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Clean Transportation Program

FINAL PROJECT REPORT

Reliable, Equitable, and Accessible Charging for Multifamily Housing in Los Angeles

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Prepared by: EV Charging Solutions



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PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the CEC allocate up to \$20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational.

The Clean Transportation Program has an annual budget of about \$100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce-training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued GFO-21-603 to demonstrate replicable and scalable business and technology models for large-scale deployment of electric vehicle (EV) charging infrastructure capable of maximizing access and EV travel for multifamily housing (MFH) residents. In response to GFO-21-603, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards May 11, 2022 and the agreement was executed as ZVI-22-016 on April 26, 2023.

ABSTRACT

Through the Reliable, Equitable, and Accessible Charging for Multi-family Housing (REACH) program, Electric Vehicle Charging Solutions (EVCS) installed charging infrastructure at three multifamily housing (MFH) communities with limited access to EV charging. The project deployed 245 Level 2 chargers and two direct current fast-charging stations, which created local access to convenient charging for housing residents. By alleviating a major barrier to EV ownership for those living in apartment settings, the program encouraged residents to transition from gasoline-powered vehicles to electric alternatives. This deployment demonstrates how targeted investment in multifamily housing can promote equitable clean transportation access and support broader emissions-reduction goals.

Keywords: California Energy Commission, Electric Vehicle Charging, Emissions Reduction, Multifamily Housing

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EXECUTIVE SUMMARY

Background

The Electric Vehicle Charging Solutions (EVCS) REACH project was initiated to expand access to reliable, equitable, and convenient EV charging infrastructure for residents of MFH communities in Los Angeles, California. The project specifically targeted low-income, underserved, and disadvantaged neighborhoods, where barriers to EV adoption, such as lack of on-site charging, have historically limited access to clean transportation options. By focusing on these communities, the project advanced transportation equity, environmental justice, and statewide clean energy goals.

The three project sites included Rise Hollywood (which has since change its name to Ovelo Hollywood), Toy Factory Lofts, and The Elysian, all located in Los Angeles. Collaborative partnerships with local public housing authorities enabled EVCS to deploy chargers at no cost to residents or housing authorities, removing a key financial barrier to EV adoption and demonstrating the potential for scalable, cost-effective solutions in subsidized housing contexts.

Beyond removing installation costs, EVCS addressed the barrier of operational affordability by offering subscription tiers designed for diverse resident needs bringing charging costs down as low as \$0.25/kWh. These included a high-mileage off-peak plan (\$99.99/month for 400 kWh) and an entry-level 'Essential' plan (\$9.99/month for 30 kWh) to maximize access for low-income drivers.

Purpose

The purpose of the project was to design, construct, commission, and operate EV charging infrastructure across three MFH sites while collecting a full year of usage data. The project sought to provide residents with reliable and accessible charging options, support research into EV usage patterns in MFH communities, and strengthen the knowledge base for future infrastructure deployment in similar underserved locations.

Objectives

The project objectives were executed across three phases:

- **Phase 1 – Design and Pre-Construction:** Develop efficient, cost-effective installation plans that incorporate load balancing, site-specific requirements, and scalability for future expansion. This included procuring appropriate Electric Vehicle Supply Equipment (EVSE) hardware and support equipment.
- **Phase 2 – Installation:** Construct installations safely, on schedule, and within budget while minimizing disruptions to residents. Installations included 245 Level 2 chargers and two Direct Current Fast Chargers (DCFC) across the three sites, with layouts optimized for visibility, accessibility, and electrical capacity.
- **Phase 3 – Operations:** Maintain and operate the chargers to provide a seamless and reliable user experience. Conduct inspections, functional testing, software and firmware maintenance, network reviews, troubleshooting, and preventive replacements, while collecting detailed operational data to inform future deployments.

Key Activities

- **Project Administration:** Monthly and quarterly meetings, along with detailed progress reporting, ensured alignment with objectives, verified expenditures, and facilitated transparent communication with funding agencies.
- **Design and Engineering:** Detailed site assessments, energy audits, and construction plans guided the installation of 245 Level 2 chargers and two DCFC units. Load calculations and conduit design ensured safe, code-compliant electrical distribution, while collaboration with specialized design firms streamlined permitting and integration with utility requirements.
- **Charger Procurement:** Procurement of chargers faced industry-wide supply chain challenges, including semiconductor shortages, transformer lead times, material cost increases, and skilled labor constraints. Specific roadblocks included delays in Noodoe Level 2 charger certifications, GSA schedule limitations, firmware issues, and DCFC supply constraints, which required careful planning to maintain the project timeline.
- **Construction and Commissioning:** Installations were completed across all three sites, incorporating trenching, electrical connections, and system commissioning according to design specifications.
- **Operations and Maintenance:** A structured maintenance program—including bi-monthly inspections, functional testing, software updates, network reviews, troubleshooting, and preventive replacement—ensured chargers remained safe, operational, and reliable. Two to three technicians were available locally to respond to service requests via a work order system.
- **Marketing and Outreach:** Educational materials, resident engagement, and community events enhanced awareness of EV technology, addressing questions, and encouraging participation in clean mobility programs. Outreach effectiveness was documented through a Community Engagement Report.
- **Data Collection and Analysis:** Ongoing data collection across all sites monitored usage, uptime, and performance. Technical errors, such as a data feed issue at the Toy Factory site, were promptly resolved to ensure accurate reporting beginning in Q2 2024.

Conclusions

The project successfully achieved its goals of providing reliable, accessible EV charging infrastructure to underserved MFH communities in Los Angeles. Residents now have convenient on-site access to Level 2 and DC Fast Charging, addressing a critical barrier to EV adoption. Collaborative partnerships, careful planning, and structured operations ensured that installations were completed safely, on schedule, and within budget.

The project also generated valuable insights into the challenges of deploying EV infrastructure in MFH settings, including procurement constraints, technical integration, and ongoing maintenance requirements. Outreach and apartment community engagement efforts enhanced awareness and acceptance of EV technology, demonstrating the effectiveness of public-private partnerships in advancing transportation equity and environmental justice.

Overall, this project provides a replicable model for deploying EV charging in low-income housing, contributing to statewide clean transportation goals and expanding equitable access to electric mobility for all residents.

CHAPTER 1: Introduction

1.1: Project Goals

The primary goal of this project was to deliver reliable, equitable, and accessible electric vehicle (EV) charging infrastructure for residents living in Multi-Family Housing (MFH) communities across three sites in Los Angeles, California. The sites included in the project are Ovelo Hollywood serving 300 units with mixed retail, Toy Factory Lofts serving 121 units, and The Elysian serving 316 units. The Elysian is an affordable housing complex in Los Angeles built for low and moderate-income renters and financed through a mix of Affordable Housing Trust Fund and No Place Like Home programs, with Housing and Urban Development Section 8 project-based vouchers supporting a portion of the units. The Affordable Housing Trust Fund is a local or state funding program run by the city, county, or state housing agency that provides financing like grants or low-interest loans to support the development, rehabilitation, or preservation of affordable housing. The installed charging infrastructure provides all residents with dependable and convenient on-site access to EV charging, a top-cited barrier to adopting electric vehicles. These installations help close an accessibility gap where MFH residents have historically been underserved by both public and private charging investments.

These locations were intentionally selected because they are situated within low-income, underserved, and disadvantaged communities that typically face significant barriers to clean transportation access. By focusing on these populations, the project sought to advance the broader goals of transportation equity, environmental justice, and statewide clean energy initiatives.

The EV Charging Solutions (EVCS) team, consisting of team members Dana Foist, Matt Robertson, Aaron Hardy, Kevin Wikholm, Mirko Pace, and Justin Arita worked collaboratively on this project. Enid Joffe from Clean Fuel Connection also worked on the project as a project partner. EVCS established partnerships with local public housing authorities in the Los Angeles area such as the Housing Authority of Los Angeles (HACLA), and the Los Angeles Housing Department (LAHD). These partnerships ensured coordination throughout the infrastructure deployment process by giving direct access to the sites and assisting with resident demographics. Working with subsidized housing sites enabled EVCS to achieve economies of scale, reducing overall installation costs and enabling the deployment of chargers at no financial burden to the housing authorities or their residents. By removing upfront costs, the project helped open pathways for EV adoption in communities where financial constraints are a significant barrier. Additional objectives included fostering partnerships with local authorities, engaging residents through outreach and education, and ensuring project administration and reporting were fully compliant with grant and contractual requirements.

