Charge the vehicle

Once parked, users will exit their vehicle to plug it in and commence the physical charging process. This means they need to be able to get out of their vehicle, manoeuvre to the charge point, connect the charger to their vehicle, and monitor charging progress. Potential issues can arise if the charging cables are difficult to use (due to tension, insufficient length, and so on), the route from the vehicle to charge point is obstructed or the terrain is difficult, or if the progress of the charging is not properly communicated. This is the step where users are most likely to require assistance, which should be taken into account.

Challenges and suggested guidance

4.1. Unobstructive barriers

Although barriers should be put in place to protect the charging point and aid users in parking, their placement also must not obstruct a user's ability to operate the charging station. The placement of bollards should consider spacing and distance from both the charging point itself, along with any accessible pathways, walls, or other nearby parking or charging bays.

Guidance

Adequate space should be provided between the protection barriers and the public charging point to enable smooth movement and avoid congestion.

In accordance with AS 1428.2-1992, bollards should not restrict ease-of-access and charging equipment should be within reach range (Figure 4.1).

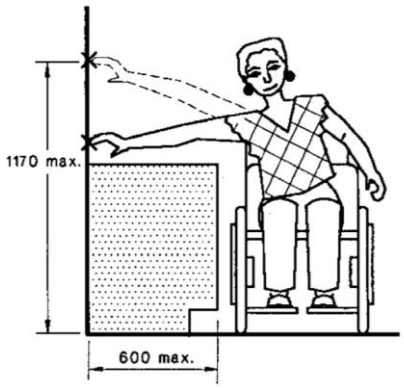

Figure 4.1: Image from AS 1428.2-1992

To ensure that bollards do not restrict reach range, there should be a gap of 850 mm between bollards to allow users to pass through and reach equipment. Installation of a bollard should ensure a minimum 1000mm clear access path when used in a walkway adjacent to an accessible charging space (Figure 4.2).

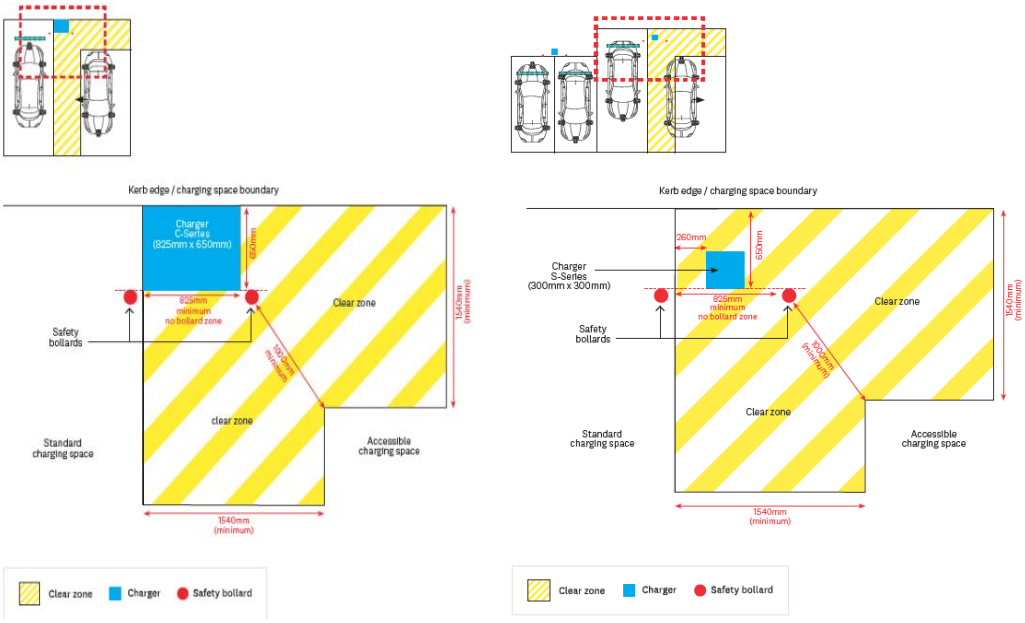

Figure 4.2 Charger/ bollard location for two and four spaces, respectively. Adapted from RADG

Sources

- All protection barriers or bollards must be in accordance with AS 2890.6, and all reaching distances must abide by AS 1428.2 1992.

4.2. Space around the vehicle

The physical layout of the charging station may lack sufficient clearance and accessible pathways, making it difficult for people with disability to manoeuvre their vehicles or comfortably use mobility aids. This is particularly relevant when exiting the vehicle, moving between charging points and vehicles/parking spaces, or visiting amenities, as people with disability are more vulnerable to being struck by traffic.

Guidance

Parking bays should be designed to enable all users to get in and out of their vehicles, move around the vehicle safely, access the charging station, and park comfortably.

In newly built 90° charging stations, a length of 6940mm should be given to accommodate the safe loading/deployment of any adaptations such as ramps, hoists, and lifts from the boot of a vehicle (Figure 4.3 and Figure 4.4). In cases where charging stations are being retrofitted to existing parking, the additional 1540mm should be placed behind the space as a shared vehicle-pedestrian area (Figure 4.5).

The headroom above each charging space and adjacent shared area, measured from the ground level of the charging space, should be a minimum of 2500mm in accordance with AS 2890.6:2022.

