Prepared by:

BLACK & VEATCH

S CURVE STRATEGIES

Site Design, Energization and Operation: Best Practices for EV Charger Siting

Prepared for:

COUNTY OF LOS ANGELES CALIFORNIA

STATE OF CALIFORNIA ENERGY COMMISSION

EV Charging Infrastructure
Training Series 5 of 5

May 15, 2025

Trainers

Will Einstein

Black & Veatch

April Bolduc

S Curve Strategies

Randy Schimka, PE

S Curve Strategies

Five-Part EV Charging Infrastructure Training Series

1. Strategic EV Charger Site Selection

Best practices for EV charger siting in LA County

COMPLETE

2. Business Models and Financing

EV charging business models, incentives, rebates and financing options

COMPLETE

3. Regulations, Ordinances & Implementation

Streamlining EV charging projects by understanding impacts

COMPLETE

4. Permitting

Best practices to streamline EV charging project permitting

COMPLETE

5. Site Design, Energization & Operation

Best practices in EV charging site design

TODAY

Agenda

1. Site Design Best Practices
2. Grid Connection & Resiliency Planning
3. Construction & Signage Guidelines
4. Commissioning
5. Operations & Maintenance
6. Case Studies
7. Resources
8. Q&A

5 Key Project Elements for Site Design, Energization & Operation

1. Site Design Best Practices

2. Connecting to the Grid and Planning for Resiliency

3. Construction and Signage Guidelines

4. Commissioning and Operational Considerations

5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Site Design Best Practices

5 Key Project Elements for Site Design, Energization & Operation

1. Site Design Best Practices

Strategies to optimize EV charger placement and site design for safety, accessibility, and user satisfaction.

2. Connecting to the Grid and Planning for Resiliency

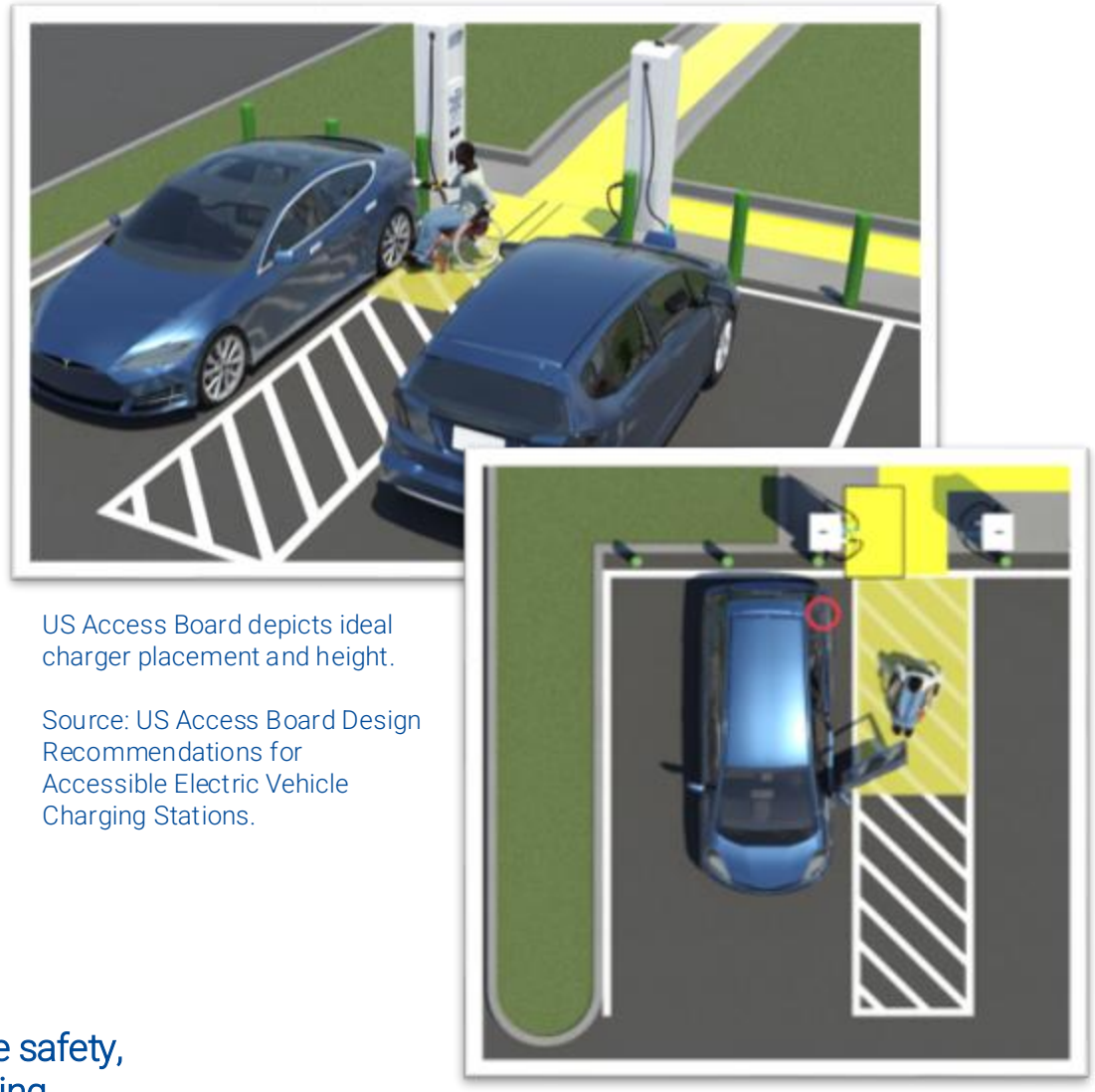
3. Construction and Signage Guidelines

4. Commissioning and Operational Considerations

5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Optimal Placement Strategies

- Visibility, Accessibility, and Security:
  - Place chargers in well-lit, accessible areas to enhance safety and attract users.
  - Install cameras and monitoring to enhance security.
- Proximity to Amenities: Position chargers near restrooms, cafes, or shops to encourage longer stays and higher usage.
- Space Allocation: Plan and allocate sufficient space to avoid congestion and allow for easier vehicle maneuverability.



