CALIFORNIA ENERGY COMMISSION

California Energy Commission

Clean Transportation Program

FINAL PROJECT REPORT

"Ready, Set, Plug-In!" PEV Readiness Activities in Corona, California

Prepared for: California Energy Commission

Prepared by: City of Corona, Department of Water and Power

Gavin Newsom, Governor

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California Energy Commission

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Agreement Number: ARV-14-041

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Schneider Electric was the consultant that prepared the rate study for the City of Corona.

PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program, formerly known as the Alternative and Renewable Fuel and Vehicle Technology 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.
- Retrofit medium- and heavy-duty on-road and nonroad vehicle fleets to alternative technologies or fuel use.
- 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 PON-14-603 to fund Zero Emission Vehicle Readiness activities. In response to PON-14-063, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards January 16, 2015 and the agreement was executed as ARV-14-041 on June 3, 2015.

ABSTRACT

This is the final report for Agreement ARV-14-041 between the California Energy Commission and the City of Corona to increase awareness of the availability, location, cost, and charging voltages of the City's new electric vehicle charging stations, to develop residential electric vehicle charging stations installation processes and rate structures, and to analyze infrastructure readiness to support the growing demand. The City of Corona Department of Water and Power applied for funding from PON-14-603 to support the expanding electric vehicle infrastructure in the City. The City was preparing to install several new electric vehicle charging stations at three locations in the City, and the number of registered electric vehicles in the City and County was growing continually. It was crucial for the City to pursue measures to assist residents in locating the new electric vehicle charging stations by installing trailblazer signs on local roadways and conducting community outreach to raise awareness about the station locations, cost, charging capabilities, and availability. An additional project goal was to develop a residential electric vehicle charging stations infrastructure and rate structure study to meet growth in plug-in electric vehicle ownership and demand for the convenience of charging infrastructure at home. This report discusses the project background and objectives, scope of work, problems encountered, and lessons learned, fulfilling the requirements of Agreement ARV-14-041.

Keywords: California Energy Commission, City of Corona, Department of Water and Power, Electric Vehicle Infrastructure, Plug-in Electric Vehicle, Readiness Planning, EV Charging

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EXECUTIVE SUMMARY

The City of Corona has a strong history of dedication to air quality improvement and commitment to the development of alternative fuel infrastructure. Increasing electric vehicle use is an important part of Corona's strategy to meet energy independence and positively affect the environment and health of its residents. The City's Alternative Fuel Rebate Program provided $2,000 for Corona residents who bought new qualified alternative fuel vehicles (or $1,000 to residents who bought qualified used vehicles). The City rewarded residents for purchasing electric vehicles, and recently, through a grant substantially funded by the Energy Commission, has provided eight new, publicly accessible charging stations at four locations in the City. Knowing that these stations were to be installed, the City also applied for funding to raise awareness about the new stations (through signage and outreach activities) and to develop residential electric vehicle charging station installation processes and rate structures to accommodate the growing demand for home-based charging. The City completed several tasks in fulfilling the project's scope of work and requirements of the grant, including:

- **Signage:** To assist motorists in identifying and finding charging station locations, the City purchased and installed 12 fixed, directional, "trailblazer signs" and arrow plaques on local roadways and received permits from Caltrans to install signs on the I-15 and SR-91 freeways.
- **Public Outreach:** The City contracted with Outdoor General, an electronic billboard company, to display messages with information about the new charging stations, including the four new, convenient locations made possible through funding by the Energy Commission.
- **Rate Study:** The City contracted with an experienced consultant to complete an analysis of residential charging infrastructure, including installation methods and requirements, installation costs, and rate structure.

The readiness activities completed with the generous funding from the Energy Commission have been well timed and aligned with the installation of the new electric vehicle charging infrastructure, which was completed in January 2018. Prior to the placement of signage and billboard messages, residents were able to find information on the City's website and via the City's mobile app and were informed through newsletter article releases on the progress and opening of the eight stations.

CHAPTER 1: Project Background and Objectives

The City of Corona is committed to supporting activities that align with the South Coast Air Quality Management District's goals, as well as the goals laid out in the Southern California Plug-in Electric Vehicle Readiness Plan (December 2012), developed by the Southern California Association of Governments. In September 2014, The City was awarded a grant from the California Energy Commission (CEC) (Agreement ARV-14-001) to install the first publicly-owned electric vehicle charging stations in the City. To complement this new infrastructure, the City applied for additional CEC funding for implementing strategies to raise public awareness about the availability, location, cost, and charging voltages of the new electric vehicle charging stations and to prepare for the growing demand for residential electric vehicle charging infrastructure. Together, these two Commission-funded projects are helping Corona further its goals to improve air quality by increasing and promoting its alternative fuel infrastructure. The objectives of the project through Agreement ARV-14-041 were to:

1. Assist residents in locating the new electric vehicle charging stations by installing trailblazer signs on local roadways and working with the California Department of Transportation (Caltrans) to request sign placement on the nearby freeways.
2. Identify infrastructure requirements and a feasible rate structure for residential electric vehicle charging stations by developing a residential electric vehicle charging installation and rate study (with the assistance of a qualified subcontractor).
3. Conduct outreach to City residents to raise awareness about the availability, location, cost, and charging voltages of the new electric vehicle charging stations by incorporating information on smartphone software applications for residents' use; operating an outreach booth at various festivals to share information about the electric vehicle charging stations; and placing content related to the stations in mass and social media outlets.

The City successfully completed these objectives, though in some cases the methodology was altered to achieve the greatest success (see Chapter 2: Scope of Work). Any deviations from the agreement were approved by the Commission Agreement Manager.

CHAPTER 2: Scope of Work

Table 1: Status for Tasks as of September 2018

TASK	STATUS
Task 1 ADMINISTRATION	
Task 1.1 Attend Kick-off Meeting	Held on August 12, 2015. Attended by Michael TenEyck (Project Manager).
Task 1.2 Critical Project Review (CPR) Meetings	None held/requested.
Task 1.3 Final Meeting	Not held yet as of the writing of this report.
Task 1.4 Monthly Progress Reports	Emailed to the CEC monthly from June 2015 through September 2018.
Task 1.5 Final Report	Draft report provided to the CEC in July 2018; Final version submitted in September 2018.
Task 1.6 Identify and Obtain Matching Funds	Not applicable; matching funds were not required for this project.
Task 1.7 Identify and Obtain Required Permits	Encroachment Permits were applied for and received for the placement of signs on the Caltrans right-of-way.
Task 1.8 Obtain and Execute Subcontracts	Contracts with all subcontractors were forwarded to the CEC. Major Subcontractors: Schneider Engineering Minor Subcontractors: Blais & Associates General Outdoor
Task 2 SIGNAGE	All tasks were completed. The list of materials for the trailblazer signs and arrow plaques and the request to Caltrans (and permits) for sign placement on the I-15 and SR-91 freeways were submitted to the Commission Agreement Manager. Installation of the trailblazer signs and arrow plaques was completed in August 2018. The City received the encroachment permits from Caltrans and will be contracting out the work to install signs on the freeways.