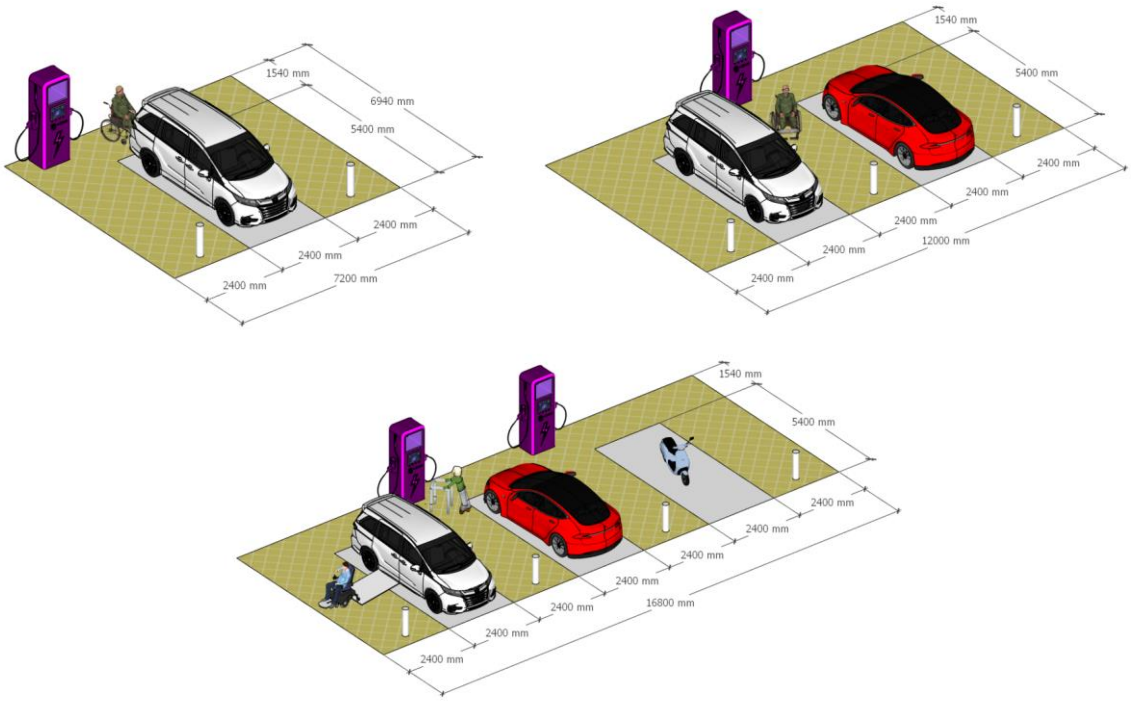

Figure 4.3: Surrounding distances for 1, 2 and 3 charging spaces, respectively. Design concepts provided by the Victorian Department of Transport & Planning's Transport Accessibility & Inclusion Branch

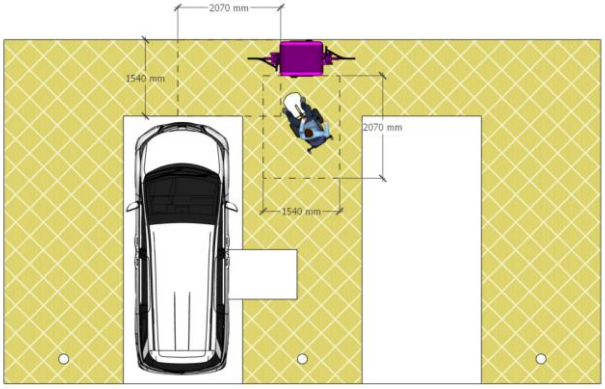

Figure 4.4: Top-down view of distance requirements for 2 charging spaces. Design concept provided by the Victorian Department of Transport & Planning's Transport Accessibility & Inclusion Branch

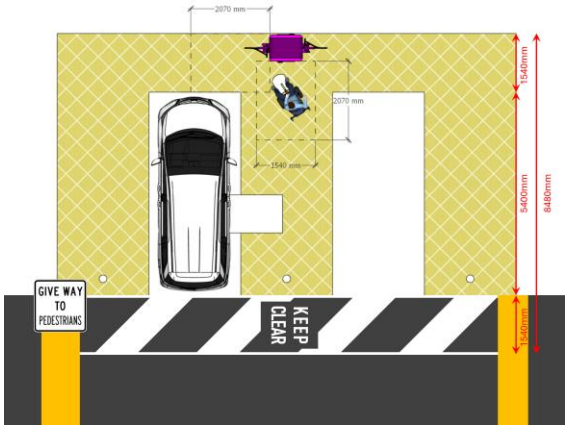

Figure 4.5: Example of potential clearway, adapted from the Victorian Department of Transport & Planning's Transport Accessibility & Inclusion Branch

Similar considerations should be given to both 45° and parallel charging stations, in accordance with AS 2890.6 to accommodate the safe loading/deployment of any accessibility adaptations (Figure 4.6 and Figure 4.7). Charging points should be placed as not to obscure entrance into any parking or charging space, with an area of 1540mm by 2070mm in front, for a user to be positioned (Figure 4.8).

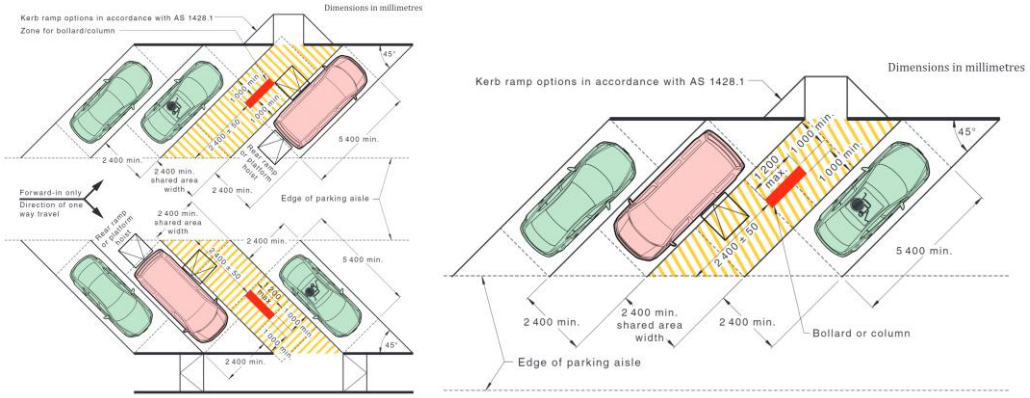

Figure 4.6: Example of 45° parking with an adjacent shared area and kerb ramp or in-line kerb ramp (allowing forward in-parking, and both forward-in and reverse-in parking, respectively). Adapted from AS 2890.6