US Access Board depicts ideal charger placement and height.

Source: US Access Board Design Recommendations for Accessible Electric Vehicle Charging Stations.

Strategic site design and charger placement enhance safety, accessibility, and user satisfaction for EV charging

User Convenience

- User-Friendly Layouts: Design charging equipment layouts to support various vehicle sizes, including larger trucks and vans.
- Clear Signage: Install consistent signage to guide users to chargers and provide usage instructions.
- Weather Protection: Add a shelter or covered area to shield drivers and charging equipment from the elements; consider additional cost implications.
- Curbside Charging:
  - An evolving landscape becoming more popular in areas difficult to install charging:
    - Multifamily communities
    - Parks with no parking lots
    - Housing with no driveways
    - Small businesses
  - Can reduce vandalism with retractable cables or bring-your-own-cord.

This clear instructional signage demonstrates 2-hour parking only.

Prioritizing user convenience in EV charger site design ensures inclusivity, ease of use, and equipment durability.

Site & Infrastructure Integration

- Existing Electrical Infrastructure: Utilize existing electrical systems where possible to reduce costs and streamline installation.
- New Electric Service: If a new electric service is needed, locate charging equipment to minimize distance and trenching costs.
- Network Connectivity: Pre-test proposed locations for network connectivity and plan for wireless repeaters or ethernet connectivity as necessary to ensure robust communications.

New electrical service is near EV chargers to minimize trenching costs. Retailer opted for reduction in parking spaces to house equipment.

A thoughtfully designed site improves the user experience, optimizes EV charger efficiency, and drives the success of the charging infrastructure.

Medium- and Heavy-Duty Site Differentiators

- Fleet Charging Infrastructure:
  - Depending on the fleet's utilization, battery sizes, and dwell times, chargers may require more power.
  - Fleets with low mileage operations and shift patterns may allow for Level 2 charging of trucks.
  - Contact the utility early regarding available capacity and check for any applicable rebates.
- Charger Positioning:
  - Install chargers strategically near vehicle parking or loading zones to minimize downtime.
  - Pull-through charging lanes eliminate the need for vehicles to reverse, increasing safety and operational efficiency.
- On-Site Storage:
  - The payback can especially offset demand charges for buses and large trucks.

Schneider pull-through charging infrastructure improves driver safety.

Grid Connection & Resiliency

5 Key Project Elements for Site Design, Energization & Operation

1. Site Design Best Practices

2. Connecting to the Grid and Planning for Resiliency

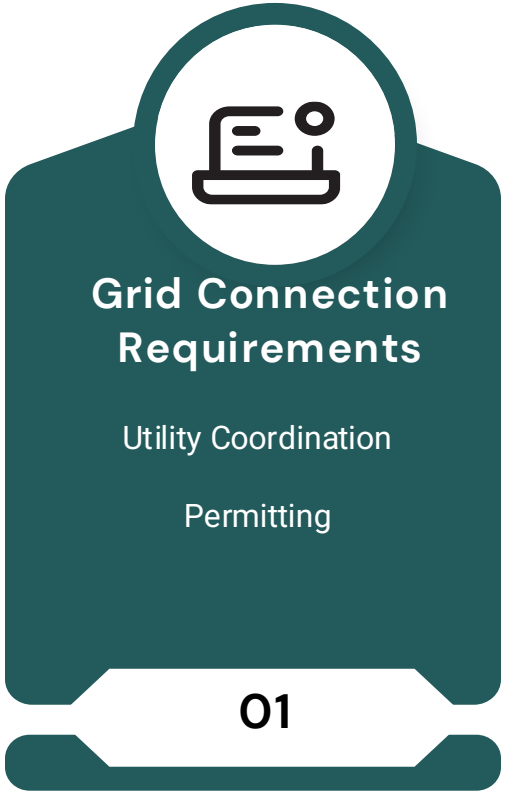
Ensure a reliable power supply for EV charging through effective Grid connectivity and resiliency planning.