TASK	STATUS
Task 3 RESIDENTIAL EVCS INSTALLATION REQUIREMENTS AND RATE STUDY	The draft study ("Electric Vehicle Charging Installation Requirements and Rate Study") was submitted to the CEC on 6/29/18. The final study was submitted on 7/31/18.
Task 4 PEV AWARENESS ACTIVITIES	
Task 4.1 Incorporate PEV Content in the Recipient's Smartphone Software Apps	Added information about the new stations to the City's mobile application, including maps with electric vehicle charging station locations.
Task 4.2 Conduct Outreach at Local Events and Festivals	In lieu of this task, the City decided that advertising via electronic billboard would be a more optimal way to provide information about the new electric vehicle charging stations to the widest target audience, including commuters. This was approved by the Commission Agreement Manager. Approval of the ads by the CEC was delayed; therefore, the billboard company was only able to run the ads for the period of 9/20/18 through 9/27/18.
Task 4.3 Conduct Outreach and Education via Mass and Social Media	The City completed several outreach activities; see Appendix C.
Task 5 DATA COLLECTION AND ANALYSIS	Electric Vehicle Charging Station Installation Requirements and Rate Study (see Chapter 3 and Appendix D).

Source: The City of Corona Department of Water and Power

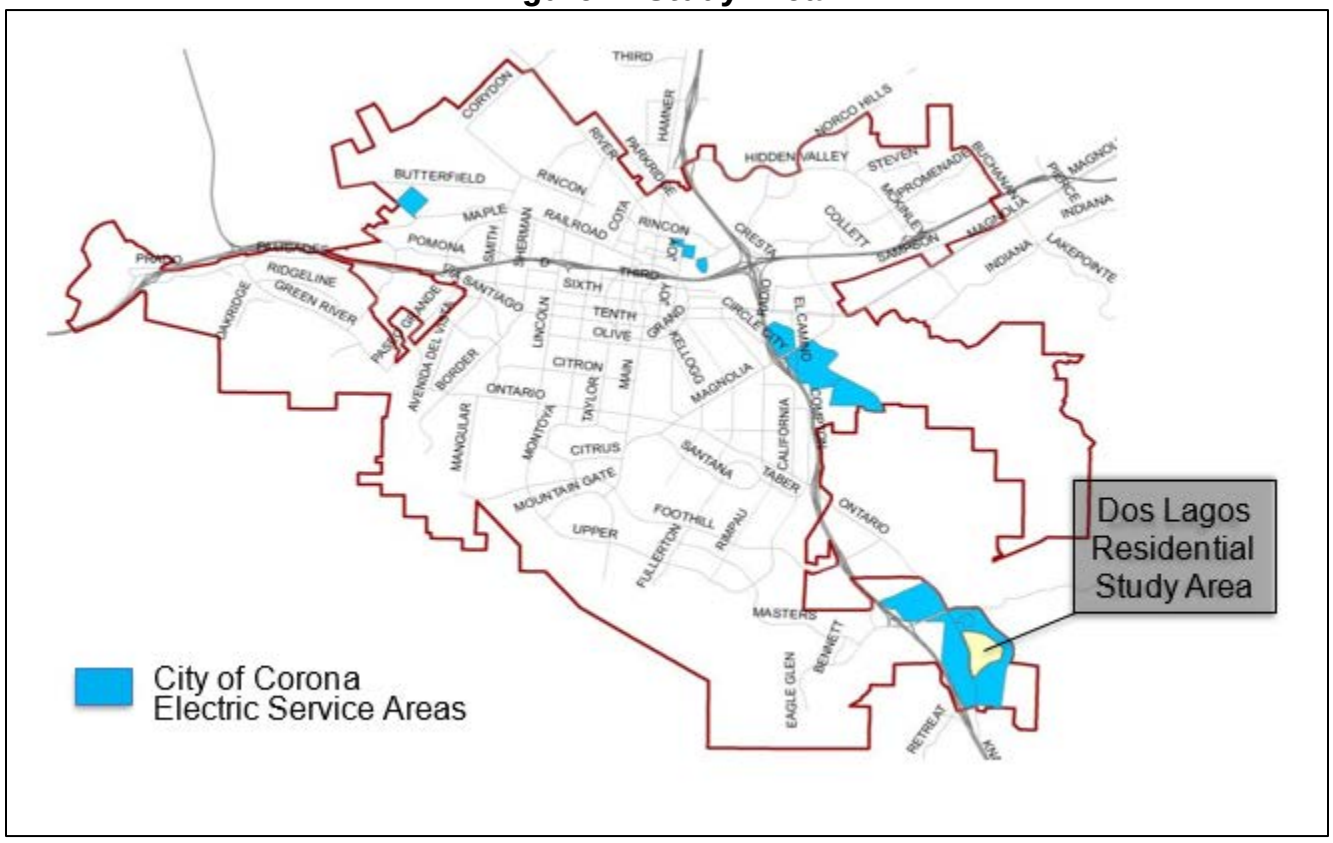
CHAPTER 3: Charging Installation Requirements and Rate Study

Study Area

The Study Area defines the limited geographic area considered in the load capacity study. It includes details of size and location of the residential neighborhood. A load area map is included below that provides an aerial view of the residential area and electric system portions evaluated in the study.

The City of Corona Department of Water and Power provides bundled electric service to four specific geographic areas within the City. Most of the areas are commercial and industrial; however, the area known as Dos Lagos, in southeastern Corona, has a mixture of commercial, industrial, retail and residential customers. The City focused specifically on the residential area within Dos Lagos, which currently consists of 249 single-family homes and 116 condominiums. The City's delivery point for electric power for Dos Lagos is a 12 kV Wholesale Distribution Access Tariff (WDAT) from Southern California Edison. A map of the Dos Lagos study area is shown below:

Figure 1: Study Area-1



Source: The City of Corona Department of Water and Power

Assumptions and Methodology

This section provides details of limitations and information used in the electric system impact study process. This includes the load levels for each charger type. In the Methodology section the process used to complete the load capacity analysis is described. Level 1 and Level 2 electric vehicle charging stations were utilized in the base assumptions, since the study area consisted of residential homes. However, because there are a wide variety of manufacturers of both Level 1 and Level 2 chargers, with varying kW demand, Level 1 chargers were assumed to have a maximum demand of 1.8 kW and Level 2 chargers a 19.2 kW maximum demand. Level 3 chargers were not included as a part of the study.

The basis for any rate study includes the identification of future improvements that will be necessary due to the impact that the new customer demand will have upon the system. To determine the impacts of residential installation of both Level 1 and 2 charging stations, Schneider Engineering developed a system model of the City's electrical residential area. Then, Schneider added charging stations at various saturation levels to the model, as well as at various iterations of the distribution of the stations in the study area. Below is a table of the saturation levels and equivalent number of homes:

Table 2: PEV Saturation Levels and Corresponding Number of Homes

PEV Saturation Levels	Approx. Number of Homes
5%	18
10%	37
15%	55
20%	73
25%	91
30%	110

Source: The City of Corona Department of Water & Power

Unbalanced load flow and voltage drop studies were completed on the area prior to analyzing any of the electric charging station data, based upon forecasted peak demand in the year 2022. System deficiencies were identified and assumed to have been replaced prior to the addition of electric vehicle charging stations to the system. Since those replacements were not caused by the addition of future electric vehicle charging stations, they were not included in the analysis. In addition, peak demand was incorporated and evaluated as a worst-case scenario, which included all EVSE locations running at maximum rated kW demand at the same time as the peak kW demand on the circuit.

Based upon system deficiencies identified in the model under the various scenarios, required improvements were identified, including costs.

Results

The Results section provides detailed results from completion of the distribution system impact analysis of installation of Level 1 and Level 2 electric vehicle service equipment at increasing saturation levels within the study area. It also includes general distribution system and point of delivery information, lists system improvements, and provides cost estimates for system improvements required to support residential customer installations of electric vehicle service equipment.

After running the model and evaluating the system deficiencies for Level 1 saturation levels between 5 percent and 30 percent, various transformers were identified in the system for replacement due to high loading and exceeding planning criteria limits. The cost for replacement ranged between $7,000 at 5 percent saturation to $35,000 at 30 percent saturation levels. This indicated a relatively low impact to the City's distribution system for Level 1 chargers, mostly restricted to customer transformers.