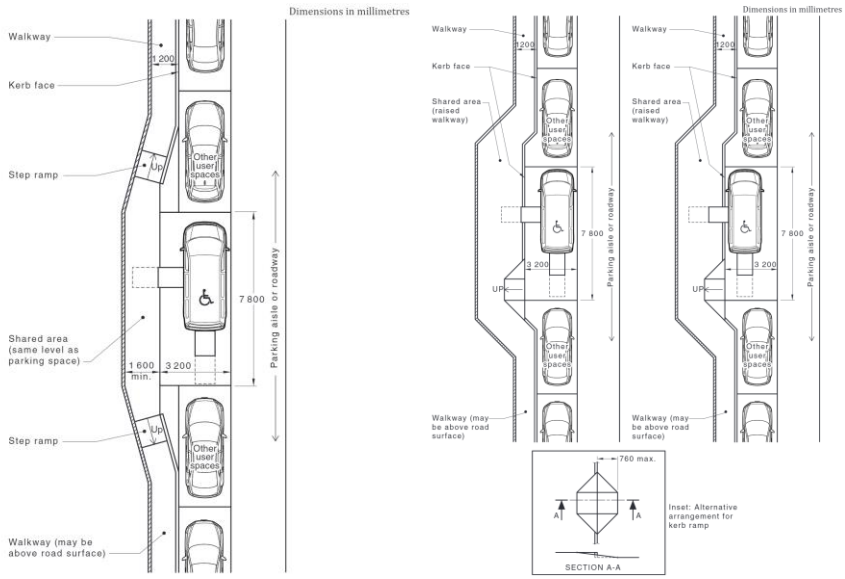

Figure 4.7: Example of a parallel parking space with a shared area at the same level, and with a raised shared area, respectively. Adapted from AS 2890.6

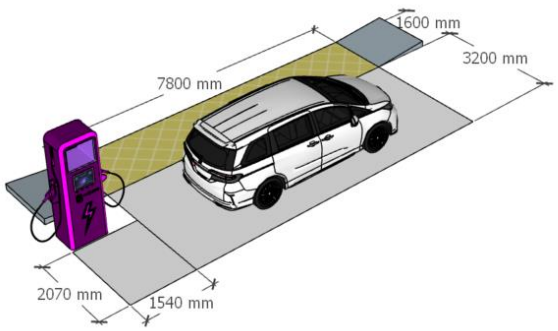

Figure 4.8: Example of a parallel charging space with a level shared area.
Design concept provided by the Victorian Department of Transport & Planning's Transport Accessibility & Inclusion Branch

Sources

- AS 2890.6, section 2 provides diagrams and outlines for accessible parking space dimensions.
- AS 2890.6, Appendix A, provides details about the parking space dimensions and the requirements for accessible parking spaces.
- AS1428.1, clause 3.5.4 suggests a space for wheelchairs no smaller that 2070mm by 1540mm.
- USDR states that accessible parking spaces should have an adjoining aisle at least 5 feet wide.
- California plug-in EV collaborative recommends having an adjoining aisle 2.5 – 3 feet.

4.3. Even and consistent surfaces

Uneven surfaces, kerbs, or other obstacles in the vicinity of the charging bay can pose barriers for people with disability. Such obstacles can impede movement and increase the risk of trips or falls. This also extends to poor ground conditions (such as, wet, slippery, or unstable terrain), which can pose significant hazards for people with disability, increasing the risk of accidents and compromising their safety.

Guidance

Obstacles around the charging station should be removed where possible. Objects like wheel stops, bollards, protective barriers, drainage systems, and kerbing must be strategically positioned to facilitate adequate access to the charging facility, while simultaneously not posing any obstacle to other road users (Figure 4.10). Unmanaged cables that are either tethered or untethered represent a potential tripping hazard and must be arranged in such a manner that they do not obstruct passage for road users, pedestrians, or cyclists.

Appropriate tactile paving should be provided. Surfaces should be firm, slip-resistant in wet and dry conditions, and should not be made of reflective material. Also, there should not be a running slope steeper than 1:20, or a cross-slope steeper than 1:48.

The charging stations should be positioned on the same level as the roadway to allow for easy access. However, where height differences are unavoidable, disabled access such as kerb drops and ramps should be built following existing regulations. Drainage infrastructure should not be placed in a way that inhibits access to the charging station.