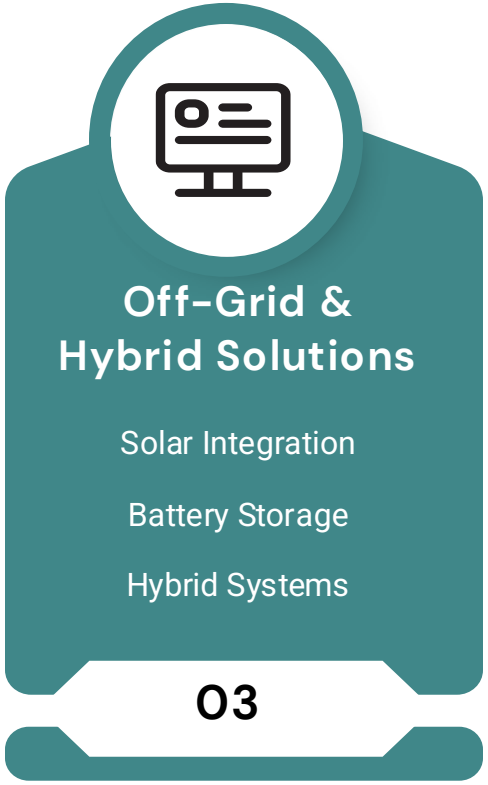
3. Construction and Signage Guidelines

4. Commissioning and Operational Considerations

5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Connecting to the Grid And Planning for Resiliency





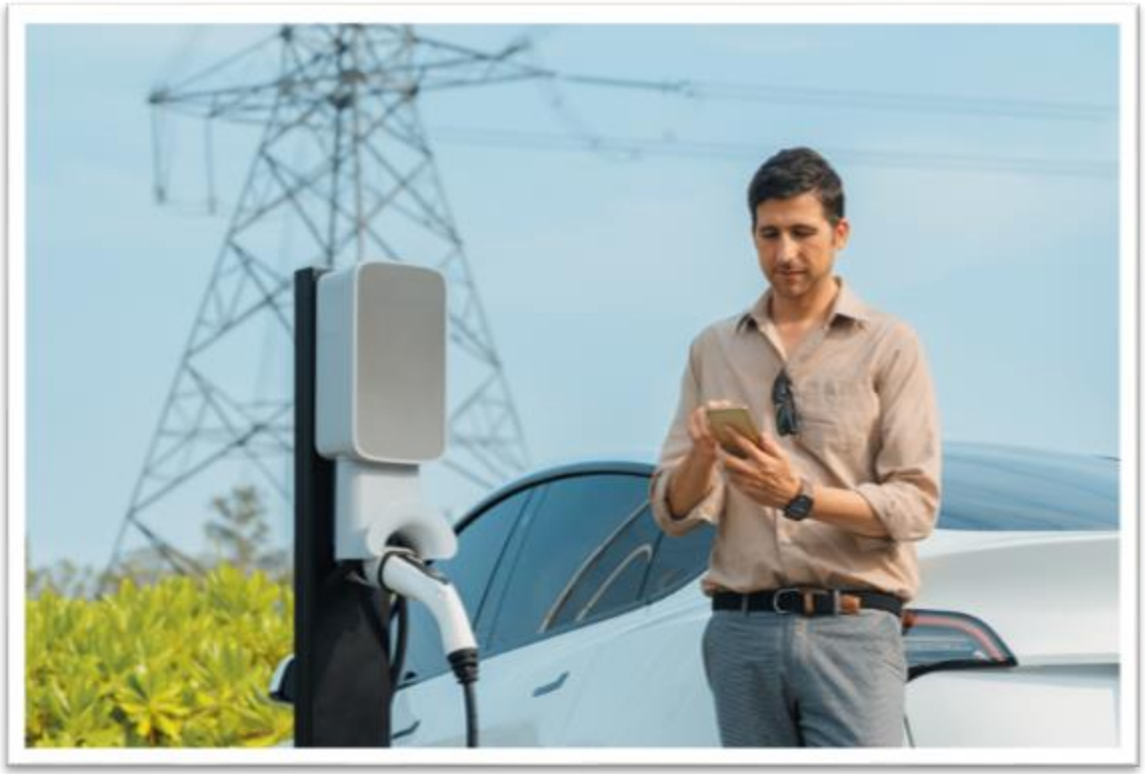
Connecting to the Grid and Planning for Resiliency

Grid Connection Requirements:

- Utility Coordination: Collaborate with utility providers to meet technical and regulatory grid connection standards.
- Permitting: Obtain required permits and approvals to ensure compliance with local regulations. *(See Permitting Training: Part 4 in the series)*

Resiliency Planning:

- Backup Power: Integrate backup systems like generators or battery storage to sustain operations during outages.
- Redundancy: Consider redundant systems to ensure a continuous power supply that will help reduce downtime.
- Emergency Protocols: Establish protocols to effectively manage power disruptions.



Connecting to the Grid and Planning for Resiliency

Exploring Off-Grid and Hybrid Solutions

- Solar Integration: Install solar panels to generate renewable energy, minimizing grid dependency and reducing operational costs.
- Battery Storage: Deploy battery systems to store surplus renewable energy for peak demand mitigation or grid outages.
- Hybrid Systems: Integrate grid connections with both renewable energy and storage for a resilient, sustainable charging ecosystem.

Effective grid connection and resiliency planning keep EV charging infrastructure operational across diverse conditions, boosting reliability, and promoting sustainable energy practices.