1.2: Project Objectives

The operational objective of this project was to design, construct, commission, and collect a years' worth of data for 245 Level 2 chargers and two direct current fast chargers (DCFC) across three different sites in Los Angeles, California. Among each phase of the project, objectives were as follows:

Phase 1 (Design and Pre-construction): Design an efficient installation plan that minimizes cost, implements load balancing techniques, and uses space effectively. This includes procuring the right type of EVSE hardware and support equipment.

Phase 2 (Installation): Construct the installations safely, on-time, and on-budget to minimize disruptions to tenants and stay within the allowable costs. Installations should reflect the plans and meet the highest quality standards.

Phase 3 (Operations): Operate and maintain the chargers to provide a smooth, reliable charging experience for tenants that rely on them while gathering key insights on the usage rates of the hardware.

The execution of this project not only provided hundreds of Los Angeles County residents with access to charging but also expanded EVCS and EVCS partners' knowledge base for future efforts. Access to reliable, convenient, and available chargers for renters is key to further expand the adoption of electric vehicles in California. This project proves that public-private partnerships can effectively deploy solutions of different types to meet tenant's needs and provided key learnings to continue to expand in the future.

CHAPTER 2: Project Administration

2.1: Project Meetings

The EVCS project team consistently carried out the communication required under this task to ensure effective oversight and progress monitoring. Monthly calls were scheduled and facilitated by the Commission Agreement Manager (CAM), except in months when quarterly progress reports were submitted. EV Charging Solutions prepared comprehensive updates on work completed, planned activities for the upcoming period, and any issues that could affect the schedule, performance, or expenditures. During each call, EVCS provided summaries of project activities, discussed anticipated work, and verified that match funds were being spent in accordance with the approved Match Funding Spending Plan. These discussions supported an assessment of project progress and provided a basis for ensuring that submitted invoices aligned with work performed. Collectively, these efforts have maintained clear communication, supported effective project management, and ensured ongoing alignment with agreement requirements throughout the life of the project.

2.2: Progress Reports

Throughout the duration of the Agreement, the project team successfully documented all activities to demonstrate continued progress toward achieving the project objectives on schedule and within budget. Each reporting period, the team compiled and summarized the work performed, outlined upcoming activities for the next period, and identified any issues that could influence technical performance, schedule, or expenditures. These evaluations provided confirmation that submitted invoices accurately reflected the work completed.

In accordance with Agreement requirements, Quarterly Progress Reports were prepared and submitted to the Commission Agreement Manager by the 10th day of each quarter. The reports documented all activities conducted during the quarter, assessed progress toward completing the Agreement within the approved budget, and identified any potential cost overruns or budget concerns. Through submission of these detailed progress reports, EVCS maintained transparent communication with the CAM and ensured ongoing alignment with project objectives, performance expectations, and fiscal requirements.

Critical Project Review (CPR) meetings provided the opportunity for discussions between the CEC and EVCS to determine if the project should continue to receive CEC funding to complete the project and to identify any needed modifications to the tasks, products, schedule or budget. There were two CPR meetings that occurred during the project life cycle. The CAM provided a written determination to allow continuance of the project on both occasions.

CHAPTER 3: Design and Engineering

3.1: Construction Design

The construction design phase for EV charger deployment involved creating detailed plans that integrated site-specific requirements with electrical and civil engineering principles. This included selecting appropriate charger types (e.g., Level 2 or DCFC), and ensuring compliance with NEC and local codes, and incorporating scalability for future expansions. Collaboration with the design firm MD7 and the engineering firm Refik, was essential to optimize layout, minimize disruptions, and align with budget constraints while prioritizing safety and efficiency. 65 Level 2 chargers were installed at the Elysian site, in the parking garage and the outdoor parking lot. The Ovelo Hollywood site design includes 60 Level 2 chargers and two DCFCs on several levels of the building's parking garage. 120 Level 2 chargers were installed in the parking garage of the Toy Factory building.

3.1.1: Site Visits

Site visits are critical for hands-on evaluation of the property, where potential challenges are identified. During these assessments, teams measure distance to power sources, assess parking configurations for optimal charger placement and note environmental factors like drainage or shading. Before the site assessment occurs, there is a two week lead time required to align logistics and ensure the on-site visit is efficient. Schedules are coordinated with various teams including electrical and civil engineers and property managers. Once the coordination is complete, which takes around two weeks, the actual site visit is concentrated into a single day on-site.

An initial assessment of the proposed sites were conducted to evaluate overall suitability for EV charger installation. This review considered location accessibility, proximity to available power sources, the existing parking layout, and anticipated user traffic patterns to confirm that the chargers would be both convenient and highly visible to users.

A utility and infrastructure check was also performed to identify current electrical capacity, locate underground utilities, and note any potential obstructions such as existing piping, tree roots, or structural features. Local zoning regulations and site constraints were reviewed as part of this process to mitigate the risk of unforeseen challenges or cost increases during construction.

To further assess readiness, an energy audit of the building was completed to analyze present power consumption, available panel capacity, and determine whether system upgrades would be required to safely and effectively support the proposed charging equipment.

In addition, an environmental and safety review was undertaken to evaluate soil conditions, floodplain considerations, ADA access requirements, and overall site security, including lighting levels and visibility. These factors were reviewed to minimize operational risks and ensure long-term site viability.

Finally, key stakeholders—including the property owner, relevant local authorities, and prospective users—were consulted to align expectations regarding access, use type (public versus private), and overall project objectives.

3.1.2: Technical Specifications

Technical specifications outline the charger's performance criteria, including voltage (e.g., 240V for Level 2, 480V for DCFC), amperage, connectivity features, and compatibility standards like J1772 or CCS. They also detail enclosure ratings for weather resistance (e.g., NEMA 3R), energy efficiency metrics, and integration with smart grids. For DCFCs, specs emphasize rapid charging capabilities and thermal management systems to handle higher power loads safely. Technical specifications related to site design are captured in Construction Documents developed by a Design Firm and approved by the Site Host.

3.1.3: Using a Design Firm

The project utilized a qualified design firm that had previously partnered with EVCS and demonstrated experience and expertise in EV infrastructure needed to support the planning and development of the charging installation. Preference was given to firms capable of providing turnkey services, encompassing civil, structural, and electrical design, and ensuring full compliance with applicable local, state, and national codes.

In collaboration with the design firm MD7, the project scope was clearly defined to address charger types, site configuration, and future scalability considerations. This included evaluating space requirements, electrical demand, conduit routing, equipment placement, and long-term expansion potential.

As part of the design process, the firm conducted comprehensive site surveys, developed detailed engineering plans and blueprints, and performed power distribution modeling to confirm system capacity and optimize performance. Coordination with the local utility company and permitting authorities was also facilitated by the design firm to support timely reviews and approvals.

Engaging a specialized firm provided several benefits, including streamlined permitting, reduced risk of design or construction errors, and improved accuracy in cost estimating. Where feasible, design considerations also included sustainable and future-ready elements, such as compatibility with potential energy management systems. Currently, the sites do not have battery storage capabilities but it could be a possibility in the future.

To support a seamless transition from the design phase to construction, the selected firm coordinated closely with certified installation contractors, helping ensure alignment between engineered plans and on-site execution.

3.1.3: Load Calculations

Load calculations determine if the electrical system can support the chargers without overload, starting with baseline usage (e.g., 3 Kilovolt Ampere (KVA) per sq ft of building area plus fixed appliances). Add the charger's demand—7,200 KVA for standard Level 2 or scaled for multiples—with a 125 percent continuous factor per National Electric Code (NEC). For DCFCs, calculations account for peak demands up to 350 kW, often requiring panel upgrades or load management tech to prevent excessive utility costs and ensure reliable operation.