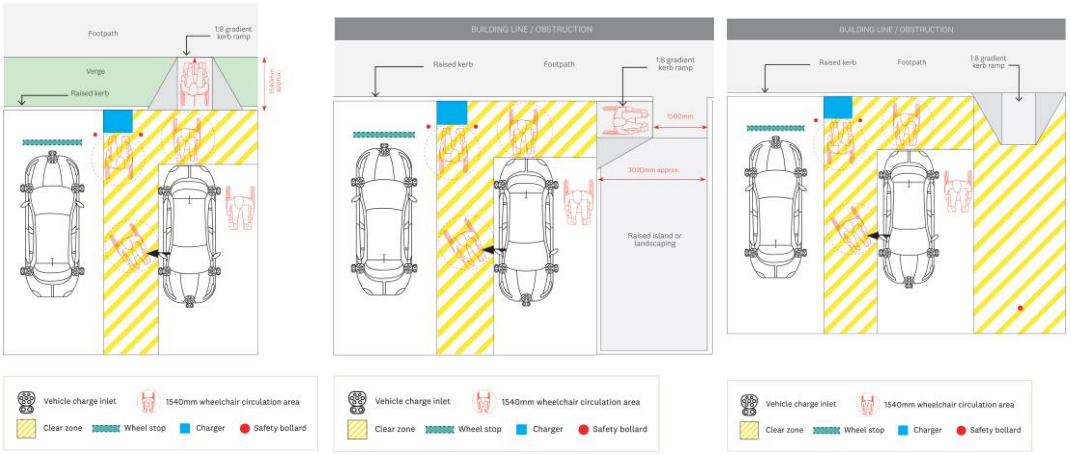

Figure 4.10: RADG's three options for raised kerb edge with footpath

Sources

- Both AS 1428.1 and AS 4586 provide suggestions for surface and dimension requirements regarding walkways, ramps, and so forth.
- PAS 1899:2022, pg. 32, 37 recommends the following:
  - 1200mm in front of and between charging points (although preferably 1800mm to allow for turning)
  - 1400mm minimum width between bollard centres
  - Less than 300mm minimum distance charging points and bollards
  - 220mm between kerb and charging point (although preferably as close to 0mm as possible).
- USDR proposes that "EV chargers with accessible mobility features must be connected to an accessible route".
- Designability UK, pg. 18-19, suggests to "make sure level access or nearby dropped kerbs are available" and that "all parts of the unit should be reachable from the ground level that the person is standing or sitting on".

4.4. Physically accessible charging point

Various physical challenges can impede the accessibility of individuals with disabilities at EV charging stations. If charging points are poorly placed, users with mobility aids (such as wheelchairs or canes) may face challenges in accessing the service if it is beyond their comfortable reaching range.

Guidance

The height of all charging components, including the socket, payment method, and screen, should accommodate users with varying height and mobility aids (Figure 4.11). This is particularly important for AC charging, as users will often need the ability to plug in their own cable. Components should be placed at the following heights:

- 900mm-1100mm for controls that need to be grasped and turned
- 900mm-1200mm for controls that need to be pushed
- 900mm-1250mm for controls that only need to be touched

Additionally, none of these controls should be within 500mm of any internal corners or barriers.

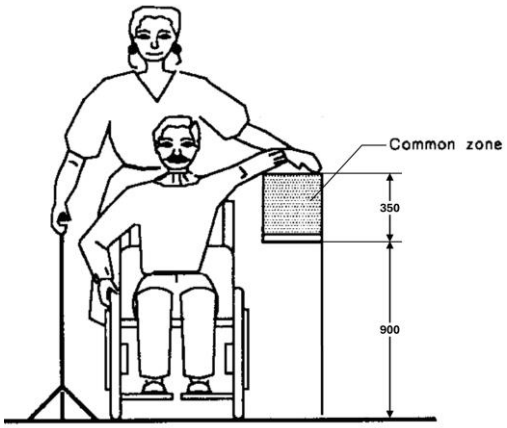

Figure 4.11: Adapted from AS1428.2, with information from AS1428.1

Sources

- AS1428.1, clause 13.5.3 specifies the different heights for different door controls (as recommended

- AS1428.2 recommends a common zone for shared interaction between standing and sitting positions, which is an area between 700mm-1200mm high with a 300mm-400mm overhang.
- PAS 1899:2022 specifies the following standards for component heights:
  - Charging point socket outlet between 800mm-950mm
  - Charging cable handle between 800mm-950mm (when in holster)
  - Screen/visual interface (bottom and top interface) between 800mm-1300mm
  - Screen/visual interface (buttons / touchscreen) between 800mm-1200mm
  - Payment terminal (bottom edge) between 800mm-1000mm.

4.5. Low tension/force to use

People with disability may face challenges when plugging or unplugging their vehicle due to physical limitations. Factors such as the force required to insert or remove the plug, and the design of the storage for the connector or dust caps may pose difficulties for individuals with limited dexterity or strength.

Guidance

The weight and rigidity of the cable should be easy to handle for people of all physical abilities. Cable hangers and overheads as pictured can significantly reduce the physical effort required.

Chargers placed in public spaces should ensure controls and connectors can be operated by individuals with limited strength and dexterity, not dissimilar to the force required to open doors. This force should not exceed 20N If there is a dust cap, the maximum force should be limited to 15N.

If the charging station has high power output, the cable might become heavier, especially during fast charging. In such situations, plug-in force should still be as low as possible. Examples of potential approaches to managing charging cables are show below (Figure 4.12).

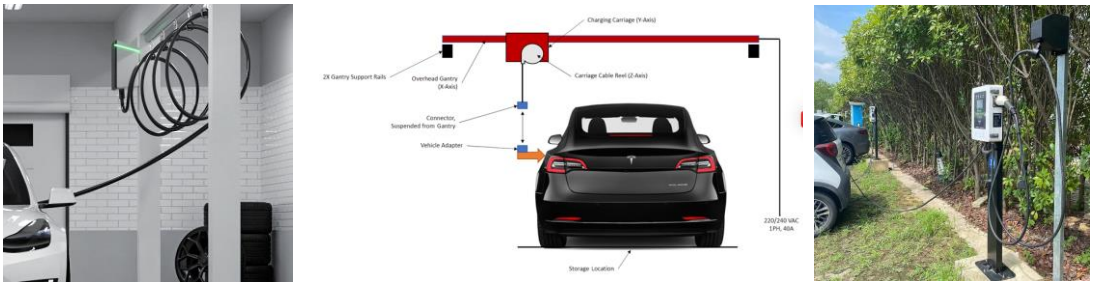

Figure 4.12: Examples of potential cable hangers and overheads. Sources are from AKON Curtain Track, the Continuing Education Center: Engineering + Mechanical Systems, and Wuhu Kerui Precision Equipment Co., Ltd.

Sources

- AS1428.1 requires that the force to operate a door handle must not exceed 20N.