Construction & Signage

5 Key Project Elements for Site Design, Energization & Operation

1. Site Design Best Practices

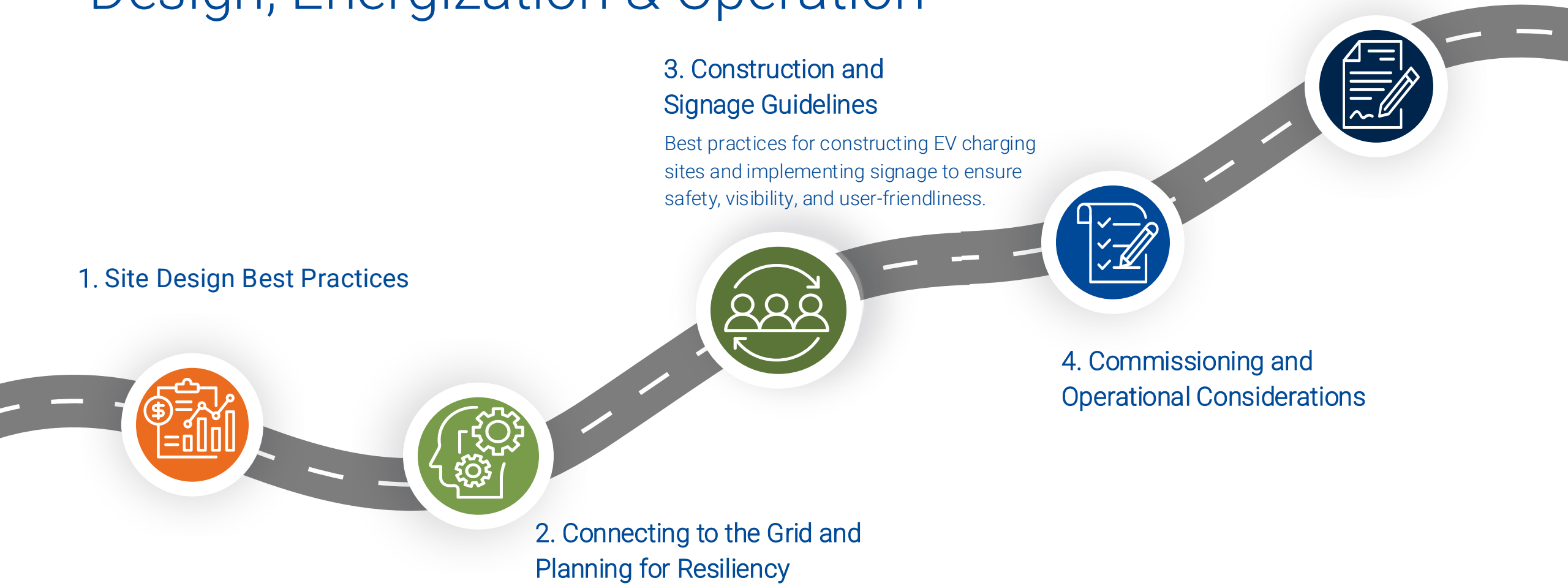
2. Connecting to the Grid and Planning for Resiliency

3. Construction and Signage Guidelines

Best practices for constructing EV charging sites and implementing signage to ensure safety, visibility, and user-friendliness.

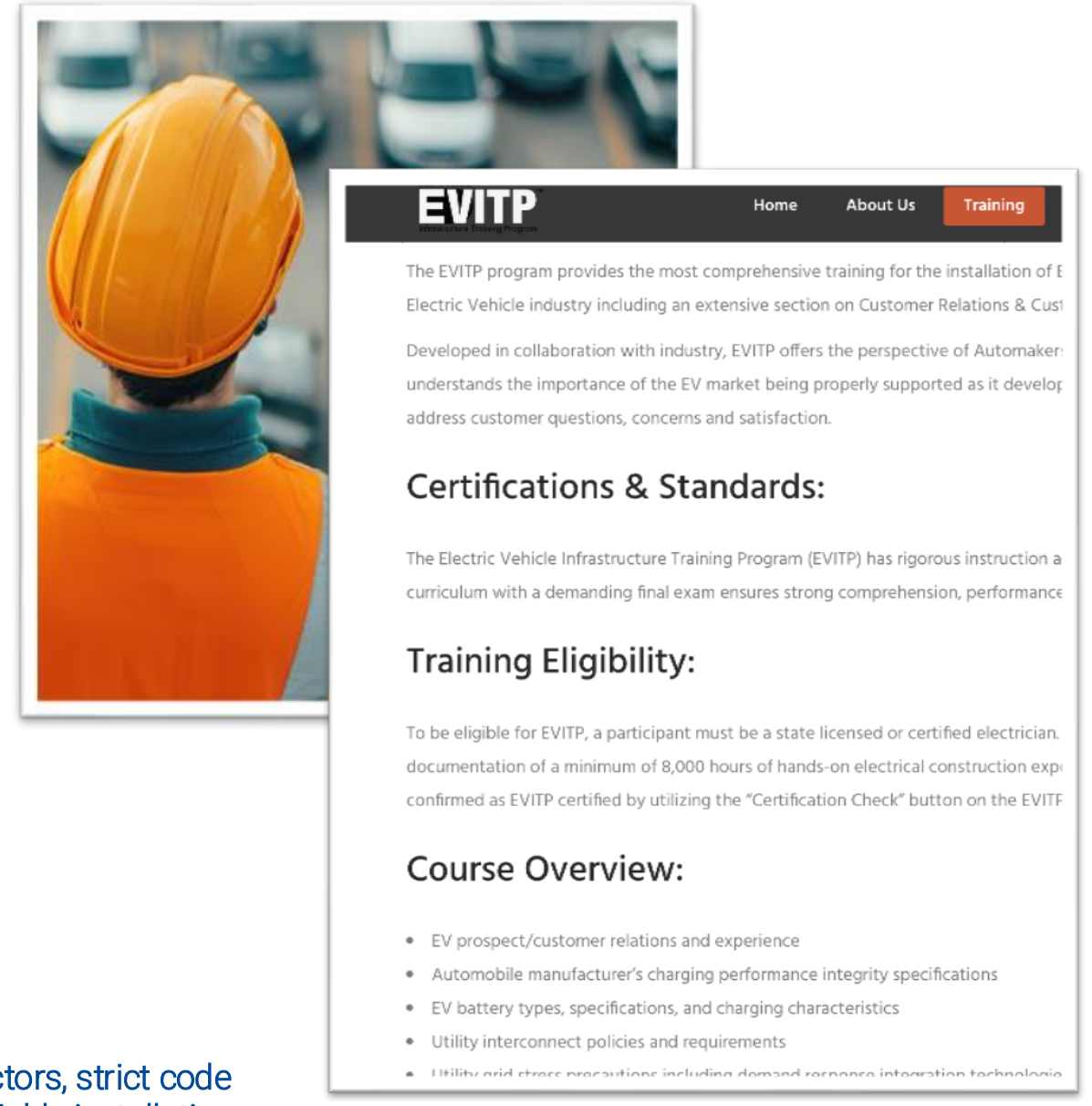
4. Commissioning and Operational Considerations