The Level 2 chargers had a different system impact than the Level 1 chargers, due to their higher demand. The model indicated the need for multiple system improvements to stay within planning criteria limits. Replacement costs varied from $48,000 at 5 percent saturation levels, which included the replacement of 6 transformers, to $393,780 at 30 percent saturation levels. At the 30 percent saturation level for Level 2 chargers, the improvements increased from just transformer replacement to include conductor replacement, voltage regulator installation, and fuse replacement.

Dos Lagos residential customers have 200-amp services, which the model and study has determined to be sufficient and would not require upgrade.

Other Considerations and Recommendations

This section provides additional system information and considerations not included in the analysis and results portions of the study. It addresses other possible consequences and impacts to the electric system from installation of electric vehicle service equipment and provides general recommendations.

Some customers may choose to try to offset electric consumption of plug-in electric vehicles by using solar panels. This would most likely coincide with peak demand as well. Implementation of time-of-use rates could be an effective tool for the utility to help reduce the demand on the system at peak times. Advanced Metering Infrastructure, or AMI, may need to be another consideration for implementing time-of-use rates.

High concentrations of electric vehicle charger installations in one area will provide the greatest challenge for the City. These issues include power quality issues and imbalanced loads which would manifest as fuse blowing, phase load imbalance, high neutral amps, high conductor and equipment loading, and voltage drops exceeding 3 percent. Monitoring installation of charging stations on a single-phase line is key. Additionally, because harmonic distortion can be caused by DC PEV chargers, it is recommended that the City require all electric vehicle chargers to adhere to IEEE 519 requirements for total harmonic distortion.

Rate Structures and Design

The Rate Structures and Design section details the different options available for developing rates that facilitate the acceptance of electric vehicles. It outlines benchmarking research of cities that have already implemented rate structures to promote EV charging habits that protect the electric system while discussing potential impacts to residential customers. Rate options considered included adjusting the baseline rate for the standard residential rate and a time of use rate (though time of use was not discussed in depth due to limitations in data).

The process to establish rate structures involved surveying existing residential electric vehicle rate structures with local and regional electric utilities. Various rate structures have pros and cons for both the customer and the utility, so it is important to ensure there is a balance between the two entities and that rates are effective at recouping costs and not punitive to the electric vehicle driver. Some options include installing a separate service for the electric vehicle charger, or time-of-use rates. Other rate structures may include monthly on-bill rebates to customers based on the weight of their vehicle to offset higher electric bills. Some utilities may make various options available to their customers as well. A single meter rate design is recommended, based upon the ease of managing this for the customer and the utility.

After a decision has been made about the type of rate to pursue, a cost allocation exercise is performed in order to assign rates based upon system upgrades associated with the service and identified through the load capacity model and study. While most of the system upgrades can be attributed to the EV customers, all of the other customers in the residential area benefit by the increased capacity, so some of the costs must be borne by existing residential customers. A 20-year flat-line depreciation of assets related to the system upgrades was assumed for the various levels of electric vehicle saturation to determine annual costs incurred and will be used in the rate design and calculation.

The two main rate structures that are available given the single meter option is a time-of-use rate structure or the tiered rate structure. The City already utilizes a tiered rate structure for its residential accounts. In order to account for the increase in electricity consumed by EV owners, an increase to the baseline would help provide the necessary budget for increased energy use as well as increase the higher tiers. This would help to ensure that EV owners are not unfairly penalized for increased energy use. The table below provides information on the current baseline and the proposed baseline based upon various EV saturation levels:

Table 3: Current and Proposed Baseline Saturation Levels

EV Saturation Level	Baseline kWh
Current	470
30% Level 1	775
10% Level 2	760
20% Level 2	740
30% Level 2	745

Source: City of Corona Department of Water and Power

The increase in baseline kWh ranges from between 157 percent to 165 percent of the current baseline. Not all saturation levels were listed, because in some cases there was very little or no difference in required system improvements based upon the model and cost estimates.

Rate Impacts

This section draws on the previous section's recommendations to analyze the impacts of different design options on PEV customers' bills. This discussion was limited due to a lack of development of the time-of-use (TOU) rate data.

At this time, the City is involved in an overall rate study for all its electric rates. This will ultimately affect the rates and rate structures for residential EV charging customers. However, based upon the current tiered rate baseline structure and the proposed adjusted baselines, the rate impacts, noted in the table below, were created for comparison. It is important to note, however, that this information is presented as a draft illustration; future programs may contain different rates and impacts based upon the City's overall direction, goals and policies. See Appendix-D for details.

Table 4: Current and Proposed Baseline Structures

Scenarios		Current Baseline Structure			Proposed Baseline Structure		
Saturation Levels	Est. kWh	Baseline kWh	Avg. Energy Price	Total Energy	Baseline kWh	Total Energy	Avg. Energy Price
30% Level 1	1252	470	$0.20	$250.43	775	$150.22	$0.120
10% Level 2	1252	470	$0.20	$250.43	760	$155.15	$0.124
20% Level 2	1252	470	$0.20	$250.43	740	$161.72	$0.129
30% Level 2	1252	470	$0.20	$250.43	745	$160.08	$0.128

Source: The City of Corona Department of Water & Power

Recommendations

This section will provide recommendations with regards to options relating to rate design and implementation, and the reasons supporting that recommendation. With the lack of data available for TOU, this section was not completed.

Due to the system vulnerabilities identified in the Level 2 analysis, there are specific areas that were the most sensitive to load increases. It is recommended that those areas be monitored closely to ensure that the system is maintained within planning criteria limits. Additionally, the analysis of the system showed that at the maximum Level 2 saturation levels, the peak demand at the WDAT would not exceed the 11,500 kW limit, but it would bring it very near to the capacity. Therefore, the loading at the WDAT should be monitored as electric vehicle stations are added to add additional capacity from SCE as needed.

While there are various rate structures available to the City, a single meter solution versus separate meter is recommended based upon ease for both the City and the residential

customer. Whether a time-of-use rate or a baseline adjusted tiered rate is utilized, it is recognized that one of these options must be pursued in order to fairly allocate appropriate charges to rate classes of customers.

CHAPTER 4: Conclusion

Problems Encountered

The City experienced some unanticipated delays with the installation of the electric vehicle charging stations (a project funded in part by another CEC grant, Agreement ARV-14-001); because of this, some of the activities for the PEV Readiness project were also delayed. Staffing shortages in the City's Purchasing Department, as well as an increased workload to prepare for the new fiscal year led to a delay in issuing the Request for Proposals for charging station installation at two of the four planned locations. At the other two locations, a change to the planner for Southern California Edison postponed the completion of preliminary site work necessary for the City's contractor to complete installation of the chargers. These delays led to the City requesting and receiving approval for a no-cost time extension of six months.

The City also encountered problems with procuring a consultant to perform the residential electric vehicle charging station installation requirements analysis and rate structure study. Only one firm, Leidos Engineering, responded to the City's initial Request for Proposals. The City contracted with Leidos for the work, but subsequently terminated the contract when Leidos declined to provide the labor rates required by the CEC for a major subcontractor. Approximately 7-8 months was spent attempting to work with Leidos to obtain the required information. Leidos officially notified the City in May 2017 that they would not be providing the information on their rates. Due to a heavy workload in the Purchasing Department, the rebidding of the work was delayed until October 2017.

Due to these delays, the City requested two no-cost time extensions from the CEC to allow the City to complete the rate study, install signs, and perform additional public outreach. The City is grateful to the CEC for granting these extensions and enabling the City to fully complete this important project.