- PAS 1899:2022 (PAS 1899:2022 Standards, 2022) recommends that the force required to lift a cable suspended in the air, with a length of 4 metres, should not exceed 60N (measure of force).
- Designability's Scoping and Discovery Report for Accessible Electric Vehicle Charging suggests a cable weight of approximately 3 kilograms.

- PAS 1899:2022 recommends that the force required to lift a cable suspended in the air, with a length of 4 metres, should not exceed 60N (measure of force).

- PAS 1899:2022 recommends that the forces required to remove and/or replace rubber dust caps are kept to a minimum, with a maximum operating force of 30N but preferably limited to 15N.

- PAS 1899:2022 suggests "[any] unused cable length shall be supported either on the ground adjacent to a vehicle or by an appropriate cable management system so it does not present a trip hazard for users and pedestrians"

4.6. Sufficient cable length

The type and length of the cable can pose challenges for people with disability. If the cable is heavy or difficult to handle, or the length is insufficient, it can make it challenging or impossible to connect the vehicle to the charging station comfortably.

Guidance

The cable of a tethered charging station must be long enough (at least 4m from charging point) to connect to vehicles with various charging port locations. It should be flexible enough to accommodate different vehicle placements within the designated parking space. A cable management system should also be considered (as stated in section 4.5 "Low tension/force to use"), as this can prevent tripping hazards.

Sources

- USDR, pg. 22, suggests "light weight charging cables (AC Level 2, and some DCFCs) should be of sufficient length to charge a vehicle with various charging inlet locations" and "heavier and shorter DCFC cables should be able to charge a vehicle positioned at least 60 inches (5 feet) away and be installed so that users can access the vehicle charging inlet, access aisle, and charger".
- PAS 1899:2022, section 5.3, states "the free cable length for standard parking bays shall not exceed 7.5 m when not in use" and "For tethered public charge points, the length of the cable shall [fit] a range of vehicle parking positions, vehicle sizes and vehicle socket-outlet locations".

4.7. Ergonomic chargers

The ergonomic design of the charging port connector grip or handle may not adequately accommodate the needs of people with disability. If the design does not prioritise user comfort and accessibility, it can create challenges during the charging process.

Guidance

Where the charging cable is supplied (in most cases with DC charging), the plug handle of the charging station should be ergonomic and easy to grip without slipping. This may include considerations around surface finish and handle design. For both tethered and non-tethered cables, there should be an option to grip the plug handle with one or two hands without relying on strength or dexterity. The plug receptacle should be ergonomically designed to ensure ease of use.

Covers for charging sockets, including a hinge in a socket cover door, a push down socket cover, or a slide up socket cover, should be designed considering the user's convenience. In instances where a charging socket includes a cover, users should be able to easily open the socket cover and insert the connector using one hand.

Sources

- AS1428.1, Clause 15.4.3, suggests that doors be operable by one hand, which could extend to plug handles and other operable parts.
- PAS 1899:2022, sections 5.3.2 and 5.3.3, discuss the importance of ergonomic designs.
- USDR, pg. 21, states that "one way to informally test if an element is sufficiently accessible for a person with limited hand dexterity is to try operation of the element with a closed fist".
- AS1428.1, Clause 15.4.3, suggests that doors be operable by one hand, which could extend to socket covers.
- Designability recommends that if a socket cover is needed, the user must be able to open it easily and insert a connector using one hand.

4.8. Visible charging point and interface

When utilising the charging point, all components should be easily accessible to all users, particularly those with visual impairments or mobility aids. In addition to the charging socket itself, the placement of screens or touchscreens should also be considered for viewing or interacting at all relevant angles and heights.

Guidance

The socket at the charging station should be visually prominent and easily noticeable by the user, along with the socket's orientation. There should always be a conspicuous lit indicator for the charging point. Surfaces should be coloured to provide visual contrast, but without creating glare.

Tilting the socket upwards at a slight angle (10°-20°) if it is less than 1000mm high can help taller users see the socket without compromising use for seated users.

It should also have an accessibility icon to raise or lower the contents screen (reachability) where the screen extends outside the shared common zone, as detailed in section 4.4.

In addition, the charging station screen should be touch-sensitive for ease of use and be sufficiently sized, with a surface with adequate contrast, sufficient brightness and anti-glare properties. Buttons and controls on the charging station should also be added, and be tactilely and visually distinguishable, including night-time functionality.

The text displayed on the charging station screen should follow accessibility guidelines to be easily readable, as outlined in the WCAG (including sans-serif font, minimum text size, high contrast mode, and other design features).

Sources

- Follow WCAG 2.1 for digital design layout.
- PAS 1899:2022 recommends that the screen interface should be tilted at an angle between 0 degrees and 20 degrees upwards from the vertical plane towards the user of the charging station.
- PAS 1899:2022, section 5.5.1, discusses screen tilt, notably between 0° and 20°, as it states "user testing has shown that tilting at an angle of between 10° and 20° for a touchscreen or other interactive elements below 1000 mm can enable usage of the screen or visual interface from both a standing and seated position."
- IUDG recommends that the buttons and controls on a charging station are tactilely distinguishable and visually differentiated from the background and underlay. Additionally, the screen interface should provide sufficient visual contrast and brightness in different light

conditions, and the charging station should be illuminated in a way that all controls can be recognised and operated even in the dark.

4.9. Charging point information

The spacing and lighting of charging point information, particularly what is displayed on a screen, may not be optimised for accessibility. Visual contrast should be present on the surfaces surrounding the charging points without causing glare, as this enhances visibility for users. Additionally, options for auditory outputs or adjustments to readability (such as text size and contrast) can provide additional support for people with disability.

Guidance

All information should follow the DSAPT/WCAG 2.1.