The electrical load assessment process began with the collection of detailed information regarding existing electrical demand at the site. This included evaluating the square footage of the home or business (calculated at approximately 3 KVA per square foot), accounting for

typical appliance loads (including an additional 4,500 KVA for small appliances), and reviewing the electrical demands associated with HVAC systems, lighting, and other active circuits.

The charger load was then incorporated into the overall calculation. For Level 2 chargers, the manufacturer's nameplate rating was used where available, or a standard value of approximately 5.76 kW per unit was applied. For DC Fast Chargers, substantially higher power requirements were factored in—up to 350 kW per unit—along with appropriate demand factors when multiple units were planned for installation.

Using NEC guidelines, the total anticipated load was calculated to determine whether the existing electrical service could safely accommodate the additional demand. This analysis also identified whether a panel or service upgrade (for example, from 100 amps to 200 amps) would be required to prevent overloading and ensure reliable operation.

To support calculation accuracy, industry-standard online tools and electrical modeling software was utilized, and appropriate safety margins were applied, including a 125 percent factor for continuous loads. Consideration was also given to the potential use of energy management systems to enable dynamic load balancing during peak demand periods.

Finally, all calculations and assumptions were reviewed by a licensed electrician or professional engineer to verify accuracy, ensure code compliance, and reduce the risk of nuisance tripping or system failure.

3.1.4: Wiring and Conduit

Wiring and conduit specifications ensure safe power delivery, typically using 6 American Wire Gauge (AWG) copper wire for Level 2 (40A circuits) within Polyvinyl Chloride or Electrical Metallic Tubing conduits sized to accommodate future upgrades (e.g., 1-2 inch diameter). Conduits must be supported every 10 feet, buried at least 18 inches if underground, and compliant with NEC for overcurrent protection. For DCFCs, thicker wiring (e.g., 2/0 AWG) and larger conduits are needed due to higher currents, with emphasis on grounding and heat dissipation to prevent faults.

CHAPTER 4: Charger Procurement

4.1: Roadblocks for Charger Procurement

Between 2022 and 2024, the EV charging industry experienced significant supply-chain and workforce challenges that affected the procurement and deployment of charging equipment nationwide. One of the primary constraints was the global shortage of semiconductors and insulated gate bipolar transistors (IGBTs), which are critical components in charging hardware. These shortages resulted in extended manufacturing lead times, often ranging from 12 to 24 months. Compounding this issue, the lead time for critical electrical infrastructure—particularly transformers required to support higher-capacity charging installations—expanded dramatically, in some cases exceeding 100 weeks. This extended timeline created bottlenecks in both planning and construction schedules for many projects.

Volatile global markets for raw materials, including copper and rare earth elements, drove substantial cost increases in charging equipment and electrical components. These price fluctuations frequently resulted in overall cost escalations of approximately 30 to 50 percent, challenging original project budgets and requiring scope or schedule adjustments.

The availability of skilled labor presented additional ongoing constraints. A shortage of qualified electricians, engineers, and certified installers further delayed both the procurement and installation of EV charging systems, particularly in regions already experiencing workforce limitations.

4.1.1: Level 2 Noodoe Chargers

Several factors contributed to procurement and deployment challenges specific to Noodoe Level 2 charging equipment. EVCS selected Noodoe as a partner because they had worked with them during the previous five years and were dependable and familiar with EVCS's network. As a company headquartered in Taiwan, Noodoe initially faced heightened scrutiny related to data security and network architecture. Early concerns regarding server locations and data handling standards required additional review and clarification, which delayed approvals and slowed deployment timelines for some projects.

Certification delays also presented a significant barrier. Key approvals, including UL and Energy Star certifications, were not fully secured until early 2024. Prior to receiving these certifications, many projects were unable to move forward with procurement or installation; compliance with recognized safety and efficiency standards is a prerequisite for publicly funded or municipally approved installations.

Prior to 2024, Noodoe equipment was not available through a General Services Administration (GSA) schedule. As a result, every public-sector project involving these chargers was required to go through a full Request for Proposals (RFP) process, which often added an additional 66 to 1212 months to project schedules. From an operational standpoint, frequent firmware and connectivity issues further complicated deployment. These technical interruptions affected reliability and performance during early installations, limiting the ability to repeat orders and requiring additional troubleshooting and technical support.

These challenges contributed to extended delivery timelines, with typical order fulfillment ranging from 66 to 1414 months during the 2022–2024 timeframe.

4.1.2: Broadband Telecom Power (BTC) Power DCFC Chargers

BTC Power was selected as the charger supplier for the DCFCs on the project. The BTC chargers utilize CCS and CHAdeMO connectors. During that time, BTC chargers had been installed at several EVCS sites, since the chargers accepted 208 volts, the same as the Level 2 chargers deployed at the time. BTC proved to be a reliable supplier. However, DCFC procurement and deployment overall faced several significant challenges that impacted project timelines and costs. From 2023 to 2024, certain manufacturers acted as sole suppliers to major networks such as Electrify America, creating a substantial backlog for all other customers and limiting the availability of new orders. Regulatory requirements also contributed to delays. In 2023, Buy America waivers required production lines to pause or be re-tooled to meet domestic content standards, temporarily halting shipments and extending lead times. Operational challenges further complicated deployment. Cold-weather firmware failures experienced during the winter of 2023–2024 necessitated field retrofits and delayed delivery of new units, while utility demand-charge exposure at many sites required the addition of load management systems confronted with high electricity costs and to prevent overloading.

These factors resulted in typical delivery timelines of 12 to 24 months for DCFC equipment throughout this period, significantly impacting project schedules and requiring careful planning to manage expectations and maintain project feasibility.

Figure 1: L2 Charger at Toy Factory



Photo Source: EVCS

CHAPTER 5: Construction and Commissioning

5.1: Install Chargers at Three MFH Complexes in Los Angeles

5.1.1: Safety

The number one requirement around construction is a strict emphasis on safety for the contractors and those around the workspace. Regardless of the type of construction, working with heavy equipment, electric connections, and around moving vehicles is an inherently risky activity. This risk is mitigated as much as possible by considering safety first in the pre-construction planning phase, properly fencing the job site, use of visible signage, use of personal protective equipment, and enforcing strict standards on contractors.

All EV charger installation activities adhered to California's electrical worksite safety standards. This compliance included conducting daily job-site safety meetings, implementing all required signage and fencing, applying appropriate preventative safety measures, and ensuring all workers received the required training. These standards were consistently followed across all work performed at the three REACH program locations for this project.

5.1.2: Pre-Construction Communication and Concerns

Three-way pre-construction planning between EVCS, the contractor, and the site host is of utmost importance to achieve a successful, safe, and on-time construction. The EVCS project manager liaisons between partners in the design and permitting phase to ensure all issues are addressed and all parties expect the same impact. The actual construction work is only a few days long at each site, which is minimal to the project lifecycle but important to the days with the most disruption. Once the Permit ready to issue (RTI) notice from the AHJ is received and Prior to any work commencing, a Pre-Con Walk is scheduled with Site Host, the EVCS Project Development Engineer and Contractor. EVCS will also submit the following documents via email to site host for construction start approvals:

- Certificate of Insurances
- Construction sequencing schedule
- CDs
- Copy Permit

Communication regarding what to expect with construction with the site hosts makes sure EVCS is properly transferring local knowledge of the site, is knowledgeable about any issues, and the information reaches all individuals impacted. In this case, minimizing tenant disruption was a large issue for the hosts. We made sure to communicate proactively with signage about upcoming construction, kept construction activities to strict 8-5pm weekday timelines, and minimized physical parking disruption. The contractors kept the staging area to a minimum and moved it through the installs, while also making sure to not to block entrances and exits..