Lessons Learned

The City has learned many important lessons during the course of this project. Many of the issues during the project were caused by staffing levels and changes within the City. Future grant opportunities need to be considered more fully prior to submission of the grant application. Additionally, potential delays and timing issues, such as those experienced during this project, need to be accounted for in the initial timeline, in order to avoid unnecessary requests for time extensions, which only cause further project delays. By properly estimating staffing levels and realistic time frames from the beginning, the City can establish and meet project goals and expectations.

Another important lesson learned deals with ensuring that grant requirements are more fully detailed in any request for proposals or scopes of work for major subcontractors. Simply including the grant document unfortunately was not enough to ensure that potential vendors were aware of and able to comply with requirements of the grant and the CEC. In the future, a pre-screening process or interview could help to eliminate vendors that cannot meet grant requirements. Also, providing specific information on requirements, such as labor rates, would

be important to include in the scope, as well as providing documents such as the forms and spreadsheets necessary to complete grant reimbursements.

Future Efforts

The City understands the growing interest in electric vehicles and alternative fuels as essential tools in fighting climate change. To prepare for and promote electric vehicle use, the City requested the assistance of the CEC through this grant to better understand the impact of electric vehicle charging on the City's electric infrastructure. This included various scenarios and levels of electric vehicle adoption in the City's residential service area. The City's future efforts will involve monitoring electric vehicle use through implementation of the permit processes recommended in the electric rate study. Ensuring proper tracking of electric vehicle proliferation will be key to meeting customer demands in the future and ensuring that the City's infrastructure is ahead of the curve, rather than behind it. Monitoring trends in electric vehicles and local sales will also be critical to anticipating demand.

GLOSSARY

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:

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

CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans) - is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries.

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

ELECTRIC VEHICLES (EV) – A broad category that includes all vehicles that are fully powered by electricity or an electric motor.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) - Infrastructure designed to supply power to EVs. EVSE can charge a wide variety of EVs including BEVs and PHEVs.

IEEE - Institute of Electrical & Electronics Engineers

KILOWATT (kW) - One thousand (1,000) watts. A unit of measure of the amount of electricity needed to operate given equipment. On a hot summer afternoon a typical home, with central air conditioning and other equipment in use, might have a demand of four kW each hour.

KILOWATT-HOUR (kWh) - The most commonly-used unit of measure telling the amount of electricity consumed over time. It means one kilowatt of electricity supplied for one hour. In 1989, a typical California household consumes 534 kWh in an average month.

PLUG-IN ELECTRIC VEHICLE (PEV) - is a general term for any car that runs at least partially on battery power and is recharged from the electricity grid. There are two different types of PEVs to choose from - pure battery electric and plug-in hybrid vehicles.

SOUTHERN CALIFORNIA EDISON (SCE) - one of the nation’s largest electric utilities, which delivers power to 15 million people in 50,000 square-miles across central, coastal and Southern California, excluding the City of Los Angeles and some other cities.

TIME-OF-USE (TOU) – PG&E rate plans that can reduce expenses by shifting energy use to partial-peak or off-peak hours of the day. Rates during partial-peak and off-peak hours are lower than rates during peak hours.

WHOLESALE DISTRIBUTION ACCESS TARIFF (WDAT) – describes the terms under which the Southern California Edison (SCE) provides open access to its distribution system to wholesale customers seeking to:

- Interconnect generation facilities to SCE's distribution system and deliver energy and capacity services to the California Independent System Operator controlled grid (using SCE's distribution system), or
- Deliver energy or capacity services from the California Independent System Operator controlled grid (using SCE's distribution system) to their customers.1

1Southern California Edison Wholesale Distribution Access Tariff Webpage (https://www.sce.com/business/generating-your-own-power/grid-interconnections/wholesale-distribution-access-tariff)

APPENDIX A: Photographs

Figures A.1 through A.4 are photographs of the charging stations installed throughout this project. The photos are taken at various locations in the City of Corona.

Figure A.1: Charging Station – City Hall

Source: The City of Corona Department of Water & Power

Figure A.2: Charging Station – Corporation Yard

Source: The City of Corona Department of Water & Power

Figure A.3: Charging Stations – Corona Pointe

Source: The City of Corona Department of Water & Power

Figure A.4: Charging Stations – Dos Lagos

Source: The City of Corona Department of Water & Power

APPENDIX B: Public Outreach Materials

The City completed the following public outreach activities (examples on subsequent pages):

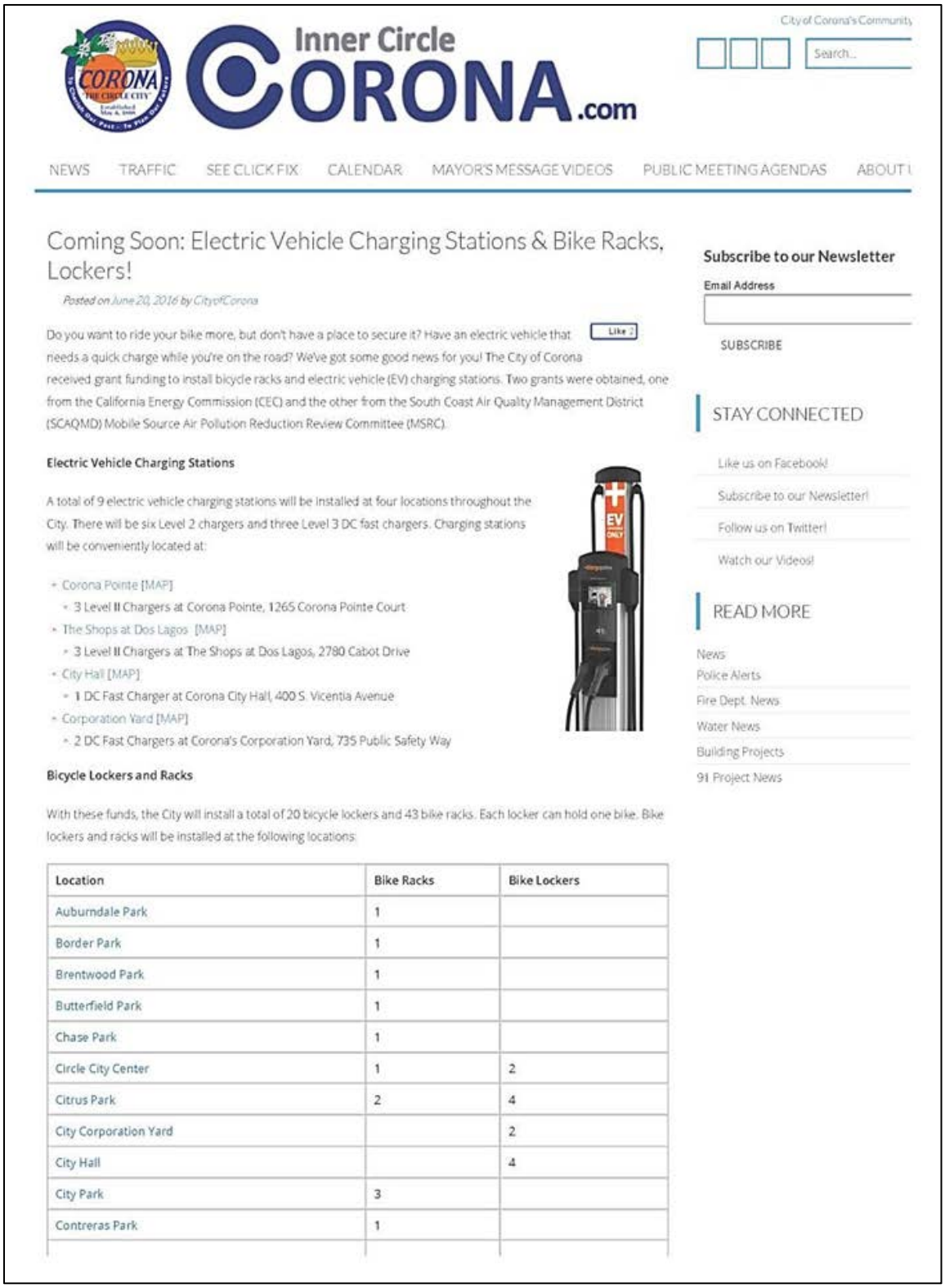
- Posted Inner Circle News e-newsletter article titled “Coming Soon: Electric Vehicle
- Charging Stations & Bike Racks, Lockers!” in June 2016.
- Posted Inner Circle News e-newsletter article titled “New Electric Vehicle Charging
- Stations Installed with Grant Funds” in January 2018.[2]
- Worked with The Shops at Dos Lagos to advertise the installation of the new charging stations through Facebook.
- Added information about the new stations to the City’s mobile application, including maps to locations.
- Added a link on the City’s website (Services/EV Charging Stations) to the station locations on Google Maps.[3]
- The City has and continues to bring its own electric vehicle, a Nissan Leaf, to many public outreach events, including its annual Garden Festival, to educate the public and encourage electric vehicle use.
- The City contracted with Outdoor General, an electronic billboard company, to display messages with information about the new charging stations, including the four new, convenient locations made possible through funding by the CEC.