Key information should be clearly displayed on or near the charging station, including who can use it (reserved for nearby patrons, those with disabilities, and so forth), how to use it, whether parking charges apply, charging prices, connector and socket type, charging speed, customer service contact, and potential time limits and penalties.

Ideally the process of charging may be completed offline, without the need of a phone. This will help to assist the accessibility of charging stations for users who are unable to operate smartphones.

There should be audio output or hearing aid compatibility to access information audibly. This should include text-to-speech and audio descriptions, along with adjustable volume controls and audio cues throughout the process.

Feedback during the charging process can provide users with information as to what stage in the charging process their vehicle is at, provide confirmation that various actions were successful (such as when the connector is plugged in successfully, when the connector is ready to unplug, and so on), and confirm that the payment process was successful. Additionally, the charging station should clearly provide the next steps in case the charging process fails (for instance, the next available charging station). Where light cues are used, these should be consistent across charge point operators and should be clearly visible even in daylight.

Three different colours should be used to represent the three main charging stages: “operational,” “charging is complete,” and “possible issue”, with a flashing light during the “charger in use” stage. To ensure inclusivity, audio cues can be added to avoid confusion in case the user is colour blind. Supplementary audio cues should be included to enhance inclusivity and vibration cues should be avoided

Sources

- Suggestions from stakeholder workshops.
- Follow WCAG 2.1 for digital design layout.
- USDR, pg. 23 – 26, discusses Accessible Communication Features, including User Interface, Customer Service, and Connectivity.

- PAS 1899:2022, section 5.5.4, states that “for the utilisation of any screen or visual interface on any public chargepoint, unambiguous instructions shall be provided to support a user through the process of setting up and using the chargepoint”.

- PAS 1899:2022, section 5.3.4, also states “The design of a tethered chargepoint cable and connector shall be of suitable visibility so as to provide a visual contrast for chargepoint users”.
- PAS 1899:2022, section 5.5.4, recommends an emergency stop button on the charging station.
- PAS 1899:2022, Annex A.4, points to research that suggests the proposed colour indication system (as recommended).

4.10. Assistance

Some people with disability may require assistance and it could be possible at certain stations to provide this on request. If this support is unavailable, some users may be unable to charge their vehicle. Specifically, charging at higher-powered charge points may require additional assistance or specialised equipment to handle the increased power safely. This can create challenges for people with disability who may require assistance or face limitations in accessing the necessary support.

Guidance

Responsive assistance (including in-person assistance or assistance through phone, text, voice command and/or a help button) should be available upon request at all operating hours of the charging station, possibly even available before a user’s arrival on request. Customer support should be accessible to all users through a number that is clearly displayed on or near the charging station.

All charging stations must have an SMS/text-based number for everyone to use. 02 or 03 or 1300 numbers (for example) are not easily accessible for deaf and hard of hearing people on the road. This means all charging companies need to have dedicated staff monitoring and responding to messages in a timely manner.

Sources

- Suggestions from stakeholder workshops.
- PAS 1899:2022, pg. 39, suggests additional assistance at service areas should be provided.

5. Move around site peripherals

In addition to the primary charging process, users will likely want to move around the wider charging station (and surrounding areas) while waiting for their vehicle to charge. This portion of the journey is primarily about ensuring that users feel safe and comfortable while doing so, with a particular emphasis on environmental factors like traffic, lighting, and weather. Additionally, while not explicitly outlined here (as it is out of scope of this document), these surrounding areas should also follow existing guidelines around general infrastructure to ensure accessibility for people with disability as they travel around the site.

Challenges and suggested guidelines

5.1. Proximity to amenities

Charging stations that lack proximity to amenities and other services may pose issues for some users, making it difficult for them to complete certain tasks (such as shopping or using the restroom). Additionally, service areas may not be easily accessible from the charging station, depriving users of the convenience of accessing necessary services while their vehicles charge.

Guidance

Charging stations should be placed in convenient locations, near amenities like shops, restrooms, cafes, or other services where they are available (Figure 5.1). Ensuring easy accessibility to these facilities from the charging area allows people with disability to access necessary services and amenities while their vehicles charge, enhancing their overall experience.

To enhance the user experience, public seating designed for everyone should be considered, providing it doesn't block or hinder anyone's way.

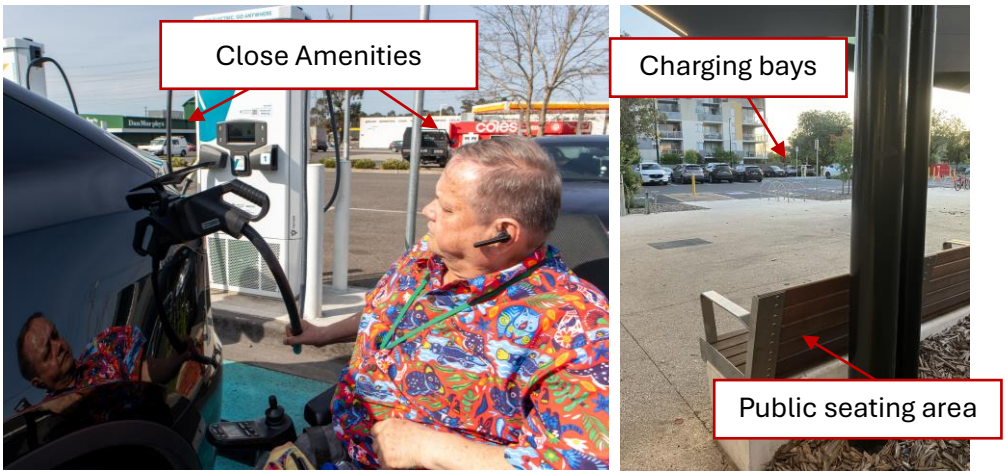

Figure 5.1: Photos captured by Austroads and Dominic Harvey

Sources

- PAS 1899:2022 recommends building the charging station as near as possible to amenities, and in the vicinity of street furniture.
- Designability, page 21, suggests that people with disability may need or want to be close to shops, toilets, cafes or other amenities while they charge their vehicle.