5.1.3: Construction Activities and Delivering On-Time

Once the Site Host has approved EVCS's pre-con package and scheduled start date - Construction Activities begin based on the Construction Schedule. Weekly updates on Construction progress were made to the site host and inspections (i.e. rough, final) with AHJ and utility interconnection completed. Construction installation includes the following steps:

- PreCon Walk
- Civil work, foundation preparation, trench work and site layout formwork (if necessary)
- Conduit installation (underground or along walls)
- Concrete pour (if necessary)
- Charger and Switchgear installation
- Wire Pull and Terminations
- Inspections, Rough and Final
- PostCon Walk
- Panel Interconnection/Energization

The physical construction process takes two to five workdays per location, which emphasizes the importance of pre-planning the coordination of materials and plan. Completed work is inspected by the local AHJ to grant final approval in the following week or two, and then the chargers can be energized. At Toy Factory Lofts, the addition of a Wi-Fi network for connectivity increased the total scope and duration.

5.1.4: Installation of the DC Fast Chargers

At Ovelo Hollywood, two 100 kW DCFC chargers were included as part of the project scope. Installation of DCFCs is considerably more complex due to the high-power equipment, buried conduit and trenching required, and the 480-volt utility service to be installed. Fortunately, in this project the utility coordination could be avoided because power capacity already existed on the building's panel. Tapping into the existing building power significantly cut down the cost, complexity, and timeline to build, by eliminating utility upgrades and additional civil building permits. Adding mid-power DCFC off large buildings with existing power is a huge opportunity, particularly with the evolution of building control systems, as it will allow for distributed fast charging at a fraction of the costs of new projects.

5.1.5: Importance of Network Signal and Communication Equipment

Effective communication in EV chargers is essential for fast, reliable charging and a great user experience. Built-in networks let chargers talk to backend systems to provide real-time status, authorize payments, and enable remote start/stop via apps, so drivers always know if a charger is available, in use, or broken before arriving. Communication supports smart charging features that balance power loads, prevent grid overloads at busy sites, and allow lower cost charging during off-peak hours. It also enables automatic firmware updates, remote diagnostics, and instant fault alerts, reducing downtime and expensive truck rolls for

technicians. Most chargers communicate through an internal cellular chip on a 4G or 5G signal, however in parking garages this communication can be limited or unavailable altogether.

At the Toy Factory Lofts, it was determined during the site walk that cellular communication would not be possible for the number of chargers installed, so the inclusion of a tethered Wi-Fi network was scoped into the installation. Routers were installed along the roof of the parking garage to ensure reliable signal throughout. As a potential added benefit to tenants, EVCS is now in discussions to open this wifi network to users so they can ensure reliable signal on their phones and for their cars to perform over-the-air updates while parked.

Incorporating tethered Wi-Fi proved to be a reliable, affordable, and replicable solution for maintaining uptime in underground parking garages where cellular signal fails.

CHAPTER 6: Operations and Maintenance

6.1: Inspection

A bi-monthly visual inspection of the EV charging equipment is conducted to ensure ongoing safety, functionality, and user accessibility. During each inspection, chargers, pedestals, cables, and connectors are examined for any signs of physical damage, including wear, corrosion, loose hardware, or water intrusion. The inspection also includes a check for vandalism or tampering and confirms that chargers remain unobstructed by parked vehicles, debris, or other potential barriers that could impede use. Regular monitoring helps identify maintenance needs early, ensuring chargers remain safe, reliable, and fully operational for users.

Functional testing is performed to verify that each EV charger operates correctly and safely. During testing, a test vehicle or a simulated load is connected to confirm that the charger successfully initiates a charging session and that cable temperatures remain within normal operating ranges. Charging speeds are monitored to ensure they align with the expected amperage for each charger type. In addition, all user authentication and payment systems—including RFID, mobile applications, and integrated payment terminals—are tested for proper functionality. The charger’s status is confirmed through the network management dashboard to ensure it is reporting online and available for use. This process helps identify operational issues early and ensures a reliable user experience.

6.2: Maintenance

Regular software and firmware maintenance is performed to ensure EV chargers remain secure, reliable, and fully functional. Firmware updates, typically provided through the charger’s network portal, are installed as they become available to address performance improvements, bug fixes, and security enhancements.

During maintenance, the charger’s user interface—including screens, buttons, and touch controls—is tested to confirm proper operation. Network connectivity is also verified, whether through cellular, WiFi, or Ethernet, to ensure the charger can communicate effectively with the management system for monitoring, reporting, and remote diagnostics.

Routine software and firmware maintenance helps prevent operational disruptions and supports long-term system reliability.

Regular network reviews are conducted to ensure that EV chargers are performing optimally and delivering a reliable user experience. This process includes analyzing charging session data and overall uptime to identify any operational trends or anomalies. Error logs and recurring fault codes are reviewed to detect patterns that may indicate underlying technical issues requiring maintenance or adjustment. Additionally, user access permissions are verified to ensure that authorized groups—such as tenants, guests, and property managers—have the correct levels of access and functionality.

These routine network reviews support proactive maintenance, enhance charger reliability, and help maintain secure and efficient system operation.

6.3: Repair

The repair and troubleshooting process is initiated whenever a charger reports a fault, or a user submits a complaint. Initially, fault codes are reviewed remotely to identify the nature of the issue and determine whether it can be resolved without an onsite visit. In many cases, a remote reboot is attempted as a first step to restore normal operation.

If remote measures are insufficient, an on-site inspection is conducted to assess the charger's condition. Consumable components, such as cables, connectors, RFID readers, or display screens, are replaced as necessary to restore functionality. For issues beyond routine maintenance or warranty coverage, coordination with the charger manufacturer is undertaken to ensure proper warranty repair or technical support. This structured approach allows for timely resolution of issues, minimizes downtime, and maintains reliable access for all users.

A preventive replacement schedule is maintained to ensure the longevity and reliable operation of EV charging equipment. Connectors are replaced every two to four years, depending on usage, while cables are typically replaced every three to five years. Cellular modems also follow a three to five-year replacement cycle to maintain network reliability. Pedestal hardware is replaced as signs of corrosion appear, and the full charger unit is generally replaced every five to seven years, reflecting the typical lifespan of EVSE equipment. To support this schedule and respond to operational needs, the maintenance team maintains two to three technicians within driving distance of the charging sites. Service requests are managed through a work order system, which receives input from site managers and call center agents. This process ensures timely preventive maintenance, rapid response to issues, and ongoing system reliability for all users.

CHAPTER 7: Marketing and Outreach

7.1: Community Engagement Report

In addition to deploying EV charging infrastructure, the project implemented a community outreach and education component aimed at building awareness and promoting understanding of electric vehicles and clean transportation options. EVCS developed and distributed educational materials and engaged directly with residents, addressing questions, explaining how EV charging works, and highlighting both the economic and environmental benefits of EVs. These efforts contributed to increasing residents' awareness of EV technology and encouraging participation in California's clean mobility programs.

Marketing and outreach efforts followed a planned, process-driven approach designed to improve community engagement and awareness. As part of the preparation phase, the project team conducted a review of previous outreach activities to identify the strategies and methods that had proven most effective in reaching the target audiences. Insights gained from this assessment lead to the development of a structured outreach plan for the project, including a welcome letter, a brochure about EVCS and the subscription plans, a link to the how to charge video and other pertinent information, ensuring that engagement activities were both targeted and efficient. After the information was distributed, a survey was sent to all the apartment community residents, with the results tallied and analyzed. EVCS staff played a central role in executing outreach activities. Their direct involvement ensured that communications reflected accurate, site-specific operational knowledge and helped strengthen relationships with apartment community residents. By engaging staff with operational expertise, the project was able to respond promptly to resident questions or concerns, enhancing the effectiveness of outreach interactions.

As part of the outreach process, the team prepared the Community Engagement Report based on results from the survey. This report captured participant feedback, and summarized key trends or concerns raised by residents. Formalizing this documentation provided a consistent method for evaluating outreach effectiveness and will serve as a resource for adjusting engagement strategies on future projects.