2 Website for City of Corona Inner Circle News Article
(https://www.coronaca.gov/Home/Components/News/News/2461/17)

3 Google Maps results for charging station locations
(https://www.google.com/maps/search/electric+vehicle+charging+station/@33.8491426,-117.5824535,13.32z?hl=en)

Figures B.1 through B.4 show the public outreach efforts taken by the City of Corona to inform residents of the charging station project.

Figure B.1: Inner Circle News Article on Upcoming Charging Stations



Inner Circle CORONA.com

City of Corona's Community

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NEWS TRAFFIC SEE CLICK FIX CALENDAR MAYOR'S MESSAGE VIDEOS PUBLIC MEETING AGENDAS ABOUT

Coming Soon: Electric Vehicle Charging Stations & Bike Racks, Lockers!

Posted on June 20, 2016 by CityofCorona

Like 2

Do you want to ride your bike more, but don't have a place to secure it? Have an electric vehicle that needs a quick charge while you're on the road? We've got some good news for you! The City of Corona received grant funding to install bicycle racks and electric vehicle (EV) charging stations. Two grants were obtained, one from the California Energy Commission (CEC) and the other from the South Coast Air Quality Management District (SCAQMD) Mobile Source Air Pollution Reduction Review Committee (MSRC).

Electric Vehicle Charging Stations

A total of 9 electric vehicle charging stations will be installed at four locations throughout the City. There will be six Level 2 chargers and three Level 3 DC fast chargers. Charging stations will be conveniently located at:

- Corona Pointe [MAP]
  - 3 Level II Chargers at Corona Pointe, 1265 Corona Pointe Court
- The Shops at Dos Lagos [MAP]
  - 3 Level II Chargers at The Shops at Dos Lagos, 2780 Cabot Drive
- City Hall [MAP]
  - 1 DC Fast Charger at Corona City Hall, 400 S. Vicentia Avenue
- Corporation Yard [MAP]
  - 2 DC Fast Chargers at Corona's Corporation Yard, 735 Public Safety Way

Bicycle Lockers and Racks

With these funds, the City will install a total of 20 bicycle lockers and 43 bike racks. Each locker can hold one bike. Bike lockers and racks will be installed at the following locations:

Location	Bike Racks	Bike Lockers
Auburndale Park	1	
Border Park	1	
Brentwood Park	1	
Butterfield Park	1	
Chase Park	1	
Circle City Center	1	2
Citrus Park	2	4
City Corporation Yard		2
City Hall		4
City Park	3	
Contreras Park	1	