5.2. Avoid congestion and crowding

Charging stations can become congested with multiple vehicles queuing at once, resulting in highly crowded areas. This can make it challenging for people with both physical and cognitive disabilities to navigate around the charging station and safely move to and from amenities.

Guidance

Disabled charging spots require proof of disability (for example, a disabled parking sticker), thus reducing the volume of traffic around these designated spots.

Sources

- AS 1742.11 outlines linear parking control signs to aid in avoiding congestion.
- Designability suggests that "Good, clear navigation signage can save people time and frustration and can prevent congestion as any users can hesitate while looking for charging points".

5.3. Lighting

Poor lighting in the charging station can impact visibility and safety, particularly during night-time or low-light conditions and for those with visual impairments. Also, photosensitive users may struggle to look at information if there are flashing or strobing lights, which could potentially cause seizures or other sensory-based problems.

Guidance

Adequate and consistent lighting following AS NZS 1158.3.1 2020 throughout different parts of the day around the site is essential. This will allow all users to safely navigate the environment surrounding the charger, use the equipment, and access the routes between the public charging stations and nearby amenities.

A layered approach using consistent, warm lighting reduces glare and contrast, creating an environment where people feel safer, with natural light being the preferred option.

Sources

- Follow AS NZS 1158.3.1 for guidelines on "Lighting for roads and public spaces".
- PAS 1899:2022, Annex A.1, recommends lighting should be provided in the environment surrounding a public charging station to enable the safe use of the charging station, as well as routes from the public charging station to any nearby venues or amenities.

5.4. Weather protection

Without proper weather protection for the charging station environment, users may feel uncomfortable when approaching the charging point to connect their vehicle, especially in extreme weather conditions. This is exacerbated for people with disability, who may have additional needs or limitations while using the charging station.

Guidance

Where possible, it is recommended that shelters be provided where there is space to do so. This can minimise the impact of adverse weather conditions on users while charging their vehicle, particularly for people with disability who may require additional time or be unable to carry personal weather protection (for example, umbrellas).

Sources

- Suggestion from stakeholder workshops.

- ADA Accessibility Standards recommends installing weather protection, security and adequate lighting at parking spaces.
- IUDG advises to install weather protection around charging stations and along access routes from the charging stations to nearby amenities or facilities.

6. Complete and pay

Once the vehicle has completed charging, users must pay for the service. There should be flexible payment options, internet signals in rural areas, and fail-safes that are in place if something goes wrong.

Challenges and suggested guidelines

6.1. Electronic payment options

If the charging station does not offer electronic payment methods or alternative accessible payment options, people with disability may face challenges in completing the transaction. This can include difficulties in accessing or using traditional payment methods or experiencing problems with the compatibility of assistive technologies.

Guidance

Flexible and user-friendly payment options (such as contactless payment/pay wave or mobile payment apps) should be provided to cater for various user preferences, aiming to make the transaction process straightforward and transparent. If a central payment system is used, it should be accessible.

Guidelines for Accessibility in PIN Entry on Touchscreen Terminals by the Australian Payments Network provides critical insights into making payment processes more accessible, especially for people with vision and/or motor impairments. It offers valuable recommendations on how to enhance the user interface of payment systems, ensuring that they are user-friendly and inclusive.

Sources

- Suggested from stakeholder workshops.
- Follow WCAG 2.1 for digital design layout.
- PAS 1899:2022 suggests that consumers can rely on a familiar payment method across charging station networks including radio-frequency identification cards, a contactless payment card and/or a smartphone application.
- IUDG recommends that EV charging infrastructure should consider ease of payment, including contactless card payment.

6.2. Internet signal

If the payment process relies on an internet signal, people with disability in areas with poor connectivity or limited internet access may encounter difficulties in completing the payment. This can result in delays or an inability to finalise the transaction.

Guidance

The charging location should preferably have sufficient broadband or mobile phone coverage to support the use of mobile applications during the charging process, especially in rural areas.

The payment process should be designed to work offline or should otherwise offer alternative methods of offline payment.

Sources

- Suggested from stakeholder workshops.
- PAS 1899:2022, section 5.5, suggests a “minimum payment method that is not specific to a brand and does not require a payee’s mobile or internet signal”.

6.3. Identifiable payment terminal

Locating and accessing the payment terminal can be a challenge for people with mobility impairments or those using mobility aids. If the terminal is not marked or positioned at an accessible height, people with disability may experience difficulties in completing the payment transaction.

Guidance

Payment terminals should be easily identifiable and tactically discernible. In cases where the payment terminal is in a different location to the charging point, clear signage should direct users to its location.

Payment terminals, whether physically distinct or built into the charge point, should be distinctly illuminated when required, with both visual and auditory cues to indicate location.

Sources

- DSAPT requires that "ticket validation systems must not require actions from passengers with disabilities that exceed the requirements for other passengers" and that "operators and providers must offer a form of payment that meets equivalent access principles".
- USDR specifies that "registration and payment card readers should be compatible with contactless payment systems, tactically discernible, and provide visual and audible feedback.
- PAS 1899:2022 specifies that "the location of a screen or visual interface on a public chargepoint, including any payment terminal on the chargepoint, shall be clearly identifiable by users such as by illumination of the screen or visual interface."

6.4. Removing time pressure

If the payment process has a short time limit or times out quickly, people with disability who require additional time to complete the transaction may find it challenging to finalise the payment within the given timeframe.

Guidance

If a timed response is required, the user must be alerted visually and by sound (or touch) and users should be allowed to request additional time.

Sources

- USDR, pg. 24, specifies that "if a timed response is required, the user must be alerted visually and by sound (or touch), and given the opportunity to indicate more time is needed."