5. Operations and Maintenance Considerations to Maintain Reliability and Availability



Construction Guidelines

- Certified & Trained Contractors and Electricians:
  - Engage licensed, experienced, and trained contractors and electricians who specialize in EV charger installations.
  - Electric Vehicle Infrastructure Training Program (EVITP) provides installation and maintenance safety training for EV charging stations and infrastructure.
- Code Compliance: Adhere to local building codes, electrical standards (e.g., National Electrical Code) and safety regulations enforced in your jurisdiction.
- Quality Assurance: Enforce rigorous quality control with contractors and electricians to ensure safe, reliable, and durable installations.
- Utility Inspection: Inspection may be required throughout construction by the utility. Speak to your utility early and often to confirm.



Effective EV charging construction relies on certified contractors, strict code compliance, and rigorous quality assurance to ensure safe, reliable installations.

Site Signage Guidelines

- Visible Signage: Install clear, prominent signs to mark EV charger locations and accessible parking.
- User Instructions: Provide concise charger usage instructions with support contact details.
- Branding and Aesthetics: Align signage with site branding and maintain aesthetic consistency with the surrounding environment.

Highway Signage Guidelines

- Jurisdictions can submit a request to CALTRANS to install EV charging signage along State highways if the stations are:
    - Within 3 miles of a State highway interchange
    - Available to the public at least 16 hours a day
- CALTRANS pays for the cost of the signs and the installation.
- The local jurisdiction must place "follow-up" signs closer to the location of the charging stations that will be seen after the driver gets off the state highway.

CALTRANS State highway EV charging directional signage options.

Source: CALTRANS Zero Emission Vehicle Signage Installation Guide

Highway signage for EV charging stations can help drivers more easily locate charging sites, which will in turn help to drive more traffic to EV charging sites and increase usage.

Commissioning

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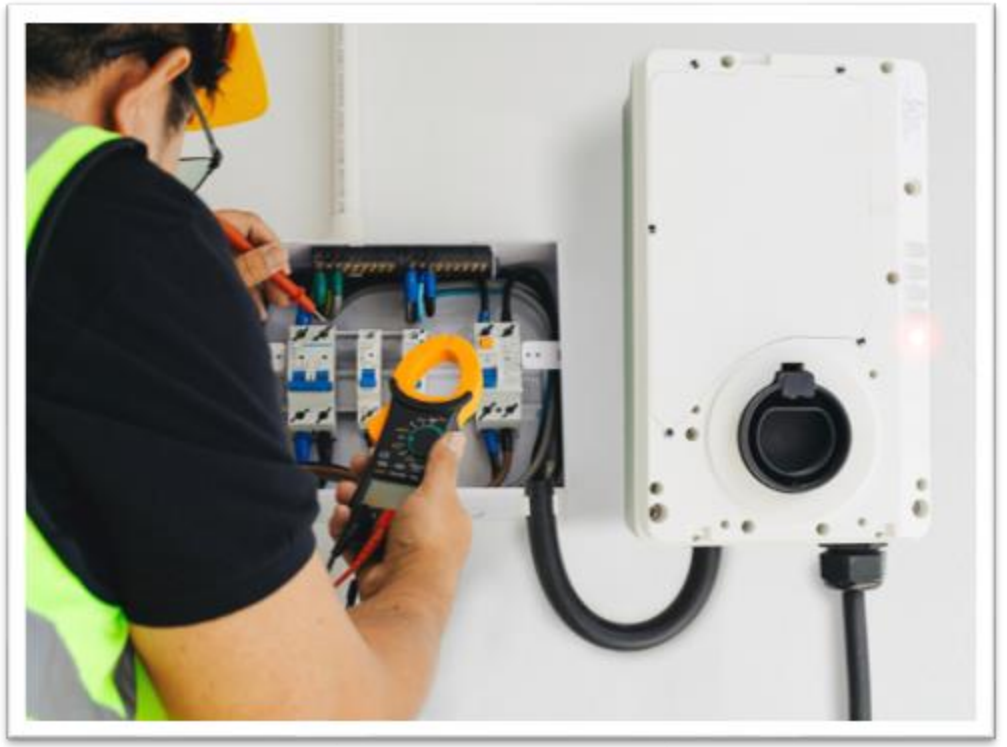
Key steps for commissioning EV chargers and establishing operational guidelines to maintain performance and usability.