The process steps of reviewing past activities, developing a targeted plan, involving EVCS staff, and formalizing reporting, ensured that marketing and outreach efforts were transparent and aligned with the project goals.

The survey assessed resident awareness, usage, and perceptions of on-site EV charging to estimate deployment awareness and perception of pricing. A small percentage of total tenants responded to the survey; however, findings indicate strong engagement from those who completed the survey, in summary:

1. EV Ownership & Intentions

- 64 percent currently own an EV or plug-in hybrid.
- 26 percent plan to purchase one within 12–24 months.
- Only ten percent are not considering an EV.

Insight: The community is highly receptive to EV adoption.

2. Awareness & Usage of On-Site Chargers

- 100 percent of residents are aware of on-site EV chargers.
- 51 percent have used the chargers.
- Reasons for non-use:
 - 33 percent do not own an EV.
 - 15 percent indicate pricing concerns.
 - Others: Uncertainty about access or charger condition.

Insight: Awareness is universal, but usage is limited by ownership and minor barriers.

3. Perceived Value of EV Charging

- EV charging rated 4.5 out of 5 in importance when choosing where to live
- 72 percent would be more likely to purchase or lease an EV if reliable charging were available.

Insight: Reliable infrastructure strongly influences EV adoption.

4. Pricing Perceptions

- 38 percent find pricing reasonable
- 38 percent are unaware of pricing
- 24 percent find pricing unreasonable

Insight: Confusion about pricing may hinder usage more than dissatisfaction.

5. Preferred Payment Models

- 33 percent prefer pay-per-use
- 26 percent prefer subscriptions
- 13 percent prefer inclusion in rent

Insight: Residents are open to flexible payment options.

To increase utilization and adoption, priorities should include transparent pricing communication, education on charger access, adequate availability, and flexible pricing models. These improvements present a clear opportunity to enhance resident satisfaction and strengthen EV infrastructure usage.

CHAPTER 8: Data Collection and Analysis

8.1: Data Collection Plan

The last 12 months of the project have been designated for data collection of the performance of the installed chargers, tracking key outputs such as energy dispensed, charger uptime, the number of sessions, and the number of chargers in use by address. The results show an encouraging trend of an increased number of drivers using the chargers, an improvement in maintenance performance, and most importantly an increase in kWh dispensed. EVCS expects as more residents adopt EV's, this trend will only continue to increase.

8.1.1: Quarterly Data Reporting

Data collection activities continued across the three project sites and were submitted on a quarterly basis, following the established reporting procedures. When a technical error was identified in the charger data feed from the Toy Factory location, the project team worked with the technical support staff to diagnose and correct the issue. This fix was implemented to ensure that accurate and complete data would be available beginning in Q2 2024, preventing future gaps in reporting.

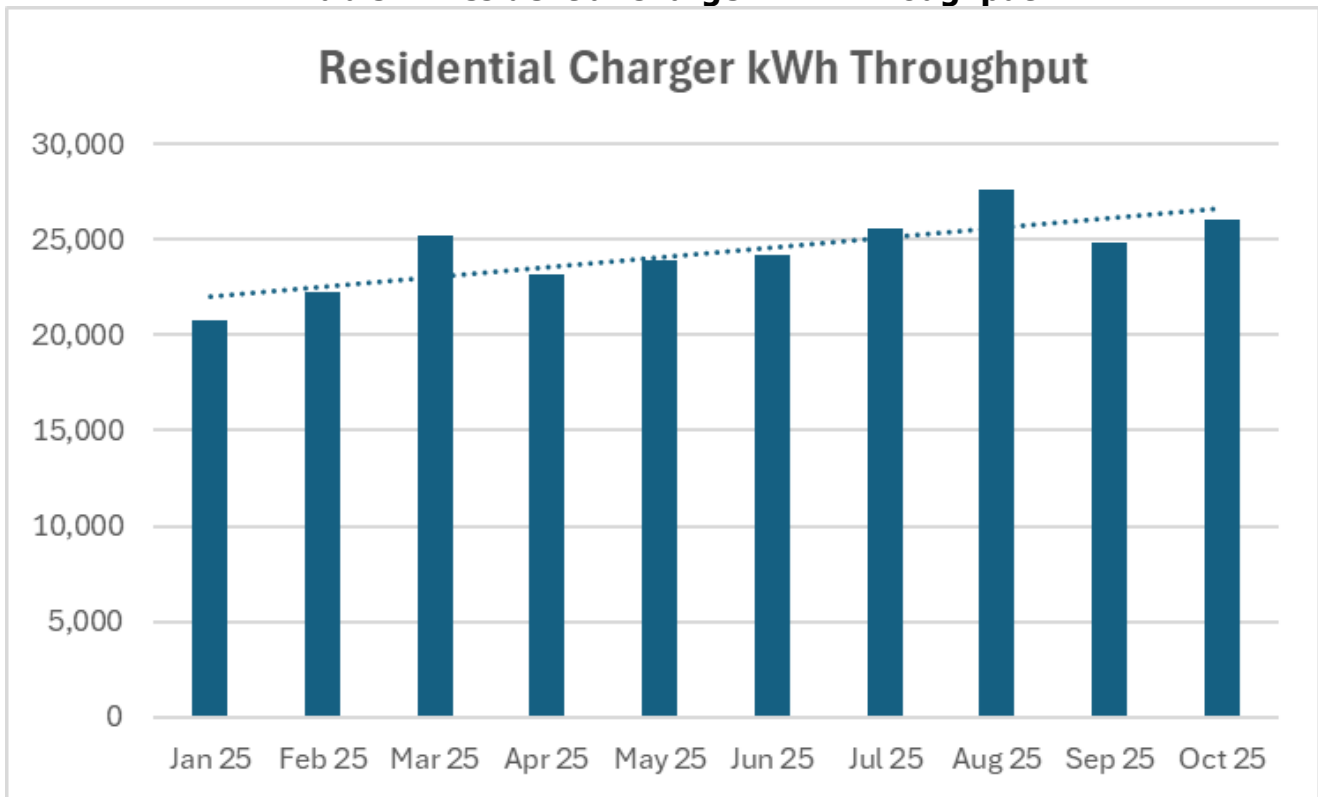
Table 1: Throughput (kWh) and Uptime

LOCATION NAME		Jan 25	Feb 25	Mar 25	Apr 25	May 25	Jun 25	Jul 25	Aug 25	Sep 25	Oct 25	Nov 25 (22 days)
The Ovelo Hollywood	kWh	10,775	10,855	12,847	9,970	10,342	9,720	10,152	11,909	10,610	11,993	8,357
	Uptime	99.5%	100.0%	99.5%	99.7%	99.6%	100.0%	97.3%	100.0%	99.9%	100.0%	100.0%
The Elysian - Tenants Only	kWh	8,221	8,929	9,157	9,451	10,921	11,671	12,255	11,846	10,823	9,824	7,322
	Uptime	98.0%	98.5%	98.2%	90.2%	99.3%	98.8%	97.2%	97.4%	95.5%	97.8%	98.2%
Toy Factory	kWh	1,802	2,463	3,205	3,713	2,672	2,823	3,164	3,890	3,395	4,205	3,263
	Uptime	73.3%	77.0%	84.3%	97.7%	90.7%	90.6%	97.9%	98.7%	82.9%	97.9%	100.0%
Total Residential	kWh	20798	22247	25209	23134	23935	24215	25570	27646	24829	26022	18943

Source: EVCS

As illustrated in Table 2 below, monthly power sales are trending upward, including preliminary data for November. Over the reporting period, EVCS also experienced growth in the number of charging ports with consistent usage (a trend expected to continue). Community outreach, while primarily reflecting feedback from current or prospective charger users, indicates that many residents are considering electric vehicles for their next purchase. Convenient access to home charging plays a key role in that decision, and as more tenants transition to EVs, overall throughput is projected to increase significantly.