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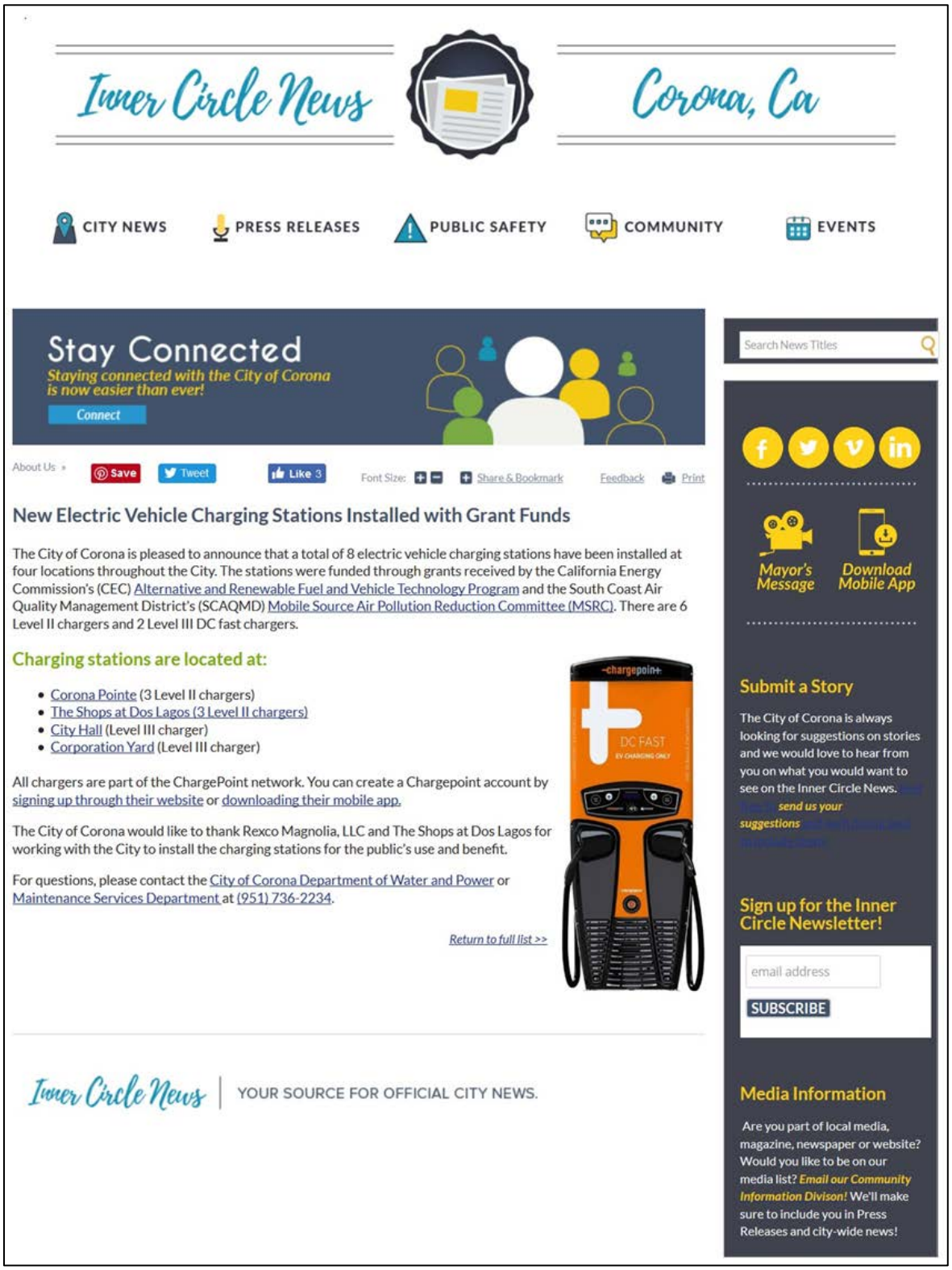
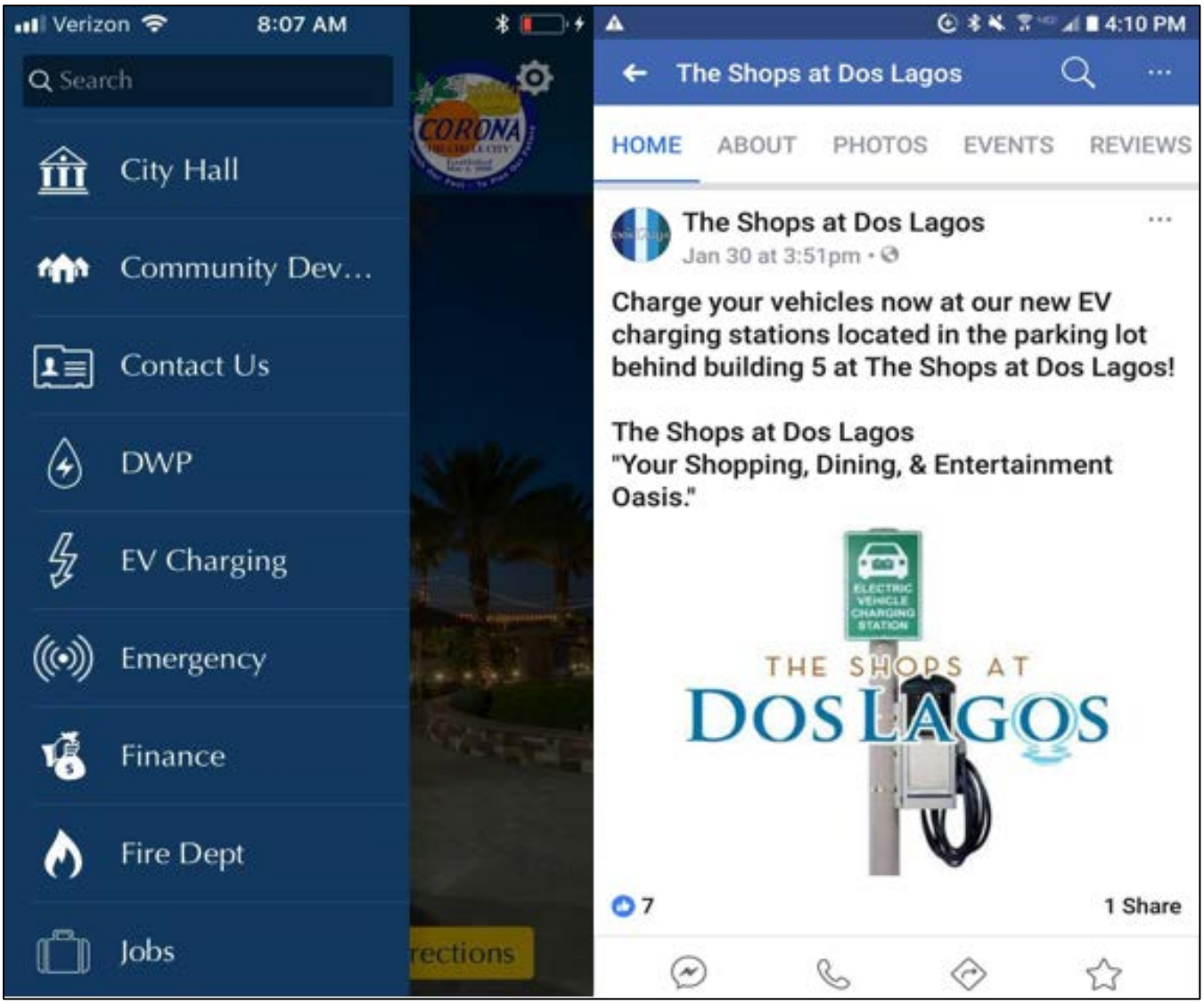
Source: The City of Corona Department of Water

Figure B.2: Inner Circle News Article on New Charging Stations



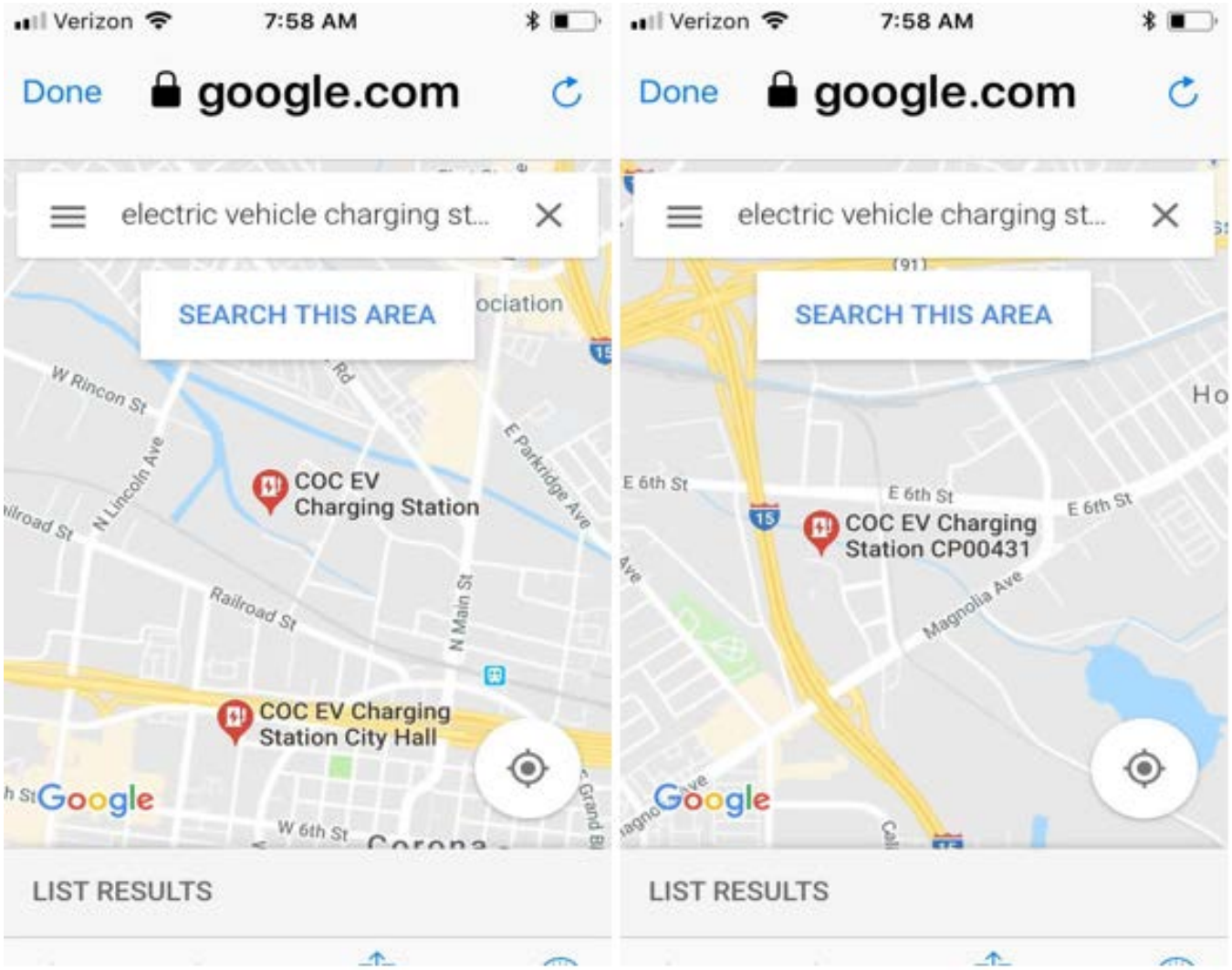
Source: The City of Corona Department of Water & Power

Figure B.3: Screen Shots from Dos Lagos Facebook Page and City of Corona Mobile App



Source: The City of Corona Department of Water & Power

Figure B.4: Screen Shots from City of Corona Mobile App



Source: The City of Corona Department of Water & Power

APPENDIX C: Electric Vehicle Charging Installations Requirements and Rate Study

Electric Vehicle Charging Installation Requirements and Rate Study

Draft Report

PREPARED BY

SCHNEIDER ENGINEERING
ENERGY. FOCUS. COMMITMENT.