5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Commissioning Considerations

- Pre-Commissioning Preparation: Verify that all installations comply with all local codes and that certified contractors have completed the installation work.
- Overall Testing & Verification: Conduct thorough electrical testing to ensure chargers power up and operate safely.
- Test Each Charger: Verify that each charger works correctly, verify charging speeds, connectivity and compatibility with various EV models.
- Networking:
  - Integrate networked chargers with remote monitoring systems to enable real-time performance tracking.
  - Set up any required alert parameters so that maintenance teams can address any errors promptly.



Successful EV charging commissioning ensures reliable startup through pre-verification, thorough testing, network integration, detailed documentation, and user training.

Commissioning Considerations, Cont'd.

- Documentation:
  - Record all test results and installation details in a commissioning report.
  - Ensure that all necessary permits and approvals from utilities and municipalities are finalized.
- Staff Training: Train staff on charger operation, troubleshooting, and emergency protocols to ensure smooth operation.
- Commissioning Approval:
  - In Los Angeles County, EV charging station commissioning is typically certified by LA County Public Works Building and Safety.
  - They issue permits for EV charger installations and conduct inspections to ensure compliance with building codes.

Charger Protection, Payments & Driver Usage

- Charger Protection: Implement robust security measures, including additional cameras and monitoring to prevent vandalism and theft:
  - Cord strengthening, bring your own cable concept, consider limiting 24-hour access and additional lighting.
  - Initial costs might be higher but can prevent costly repairs later.
- Payment Systems: Install secure, intuitive payment systems supporting credit cards, mobile payments, and RFID to enhance user convenience.
- Driver Usage Guidelines: Establish clear rules for responsible charger use, specifying time limits and proper plug-in procedures to optimize availability.

Effective charger protection, driver usage guidelines, and payment systems ensure reliability and user satisfaction by implementing robust security, clear usage rules, and intuitive payment options.

Driver Usage Guidelines

- Workplace EV charging survey template:

1. If you drive to work, approximately how far is your trip (one-way)?
    a. Less than 10 miles
    b. 10-25 miles
    c. 26-50 miles
    d. More than 50 miles

2. Throughout the workday, what is your usual travel pattern?
    a. I stay at the worksite and do not move my vehicle
    b. I leave the worksite and move my vehicle once per day
    c. I leave the worksite and move my vehicle more than once per day

3. Do you own or are you considering purchasing or leasing an electric or plug-in hybrid electric vehicle?
    a. Yes, I already own one
    b. Yes, I'm considering purchasing in the next 6 months
    c. Yes, I'm considering purchasing in 12-24 months
    d. Yes, I'm considering purchasing but I'm not sure when
    e. No

A brief employee survey can help quickly determine the size needed for your installation and future-proofing considerations.

Operations & Maintenance

5 Key Project Elements for Site Design, Energization & Operation

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5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Attaining EV charger reliability and availability through proactive maintenance and monitoring practices.

Operations and Maintenance

Routine Maintenance Practices:

- Scheduled Inspections: Perform regular inspections to detect and resolve issues early.
- Preventive Maintenance: Follow manufacturer-recommended maintenance schedules for cleaning, testing, and software updates to ensure optimal performance.
- Repairs & Replacements: Implement procedures to ensure prompt repairs and component replacements to minimize downtime.

Proactive maintenance and monitoring ensure reliable EV charger performance through regular inspections, timely repairs and real-time issue detection.

Monitoring and Troubleshooting

Charger Up-Time Best Practices:

- Remote Monitoring: Use networked chargers to track performance and identify performance issues in real time.
- Automated Alerts: Enable alerts to notify maintenance teams of any errors or required actions.
- Troubleshooting Guides: Create detailed guides to help staff quickly resolve common issues.

Proactive maintenance and monitoring ensure reliable EV charger performance through regular inspections, timely repairs and real-time issue detection.

Maintaining Reliability and Availability

Ensuring Long-Term Reliability and Availability:

- Spare Parts Inventory: Stock essential spare parts to enable fast repairs and reduce downtime.
- Vendor Support: Build strong vendor relationships for reliable and quick access to technical support and parts.
- Performance Metrics: Monitor key performance indicators like uptime, usage, and charging session information to enhance charger reliability.

Robust operations and maintenance strategies ensure EV charging infrastructure stays reliable, available, and efficient, boosting user satisfaction and leading to long-term success.

Importance of Continuous Improvement

User Feedback:

- Feedback Mechanisms: Provide channels for users to report issues and share feedback on charger performance.
- Data Analysis: Analyze usage data and feedback to spot trends and improve operations.
- Continuous Training: Offer regular training to staff on new technologies and maintenance practices.

Case Study: Preliminary Desktop Review

Case Study: Pre-Engineering Design -- Co-locating Public & Private Charging

Case Study: Public DCFC

ADA Exceptions

ADA Building Code Exceptions:

1. ADA is not required if the EV chargers are (Section 11B-228.3 Exception #1):
    - Not available to the public and intended for use by a designated vehicle or driver, such as private fleet vehicles and EV charging stations assigned to an employee.
    - Installed in public housing facilities intended for use by an EV owner or operator at their residence.

2. ADA path of travel requirements are not required if the new EV charging stations will be installed at an existing facility where charging is not a primary function (Section 11B-202.4 Exception #10).