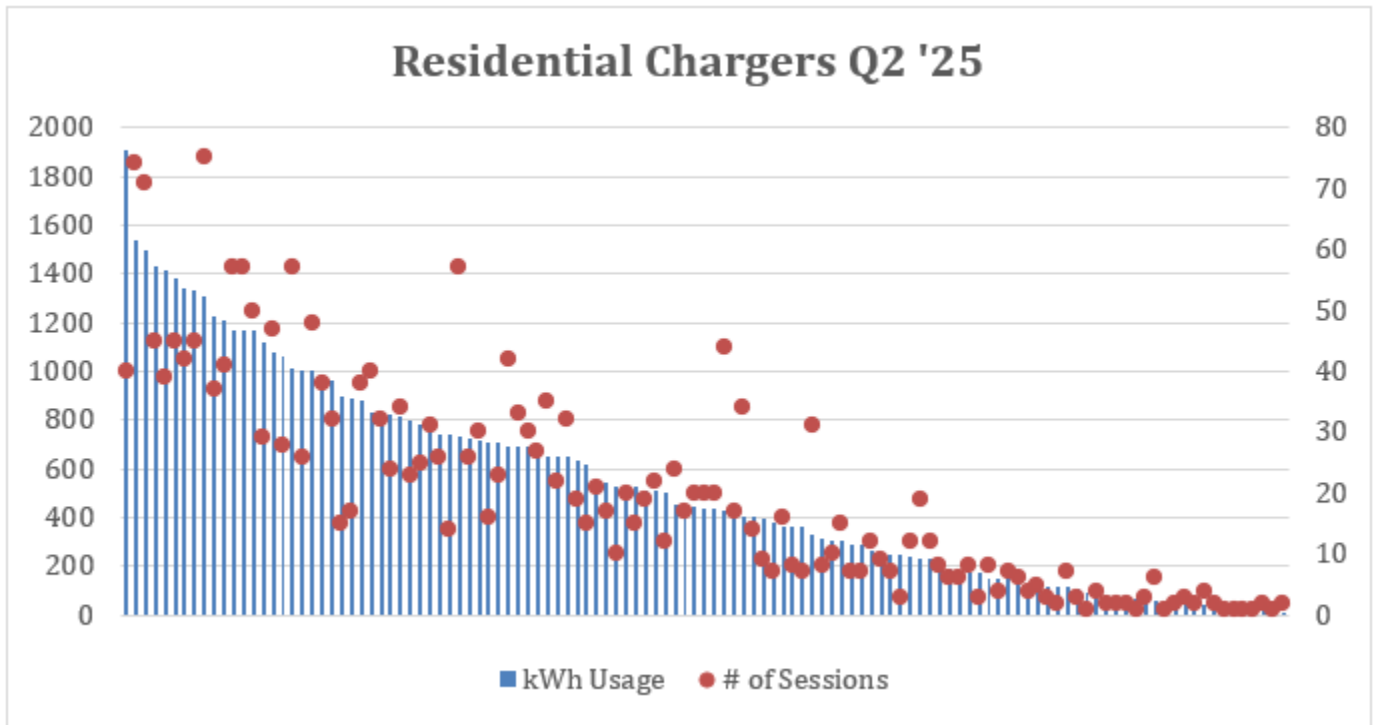
Table 2: Residential Charger kWh Throughput



Source: EVCS

Individual ports had a wide range in the amount of energy throughput, which correlated closely to the number of sessions. EVCS attributes this to the driving habits (commuting distance, regularity of commute, type of vehicle) as well as the preferred location of some chargers (where residents have option to select non-designated spaces). Table 3 below shows this distribution by charger of the energy sold and the total amount of sessions in Q2 of 2025.

Table 3: Residential Chargers Q2 2025



Source: EVCS

Individual charging behaviors revealed valuable insights, as shown in the session distribution and summary statistics chart above. The data shows Level 2 chargers throughout the properties including quantity of sessions and amount of energy dispersed. Notably, the red dots in Table 3 highlight drivers who charged nearly every day during the quarter—up to 92 sessions—or consistently on weekdays. On average, users plugged in approximately once every three days, aligning with EVCS’s expectations. For Q2 2025, the average residential charging session delivered 25.9 kWh, closely matching the median of 24.6 kWh. This consistency suggests a stable pattern in how and when drivers utilize Level 2 chargers. A typical session provides around 100 miles of range—more than sufficient for most daily commutes—and lasts about four hours, indicating that users often charge overnight while parked. With reliable access to charging at their residence, tenants can conveniently top off their batteries as needed, maintaining a near-full charge without concern.

CHAPTER 9: Findings and Recommendations

This project provided valuable insights that can inform future efforts in multifamily EV charger installations, public-private partnerships, and commercial deployment strategies. The lessons learned span installation logistics, operational challenges, and policy implications.

9.1: Installations in Multifamily Developments

Installing EV chargers in multifamily settings presents both advantages and challenges:

- **Advantages:**
 - Streamlined decision-making due to centralized ownership and management.
 - Easier access to existing electrical infrastructure.
 - On-site resources can reduce installation complexity and timelines.
- **Challenges:**
 - Success depends on buy-in from property owners, managers, and tenants.
 - Parking garages often pose wireless connectivity issues, which can affect networked charger functionality.
 - Even with sufficient electrical capacity, load management is essential to scale installations cost-effectively and avoid expensive upgrades.

9.2: Operating Environment and Economics

The financial viability of EV chargers depends heavily on utilization:

- **Utilization Challenges:**
 - Chargers assigned to individual vehicles or small tenant groups may not generate sufficient throughput to justify the investment.
 - High upfront costs and ongoing maintenance require careful planning.
- **Cost Considerations:**
 - Electricity rates are a major cost driver; overnight charging is significantly more economical than afternoon peak rates in Southern California.
 - Smart charging and vehicle-to-charger communication can help optimize energy use and reduce costs.
 - Right-sizing installations to match actual demand is critical for long-term sustainability.

9.3: Public-Private Partnerships

Public investment in residential EV charging, especially for lower-income renters, is a strategic and impactful use of funds:

- **Benefits:**
 - Expanding access to home charging supports equitable EV adoption.
 - Infrastructure improvements in multi-unit dwellings offer long-term value.

- While initial electrical upgrades can be costly, ongoing hardware operation and replacement are relatively modest.
- **Impact:**
 - Partnerships that offset upfront costs reduce barriers for property owners.
 - These initiatives pave the way for broader renter participation in the EV transition and support California’s climate goals.

9.4: Project Impact and Emissions Reductions

The project has demonstrated clear and lasting benefits:

- **Community Engagement:**
 - Growing charger usage and positive tenant feedback indicate strong demand and satisfaction.
 - Hundreds of current and future residents now have reliable access to EV charging, making ownership more practical and appealing.
- **Environmental Impact:**
 - In the first year of operation, the three project sites achieved an estimated 68 metric tons of CO₂ equivalent in greenhouse gas reductions.
 - EVCS anticipates continued growth in these reductions as charger utilization and public awareness increase.

Figure 2: Charging Station at Ovelo Hollywood



Photo source: EVCS

Figure 3: DCFC Chargers at Ovelo Hollywood



Photo source: EVCS

Figure 4: L2 Charging Stations at Ovelo Hollywood



Photo source: EVCS

Figure 5: Charging Station at Elysian



Photo source: EVCS

GLOSSARY

ASSEMBLY BILL (AB) – A proposed law, introduced during a session for consideration by the Legislature, and identified numerically in order of presentation; also, a reference that may include joint and concurrent resolutions and constitutional amendments, by Assembly, the house of the California Legislature consisting of 80 members, elected from districts determined on the basis of population. Two Assembly districts are situated within each Senate district.

AMERICANS WITH DISABILITIES ACT (ADA) - ADA refers to the Americans with Disabilities Act of 1990 which is one of the most significant federal laws governing discrimination against persons with disabilities. This Act prohibits discrimination against individuals with disabilities in employment, housing, education, and access to public services. The ADA defines a disability as any of the following: 1. "a physical or mental impairment that substantially limits one or more of the major life activities of the individual." 2. "a record of such impairment." or 3. "being regarded as having such an impairment."