6.5. Provisions for disability concession

If there are no provisions in place to recognise and facilitate smooth payment processes for people with disability, they may face challenges in availing themselves of any applicable discounts, benefits, or accessible payment methods specifically designed for people with disability.

Guidance

Concession rates and other disability benefits should be considered (potentially having a bypass/identification for accessible charging spaces).

Sources

- Suggestion from stakeholder workshops.

- Designability suggests signage should indicate whether parking charges apply (and whether this also applies to blue badge holders).

6.6. Fail-safes

Due to the nature of most payment processes, there can be significant consequences if something goes wrong with this aspect of the journey. People with disability may experience a higher risk of these issues occurring if the systems do not cater well enough to their disability. As such, fail-safes should be in place to lessen the impact of these concerns when they occur.

Guidance

If payment is unsuccessful, fallback options should be readily available, especially if the handle can only be taken out of the socket once payment is completed.

Sources

- DSAPT Clause 25.2 states that alternate payment methods must be available if users have difficulty paying.

Appendix 1 – Inclusive Design Principles

Principles

1. Equitable Use

This principle emphasises that the design should be useful and marketable to people with diverse abilities.

Guidance:

a. Provide the same services for all users identically whenever possible, equivalent when not.
b. Promote inclusion and avoid isolating or marginalising any users.
c. Ensure that provisions for privacy, security, and safety are equally accessible to all users.
d. Aim to create a design that appeals to a diverse range of users.

In the context of EV charging stations, implementing the equitable use design principle involves considerations such as providing obstacle-free and even surfaces, ensuring optimal ground conditions and visibility, as well as addressing parking space occupancy. For example, all EV charging bays may be universally accessible, thus removing the need for special signage.

2. Flexibility in Use

This principle focuses on providing options and features that accommodate a wide range of user preferences and abilities.

Guidance:

a. Offer users a range of options for methods of use.
b. Accommodate access and use for both right-handed and left-handed individuals.
c. Optimise design to enhance user accuracy and precision during operation.
d. Allow for adaptability to accommodate the user's preferred pace.

In the context of EV charging stations, when implementing this principle, it is essential to provide users with the ability to choose between different charging methods (where possible), offering flexibility in charging port types available at the station and allowing more accessible decisions to be made from a broad range of options. For example, shelter may be provided over all charging bays to account for varying weather conditions.

3. Simple and Intuitive Use

This principle advocates for designs that are easy to understand and use without the need for extensive training or complex instructions.

Guidance:

a. Minimise unnecessary complexity.
b. Align with user expectations and intuition for consistency.
c. Cater for diverse literacy and language skills.
d. Organise information based on its importance.
e. Offer effective prompts and feedback throughout and after task completion.

To apply this principle in the context of EV charging, several options can be implemented, such as clear signage, intuitive charging station display screen, step-by-step visual instructions to guide users throughout the charging process, and so on. Additionally, charging stations should be placed on the same level as the parking bay, removing kerbs and the need for ramps.

4. Perceptible Information

This principle emphasises the importance of presenting information in a clear and perceivable manner, regardless of ambient conditions or the user's sensory abilities. It involves utilising multiple sensory modalities (such as visual, auditory, and tactile) to convey information effectively, ensuring that users can comprehend and interpret it regardless of their sensory abilities.

Guidance:

a. Utilise multiple sensory modalities (visual, auditory, and tactile) to convey information effectively.
b. Ensure sufficient contrast between essential information and its surroundings.
c. Optimise the legibility of essential information.
d. Differentiate elements in a way that facilitates clear instructions or directions.
e. Support compatibility with devices or techniques that are commonly utilised by individuals with sensory limitations.

In the context of EV charging stations, achieving this principle requires careful consideration, such as providing clear signage and visible markers at the station. Additionally, it entails the offer of easily perceivable visual and audible information regarding payment methods and other relevant details. For example, higher luminance contrast could be provided to edges of the charging station and the most important features (like the plug handle, payment terminal, or primary interface).

5. Tolerance for Error

The design mitigates hazards and reduces the negative impacts of accidental or unintended actions.

Guidance:

a. Organise elements to minimise hazards and errors (namely, prioritise frequently used elements for easy accessibility; eliminate, isolate, or shield hazardous elements).
b. Provide error feedback whenever faults or hazards may occur.
c. Incorporate fail-safe features.
d. Ensure the user is alerted to significant decisions and tasks.

In the context of EV charging stations, an example of implementing this principle could involve the assistance of workers or automated systems if errors occur, extending the time required to make payment or undergo charging processes, or generally ensuring a more user-friendly and accommodating experience. Additionally, where there is a kerb or ramp, luminance contrast should be provided on the edges.

6. Low Physical Effort

This principle aims to reduce physical exertion and fatigue for users by minimising the effort required to operate or access a design.

Guidance:

a. Enable users to maintain a neutral body position while performing tasks.
b. Actions use the minimum reasonable force for operation.
c. Minimise repetitive actions.
d. Reduce sustained physical exertion.

In the context of EV charging stations, this principle can be applied through considerations such as efficient cable management to facilitate easy handling and the reduction of effort needed to unplug charging connectors or use the charging station.

7. Size and Space for Approach and Use

This principle addresses the importance of providing adequate space and size for all users to approach, reach, manipulate, and use equipment, regardless of the user's body size, posture, or mobility.

Guidance:

a. Ensure important elements are visible to both seated and standing users.
b. Make sure components are comfortable to reach for both seated and standing users.
c. Accommodate variations in hand and grip size.
d. Provide sufficient space for the use of assistive devices or personal assistance.

Implementing this principle involves providing an adequate parking space and an adjoining aisle between charging points to facilitate easy and comfortable movement for people with disability. These considerations ensure that users can access the charging infrastructure without encountering physical barriers or restrictions.