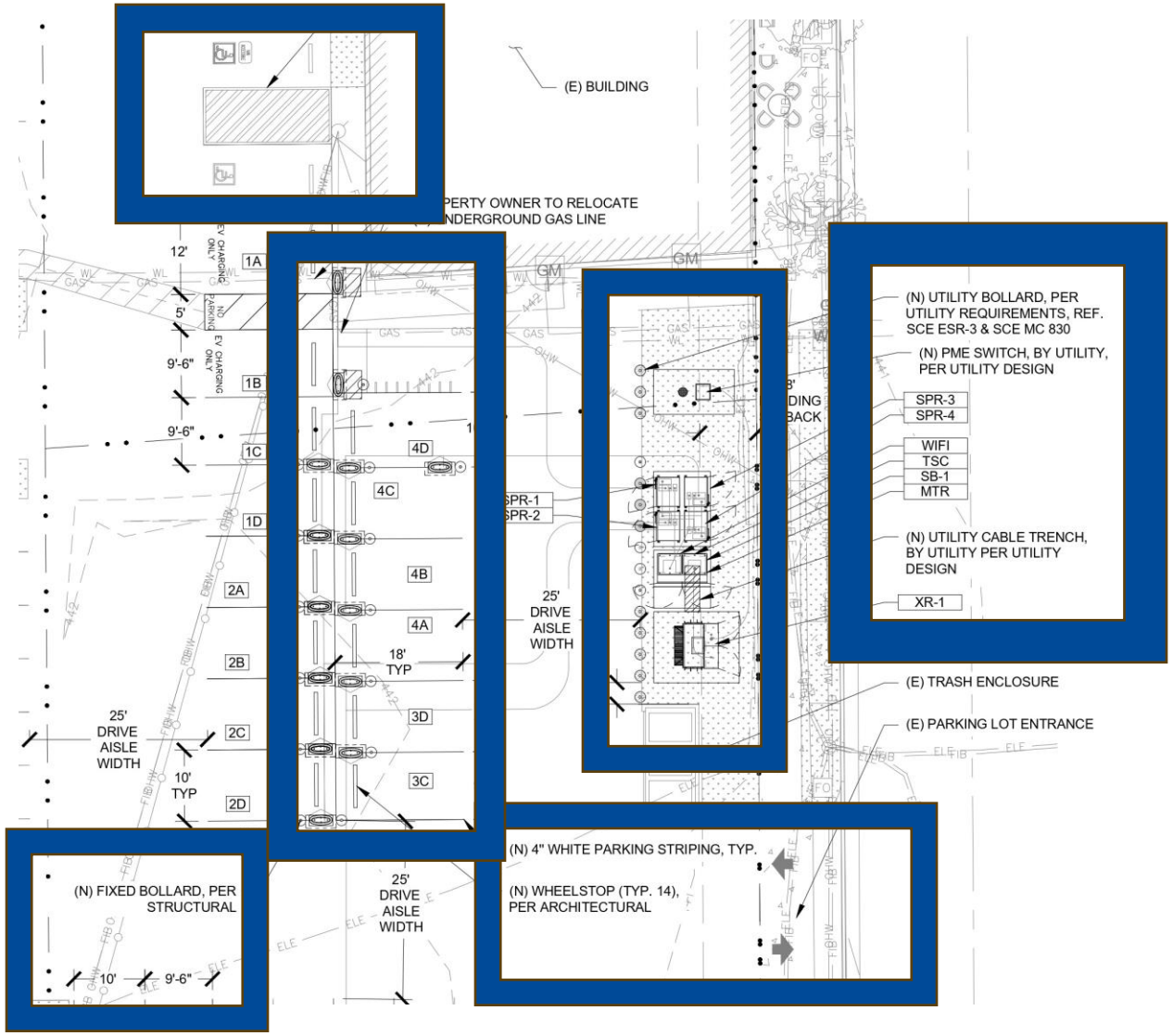
ADA Assembly Bill 970 Exceptions:

If a charging station installation reduces or eliminates parking spaces, it should not impact that building's parking space requirements.

	AB 1236 and AB 970 Compliant (EVCS Friendly)
Required by AB 1236 *(continued)*	**Single Corrective Action Notice:** AHJ commits to issuing one complete written correction notice detailing all deficiencies in an incomplete application and any additional information needed to be eligible for expedited permit issuance
Required by AB 970	**Permit Review Timelines:** EVCS application reviewed for completeness within 5 or 10 business days (based on the size of the project), and approved or denied within 20 or 40 business days (based on the size of the project)[50]
	Parking Count Requirements: AHJ reduces the number of required parking spaces at the existing building hosting the station by the amount necessary to accommodate the EVCS (including chargers and associated equipment) if the EVCS interferes with, reduces, eliminates, or in any way impacts the required parking spaces for existing uses