CALIFORNIA ENERGY COMMISSION (CEC)—The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's five major areas of responsibilities are:

1. Forecasting future statewide energy needs
2. Licensing power plants sufficient to meet those needs
3. Promoting energy conservation and efficiency measures
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels
5. Planning for and directing state response to energy emergencies.

CARBON DIOXIDE (CO₂) – A colorless, odorless, non-poisonous gas that is a normal part of the air. Carbon dioxide is exhaled by humans and animals and is absorbed by green growing things and by the sea. CO₂ is the greenhouse gas whose concentration is being most affected directly by human activities. CO₂ also serves as the reference to compare all other greenhouse gases (see carbon dioxide equivalent). The major source of CO₂ emissions is fossil fuel combustion. CO₂ emissions are also a product of forest clearing, biomass burning, and non-energy production processes such as cement production. Atmospheric concentrations of CO₂ have been increasing at a rate of about 0.5% per year and are now about 30% above preindustrial levels. (EPA)

COMBINED CHARGING SYSTEM (CCS) – This is a standard for charging electric vehicles, widely used for DC rapid charging.

COMMISSION AGREEMENT MANAGER (CAM) – Primary point of contact for CEC.

DIRECT CURRENT (DC)—A charge of electricity that flows in one direction and is the type of power that comes from a battery.

ELECTRIC VEHICLE (EV)—A broad category that includes all vehicles that are fully powered by Electricity or an Electric Motor.

ELECTRIC VEHICLE CHARGING SOLUTIONS (EVCS) – California based electric vehicle charging company providing alternatives to gas powered vehicles.

GRANT FUNDING OPPORTUNITY (GFO) –

GREENHOUSE GAS (GHG) – Any gas that absorbs infra-red radiation in the atmosphere.

Greenhouse gases include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), halogenated fluorocarbons (HCFCs), ozone (O₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs). (EPA)

KILAVOLT AMPERE (KVA) GENERAL SERVICES ADMINISTRATION (GSA) –

HOUSING AND URBAN DEVELOPMENT (HUD) –

INSULATED GATE BIPOLAR TRANSISTOR (IGBT) –

LEVEL 2 (L2) –

MULTI FAMILY HOUSING (MFH) –

NATIONAL ELECTRICAL CODE (NEC) –

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) –

) – The unit of measure that tells how much electricity flows through a conductor. It is like using cubic feet per second to measure the flow of water. For example, a 1,200 watt, 120-volt hair dryer pulls 10 amperes of electric current (watts divided by volts).

RELIABLE, EQUITABLE AND ACCESSIBLE CHARGING (REACH) – Program implemented by the California Energy Commission to include charging for multi-family housing

RADIO FREQUENCY IDENTIFICATION (RFI) –

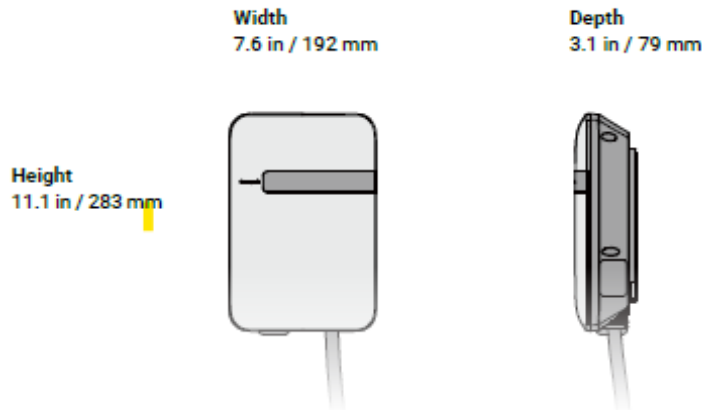
UNDERWRITERS LABORATORIES (UL) – Safety Certification

VOLT AMPERE (VA) WORK ORDER (WO) -

APPENDIX A: Battery Charger Specifications

Level 2 Charger

noodoe



SPECIFICATIONS

Cloud service	Noodoe EV OS
Maximum output power	7.6 kW
Output power	32 A @208-240 Vac, 1-phase
Vehicle connector	SAE J1772
Charging cable length	25 feet / 7.6 m
Input power	1-phase, 3-wire, 208-240 Vac, 32 A maximum
Grounding system	TN, TT
Efficiency	> 99%
Power factor	> 0.99
Display	LED indicator, OLED, 20 characters, 2 lines
Communication protocol	OCPP 1.6 JSON
Network connectivity	Wi-Fi, 4G
NEMA enclosures(NEMA)	NEMA 4
Impact protection	IK10
Electrical protection	Over voltage protection, under voltage protection, surge protection, ground fault protection, residual current device, short circuit protection, over current protection, over temperature protection
Operating temperature	-22 °F to +122 °F / -30 °C to +50 °C
Dimensions	7.6 (W) x 11.1 (H) x 3.1 (D) in 192 (W) x 283 (H) x 79 (D) mm
Weight	11 lbs / 5 kg
Certifications	UL (UL-2594), FCC, Energy Star Noodoe is an OCA certified provider

Noodoe EV OS



Noodoe Corp.
15F, No.19-13,
Sanchong Road,
Nangang District,
Taipei City 11501,
Taiwan
+886 2 7722 0677
info@noodoe.com
noodoe.com

COMBINATION

Width
7.6 in /
192 mm

Depth
6.4 in /
163 mm

Width
7.6 in /
192 mm

Depth
9.8 in /
243 mm

Height
53.6 in /
1360 mm



Height
53.6 in /
1360 mm



DC Fast Charger

100 kW DC Fast Charger

PARAMETERS	MODEL	
	L3R-100-480	
Power Rating	100 kW	
Dual Port Charging Topology	100 kW Single Output or 50 kW Parallel Output	
Connector	SAE J1772 Combo CCS1	CHAdEMO
Max Current	200 A	200 A
Max Voltage	50 - 920V	50 - 500V
Efficiency Rating	> 92%	
Network Compatibility	OCPP 1.5/1.6, BTCP Network	
Input Power	480VAC-3P@132A	
Input Power AC Current (FLA)	132 A	
Dimension	42" W x 86" H x 34" D	
Weight	1,350 lbs	
ENVIRONMENTAL AND COMPLIANCE		
Ambient Condition	-30 °C to +50 °C, 95% Humidity Non-Condensing, 6000 ft Altitude, NEMA 3R	
Safety Compliance	ETL Listed for USA and Canada; Complies with UL 2202, UL 2231 UL50E, NEC Article 625, CSA STD C22.2 No. 107.1, FCC Part 15 Class A	



STANDARD

- Integrated Cord Retractor (for CCS1)
- 15" Outdoor Color Display
- Connector Configuration:
 - CHAdEMO and SAE J1772 Combo CCS1
- Payment types: (OCPP Network Enabled)
 - Credit Card Reader
 - RFID

OPTIONAL

- ISO 15118:2014
- 4G Modem
- Connector Configuration:
 - Dual SAE J1772 Combo CCS1
 - Single CHAdEMO
 - Single SAE J1772 Combo CCS1