JUNE 29, 2018

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INTRODUCTION

Corona Department of Water and Power (CDWP) commissioned this study to evaluate the impact to its distribution system from potential sharp increases in Electric Vehicle Service Equipment (EVSE) or Plug-In Electric Vehicle (PEV) chargers installed in residential homes. This report includes a load capacity study to determine electric system improvements required to support the increases in electric system loads from EVSE and development of residential rates to support the necessary improvements to the distribution system. It includes recommendations for EVSE installation, design, and permitting process considerations for additions of EVSE in residential homes.

ELECTRIC SYSTEM DATA AND BACKGROUND

The load area considered in this study is restricted to the Dos Lagos residential neighborhood in southeast Corona (See Appendix A). The neighborhood dwellings include 249 single-family homes and 116 condominiums. The apartments in the Dos Lagos neighborhood do not have individual garages and were excluded from this study analysis.

CDWP point of delivery for electric power is from a Wholesale Distribution Access Tariff (WDAT) from Southern California Edison (SCE). The "Dos Lagos" WDAT has a commercial distribution Circuit #2 and a residential Circuit #1 serving the Dos Lagos neighborhood. The Dos Lagos electric distribution system is a 12-kV, underground delta system with pad mounted transformers and equipment. The Dos Lagos WDAT has a current load limit of 11,500 kW for the two circuits' combined load. The protective relay installed for Circuit #1 is RLY-52-01 at the WDAT with settings recommended in the Short Circuit Study Protective Device Coordination Study REV2, completed by Eaton, dated March 2016, shown in Table 4.1 (See Appendix B). There are two locations on the three-phase distribution lines on Circuit #1 with fusing cabinets. Based on provided information, it is assumed these fuses are S&C 80 - 125-amp fuses. It is also assumed that all customer transformers have source side bay-o-net type fuses installed according to the manufacturer's recommended fuse sizing based on transformer kVA.

The most recent summer peak demand on Circuit #1 was 2,141 kW with 96% power factor set in August 2017. Residential Circuit #1 is expected to have a 1% annual growth rate on existing meters, with a peak demand of 2,250 kW forecasted for 2022. All residential customers have single-phase, 120/240 volt, 200 amp services.

LOAD CAPACITY STUDY

The impact to the distribution system from load increases due to charging of PEV in residential homes was evaluated in a comprehensive load capacity study on CDWP's residential Circuit#1.

ASSUMPTIONS

In this application, limited to the Dos Lagos residential neighborhood, PEV charging using Level 1 and Level 2 EVSE were considered with an assumed power factor near unity. This type of PEV charging uses the EVSE installed in a residence and plugs into the charger located on board the vehicle. Level 1 EVSE are slow chargers with a wide range of charging time required (9 to 17 hour range) depending on vehicle

and battery type. The EVSE typically plugs into a standard 120 VAC outlet on a 20 amp breaker. Level 2 EVSE are medium speed chargers with charging times in the 3 to 7 hour range requiring 240 VAC on a dedicated 40-100 amp breaker. Many different manufacturers and types of Level 1 and Level 2 EVSE exist, resulting in varying kW demand ratings for EVSE. For the purpose of this readiness study Level 1 EVSE were evaluated at a maximum demand of 1.8 kW and Level 2 EVSE were evaluated at 19.2 kW maximum demand. Level 3 chargers or "Fast DC Chargers" are not typically installed in residential homes due to the high cost and electrical requirements. The Level 3 chargers will not be considered in this study at any saturation level. It is recommended that an individual engineering analysis be completed at the customer's expense for any requests for Level 3 charging stations.

METHODOLOGY

In order to complete the load capacity analysis, a detailed system model was developed using Milsoft WindMil software for the electric distribution system from the WDAT to the individual customer meter locations. The system model was based on system information provided in as-built maps and information provided by CDWP and Pacific Utility Installations, Inc. Billing loads were imported to each customer meter in the model and load allocation was run with 2017 summer peak demand of 2,141 kW and projected 2022 summer peak demand of 2,250 kW.

The following saturation levels were considered in the load capacity analysis for the 365 residential single family dwellings in the Dos Lagos neighborhood. The table below provides the saturation levels and the approximate number of homes.

Saturation Levels for single family dwellings in Dos Lagos

PEV Saturation Levels	Approximate Number of Homes
5%	18
10%	37
15%	55
20%	73
25%	91
30%	110

Source: City of Corona Department of Water and Power

PEV charging stations were added to the system model at all 365 residential single family customer locations. Load flow and voltage drop studied were completed on Circuit #1. The system performance and the ability to maintain reliable electric service with the addition of PEV charging stations were evaluated based on general guidelines in the System Planning Criteria in Appendix C and the in accordance with the City of Corona Department of Water and Power Electric Energy Rules and Regulations for the Electric Utility Department in Appendix D.

A relatively even distribution of PEV charger installations was assumed throughout Circuit #1 for the saturation levels listed above. Multiple iterations of load flow analysis were competed at each of the respective saturation levels with diversified sets of meters selected to include PEV charging loads. Projects were developed to mitigate system deficiencies and improve the distribution system to meet planning criteria limitations. The system improvements developed and indicated in this study for each saturation

level are independent of each other. Costs for each system improvements were developed by unit costs shown in Appendix E.

Interval data for Circuit #1 was not available for this analysis, but it is expected that the summer peak demand on the circuit occurs during the typical 4pm-8pm peak demand timeframe. The analysis evaluated a worst case condition with all EVSE locations running at maximum rated kW demand during a time coincident to the peak kW demand of the circuit.

ANALYSIS AND RESULTS

Unbalanced load flow and voltage drop studies were completed on Circuit #1 without the addition of any PEV charging station at a forecasted 2022 peak kW demand. From those load flow studies, the existing system model analysis indicated the need for replacement of six service transformers to stay within the transformer loading planning criteria limits. For the purpose of this study, it was assumed these transformers will be replaced. The project and costs for these replacements are not included in the analysis that follows.

Level 1 EVSE

For Level 1 analysis, unbalanced load flow and voltage drop studied were completed on Circuit #1 at each of the EVSE saturation levels listed from 5% to 30%. The system model load flow results indicate only the need for replacement of customer transformers and associated transformer fusing to reduce transformer loading within planning criteria limits. See list of system improvements and associated costs below at each saturation level.