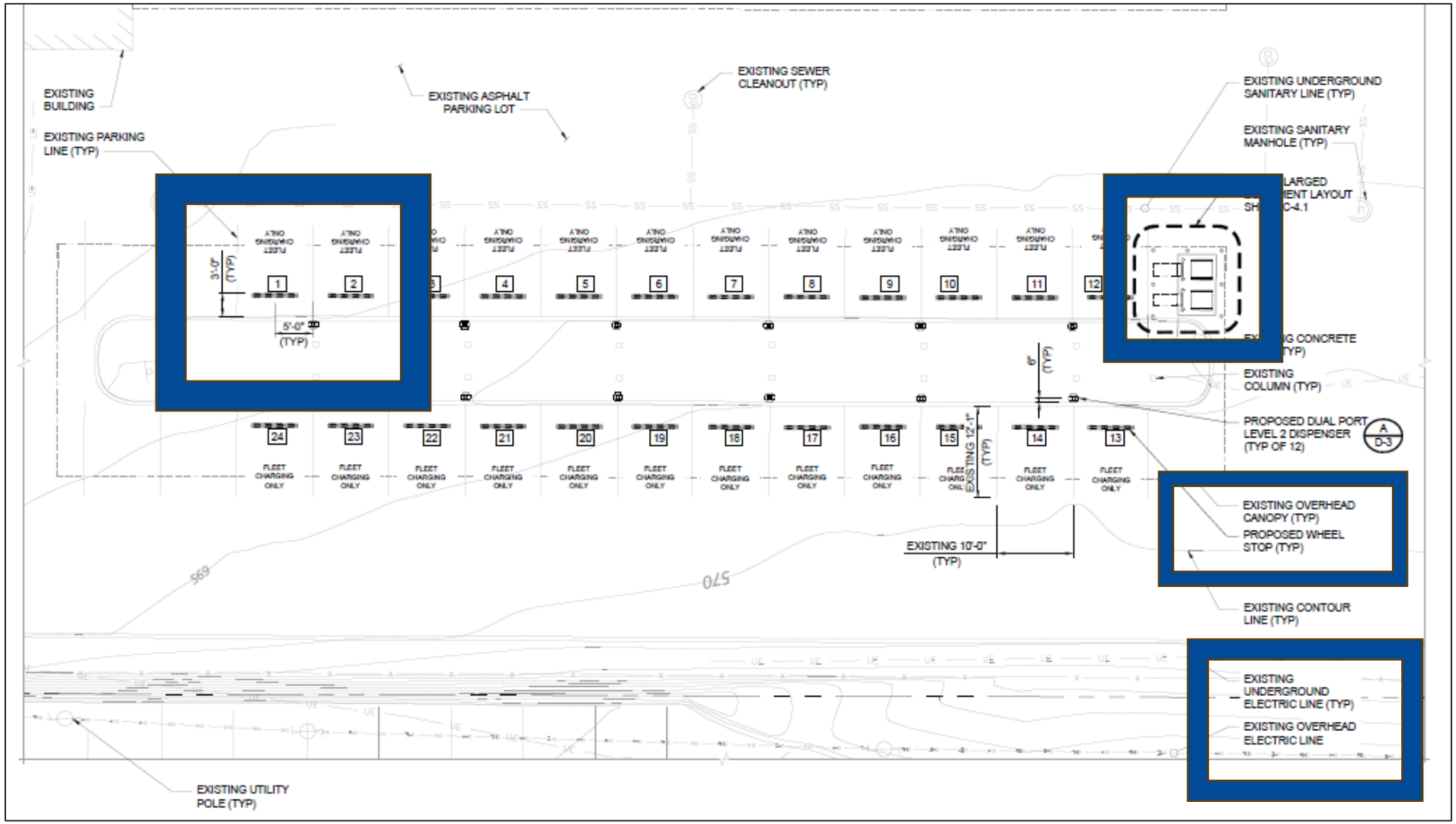
Source: CA Governor's Office of Business and Economic Development Electric Vehicle Charging Station Permitting Guidebook, Second Edition

Case Study: Public DC Fast Charging



Case Study: Fleet Level 2, Dual Port

Case Study: Fleet Charging



Key Takeaways

5 Key Project Elements for Site Design, Energization & Operation

1. Site Design Best Practices

Strategic site design and charger placement enhance safety, accessibility, and user satisfaction for EV charging.

2. Connecting to the Grid and Planning for Resiliency

Effective grid connection and resiliency planning ensure a reliable power supply for EV charging infrastructure.

3. Construction and Signage Guidelines

Optimized construction and signage ensure safe, reliable, and user-friendly EV charging stations.

4. Commissioning and Operational Considerations

Thorough commissioning and operational strategies ensure reliable and user-friendly EV charging performance.

5. Operations and Maintenance Considerations to Maintain Reliability and Availability

Proactive maintenance and monitoring ensure reliable and available EV charger performance.

Resources

Resources

CA EV Charging Readiness

Permitting Guidebook, Fact Sheets, Streamlining Progress, Scorecard, Best Practices:
https://business.ca.gov/industries/zero-emission-vehicles/plug-in-readiness/

Guidebook:
https://business.ca.gov/wp-content/uploads/2019/12/GoBIZ-EVCharging-Guidebook.pdf

Ordinance Examples: https://business.ca.gov/industries/zero-emission-vehicles/plug-in-readiness/permitting-electric-vehicle-charging-stations-best-practices/

County of LA 5 Part Training Series

Internal Services Department:
https://isd.lacounty.gov/electric-vehicles-and-charging-stations/

Tools

NREL Data Analytics and Infrastructure:
https://www.nrel.gov/transportation/data-tools

Guidelines

CALTRANS Highway Signage: https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/signs/ev-hydrogen-signage-installation-guide-a11y.pdf

US Access Board Design Recommendations For Accessible Electric Vehicle Charging Stations: https://www.access-board.gov/tad/ev/

Questions & Answers

- Add your questions to the Q&A.
- Take the County of LA survey.
- Watch the 5-Part Training Series on the County of Los Angeles website:

  https://isd.lacounty.gov/electric-vehicles-and-charging-stations/

Thank You!

Laura Iannaccone or Jennifer Caron
Los Angeles County, Internal Services Department,
Clean Transportation and Energy Team

evprogram@isd.lacounty.gov