BTC POWER

1719 S Grand Ave, Santa Ana, CA 92705

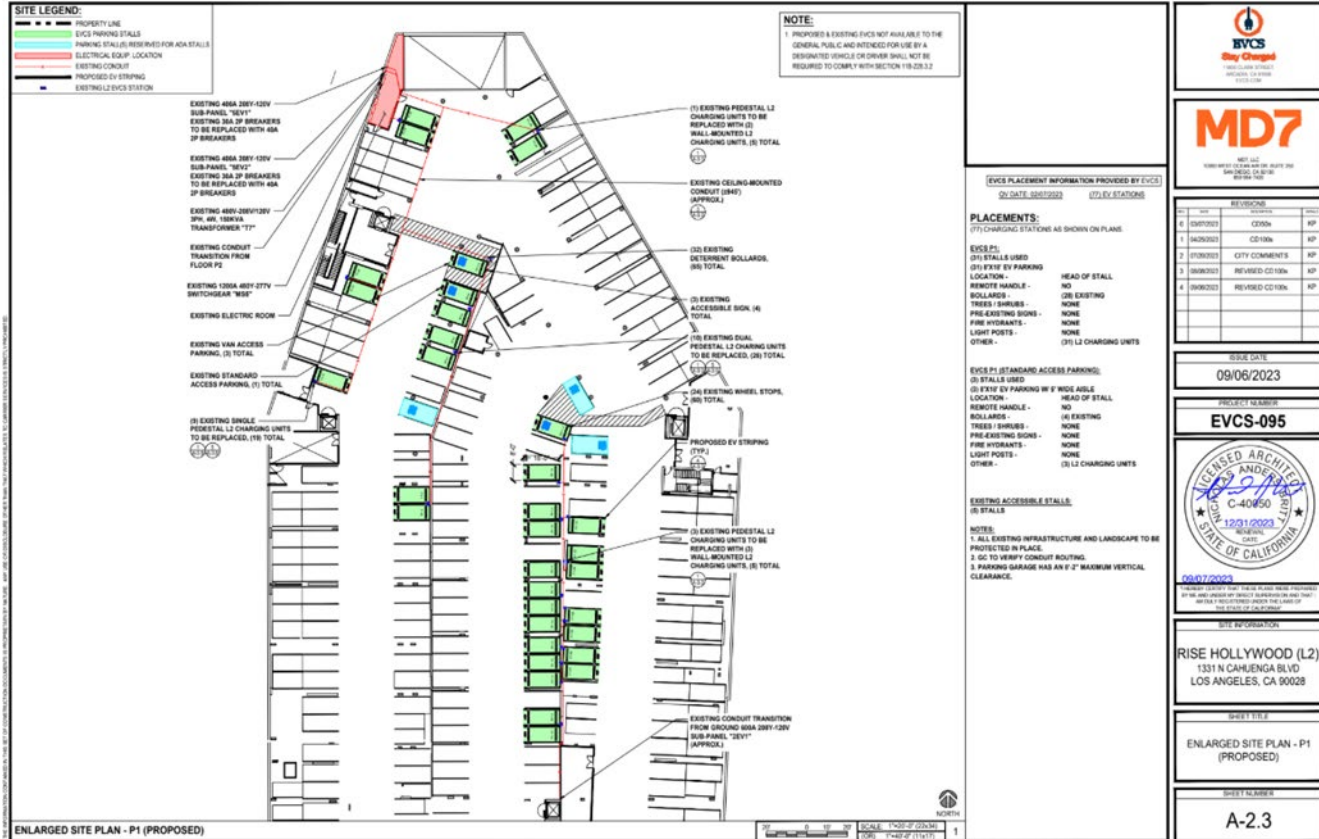
www.btcpower.com

sales@btcpower.com

APPENDIX B: Engineering and Design Drawings

Example Build Plans (Rise Hollywood)

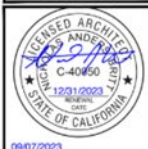
Proposed Parking and Electrical Connections



NO.	DATE	BY	REVISION
1	09/06/2023	CSM	REVISED
2	09/06/2023	CSM	REVISED
3	09/06/2023	CSM	REVISED
4	09/06/2023	CSM	REVISED

ISSUE DATE: 09/06/2023

PROJECT NUMBER: EVCS-095



SITE INFORMATION
RISE HOLLYWOOD (L2)
1331 N CAHULENGA BLVD
LOS ANGELES, CA 90028

SHEET #
ENLARGED SITE PLAN - P1 (PROPOSED)

SHEET NUMBER
A-2.3

Example Layout Details

EV CHARGING ONLY

NO PARKING

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	09/06/2023	CD-100A	KP
2	09/06/2023	CD-100A	KP
3	09/06/2023	CITY COMMENTS	KP
4	09/06/2023	REVISED CD-100A	KP
5	09/06/2023	REVISED CD-100A	KP

DATE: 09/06/2023

PROJECT NUMBER: **EVCS-095**

DATE: 12/01/2023

PROJECT INFORMATION

RISE HOLLYWOOD (L2)
1331 N CARLENGA BLVD
LOS ANGELES, CA 90028

SHEET TITLE: **DETAILS**

SHEET NUMBER: **A-3.0**

NOT USED

SCALE: N.T.S.

8

NOT USED

SCALE: N.T.S.

6

PARKING STRIPING

SCALE: N.T.S.

4

EVCS L2 CUT SHEET - 7KW

SCALE: N.T.S.

1

NOT USED

SCALE: N.T.S.

7

EVCS L2 PEDESTAL - CUT SHEET - P200

SCALE: N.T.S.

5

CEILING CONDUIT SUPPORT

SCALE: N.T.S.

3

Electrical One Line Diagram

NOTE:
EVCS UNITS HAVE A LOAD BALANCING TECHNOLOGY THAT ALLOWS A LARGE NUMBER OF UNITS TO DRAW FROM A LOWER AMPERAGE SERVICE

CONDUIT SECTION	SECTION NUMBER	CONDUIT SIZE	CONDUIT TYPE	COMMENTS	INSTALLATION METHOD
48	48P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
49	49P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
50	50P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
51	51P	1"	1P	DARTING CONDUIT	CEILING MOUNTED

CONDUIT SCHEDULE

CONDUIT SECTION	SECTION NUMBER	CONDUIT SIZE	CONDUIT TYPE	COMMENTS	INSTALLATION METHOD
48	48P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
49	49P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
50	50P	1"	1P	DARTING CONDUIT	CEILING MOUNTED
51	51P	1"	1P	DARTING CONDUIT	CEILING MOUNTED

NOTES:

- ALL ELECTRICAL WORK AND RELATED ACTIVITIES PERFORMED ON SITE SHALL BE DONE IN ACCORDANCE WITH CALIFORNIA ELECTRICAL CODE (CEC) STANDARDS AND LOS ANGELES ELECTRICAL CODES BEING ENFORCED BY ALL APPLICABLE JURISDICTIONAL REQUIREMENTS AT THE TIME OF CONSTRUCTION.
- ANY PAYMENT DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR TO PRE-CONSTRUCTION CONDITIONS OR BETTER.
- CONTRACTOR SHALL USE THIRTYTHREE-2 COPPER CONDUCTORS.
- CONTRACTOR SHALL USE ENFT INSIDE AND OUTSIDE ABOVE GRADE WHERE NOT SUBJECT TO DAMAGE. CONTRACTOR SHALL NOT INSIDE AND OUTSIDE ABOVE GRADE WHERE SUBJECT TO DAMAGE. CONTRACTOR SHALL USE PVC SCHEDULE 40 BELOW GRADE.
- CONTRACTOR TO LOCATE JUNCTION BOX, LINE BOX, OR APPROVED ALTERNATIVE FOR SITE SPECIFIC RUN LENGTHS AND BENDS.
- NO LOAD STUDY REQUIRED: EXISTING SERVICE.
- GC TO CONFIRM BREAKER / CHARGER PAIRING.
- ALL EXISTING 30A 2P BREAKERS ARE TO BE REPLACED WITH 40A 2P BREAKERS.

EVCS L2 PEDESTAL - CUT SHEET - P200

SCALE: N.T.S.

5

CEILING CONDUIT SUPPORT

SCALE: N.T.S.

3

EVCS L2 CUT SHEET - 7KW

SCALE: N.T.S.

1

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	09/06/2023	CD-100A	KP
2	09/06/2023	CD-100A	KP
3	09/06/2023	CITY COMMENTS	KP
4	09/06/2023	REVISED CD-100A	KP
5	09/06/2023	REVISED CD-100A	KP

DATE: 09/06/2023

PROJECT NUMBER: **EVCS-095**

DATE: 12/01/2023

PROJECT INFORMATION

RISE HOLLYWOOD (L2)
1331 N CARLENGA BLVD
LOS ANGELES, CA 90028

SHEET TITLE: **ELECTRICAL ONE LINE DIAGRAM**

SHEET NUMBER: **E-1.0**