5% Saturation

5% Saturation			
	Qty.	Unit Cost	Total
Replace 50 kVA transformer with 75 kVA transformer	1	$7,000	$7,000
		5% Saturation Total	$7,000

Source: City of Corona Department of Water and Power

10% Saturation

10% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 50 kVA transformer	1	$6,000	$6,000
Replace 50 kVA transformer with 75 kVA transformer	1	$7,000	$7,000
		10% Saturation	$13,000

Source: City of Corona Department of Water and Power

15% Saturation

15% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 50 kVA transformer	1	$6,000	$6,000
Replace 50 kVA transformer with 75 kVA transformer	2	$7,000	$14,000
		15% Saturation Total	$20,000

Source: City of Corona Department of Water and Power

20% Saturation

20% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 50 kVA transformer	1	$6,000	$6,000
Replace 50 kVA transformer with 75 kVA transformer	2	$7,000	$14,000
		20% Saturation Total	$20,000

Source: City of Corona Department of Water and Power

The system improvement for 15% and 20% saturations levels are identical. This demonstrates an increase from 15% to 20% saturation levels for Level 1 EVSE does not require additional system improvements.

25% Saturation

25% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 50 kVA transformer	1	$6,000	$6,000
Replace 50 kVA transformer with 75 kVA transformer	3	$7,000	$21,000
Replace 75 kVA transformer with 100 kVA transformer	1	$8,000	$8,000
		25% Saturation Total	$35,000

Source: City of Corona Department of Water and Power

30% Saturation

30% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 50 kVA transformer	1	$6,000	$6,000
Replace 50 kVA transformer with 75 kVA transformer	3	$7,000	$21,000
Replace 75 kVA transformer with 100 kVA transformer	1	$8,000	$8,000
		30% Saturation Total	$35,000

Source: City of Corona Department of Water and Power

The system improvement for 25% and 30% saturations levels are also identical. This demonstrates an increase from 25% to 30% saturation levels for Level 1 EVSE does not require additional system improvements.

All transformers listed in the tables above at each saturation level are identified for replacement due to high transformer loading, exceeding the planning criteria limits listed in Appendix C, part E.

As discussed in the Methodology section of this report, this analysis evaluated the potential for all Level 1 EVSE running at maximum rated kW demand of 1.8-kW at a time coincident to the peak kW demand

on the circuit. With the long time required for charging using Level 1 EVSE, there is a high probability of PEV charging being completed during peak kW demand times on Circuit #1.

With the relatively low impact to the distribution system with a saturation level of 30%, a sensitivity study was run to evaluate 100% saturation for charging using Level 1 EVSE. Again, the load flow results only indicated the need for transformer replacements (16 total), with every customer installing Level 1 EVSE running at a coincident time. All other electric system elements were shown to be within Planning Criteria limits including: primary and secondary distribution system conductor loading, voltage levels, percent voltage drop, WDAT capacity, and system protections.

Level 2 EVSE

The kW demand listed for Level 2 EVSE ranges from approximately 3.3 kW to 20 kW. The higher rated EVSE is capable of shorter PEV charging times. Advancing technology for EVSE and PEVs makes it challenging to predict the actual demand from Level 2 EVSE that may be seen on the CDWP's system. Level 2 EVSE were evaluated at 19.2 kW maximum demand for the purpose of this study. For Level 2 analysis, unbalanced load flow and voltage drop studied were completed on Circuit #1 at each of the EVSE saturation levels listed from 5% to 30%. The system model load flow results indicated the need for multiple system improvements to maintain the system within planning criteria limits. The required system improvements and associated costs are shown below at each saturation level evaluated.

5% Saturation

5% Saturation			
	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 75 kVA transformer	1	$ 6,500	$ 6,500
Replace 50 kVA transformer with 100 kVA transformer	1	$ 7,500	$ 7,500
Replace 50 kVA transformer with 167 kVA transformer	3	$ 8,500	$ 25,500
Replace 75 kVA transformer with 167 kVA transformer	1	$ 8,500	$ 8,500
	5% Saturation Total		**$ 48,000**

Source: City of Corona Department of Water and Power

The transformers listed are identified for replacement due to high transformer loading, exceeding the planning criteria limits listed in Appendix C, part E. Electric system improvements are limited to replacement of transformers at 5% saturation level for Level 2 EVSE.

10% Saturation

10% Saturation			
Transformers	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 75 kVA transformer	2	$6,500	$13,000
Replace 50 kVA transformer with 75 kVA transformer	1	$7,000	$7,000
Replace 50 kVA transformer with 100 kVA transformer	1	$7,500	$7,500
Replace 50 kVA transformer with 167 kVA transformer	4	$8,500	$34,000
Conductor	Feet	Unit Cost	Total
Replace 350 MCM Al UG with 500 MCM Al UG (3	26	$9	$230
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	137	$5	$690
	10% Saturation Total		**$ 62,420**

Source: City of Corona Department of Water and Power

At a 10% saturation level for charging using Level 2 EVSE, it is required to replace the secondary conductor with higher rated conductors. These conductor replacements are required due to high conductor loading and low voltage on secondary system equipment outside of the planning criteria limits in Appendix C, parts B, D. All line replacement cost estimates shown in this study assume the existing 3" conduit is adequate and only requires replacement of the conductor.

15% Saturation

15% Saturation			
Transformer	Qty.	Unit Cost	Total
Replace 50 kVA transformer with 75 kVA transformer	2	$7,000	$14,000
Replace 50 kVA transformer with 100 kVA transformer	4	$7,500	$30,000
Replace 50 kVA transformer with 167 kVA transformer	5	$8,500	$42,500
Replace 75 kVA transformer with 167 kVA transformer	1	$8,500	$8,500
Conductor	Feet	Unit Cost	Total
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	108	$5	$540
Voltage Regulation			Total
Install three, 200-amp voltage regulators for Circuit #1			$150,000
		15% Saturation Total	**$ 245,540**

Source: City of Corona Department of Water and Power

With an increase in saturation level from 10% to 15%, additional transformer replacements are required due to high transformer loading exceeding the planning criteria limits listed in Appendix C, part E. Additionally, it is recommended to install voltage regulation for Circuit #1 due to low voltage seen on both primary and secondary distribution, outside the voltage parameters in the planning criteria in Appendix C, parts B, D. The Dos Lagos WDAT is not a regulated source and CDWP distribution system is susceptible to voltage level changes from the WDAT. Installation of voltage regulation at the WDAT, will mitigate the widespread low voltage that could be observed beginning at a saturation level of 15%.

20% Saturation

20% Saturation			
Transformer	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 75 kVA transformer	2	$6,500	$13,000
Replace 50 kVA transformer with 75 kVA transformer	3	$7,000	$21,000
Replace 50 kVA transformer with 100 kVA transformer	4	$7,500	$30,000
Replace 50 kVA transformer with 167 kVA transformer	4	$8,500	$34,000
Replace 75 kVA transformer with 167 kVA transformer	2	$8,500	$17,000
Replace 100 kVA transformer with 167 kVA transformer	3	$8,500	$25,500
Conductor	Feet	Unit Cost	Total
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	81	$5	$410
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	63	$5	$320
Voltage Regulation			Total
Install three, 300-amp voltage regulators for Circuit #1			$150,000
		20% Saturation Total	**$ 291,320**

Source: City of Corona Department of Water and Power

The required system improvements at a 20% saturation level for Level 2 EVSE installations is very similar to those at a 15% saturation level. With the 5% increase in saturation level, there are additional

transformer replacements required due to high transformer loading, exceeding the planning criteria limits listed in Appendix C, part E. Conductor replacements are required due to high conductor loading and low voltage on secondary system equipment outside of the planning criteria limits in Appendix C, parts B, D. Installation of voltage regulation at the WDAT is also recommended to mitigate low voltage on secondary line.

25% Saturation

25% Saturation			
Transformer	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 75 kVA transformer	2	$6,500	$13,000
Replace 50 kVA transformer with 75 kVA transformer	7	$7,000	$49,000
Replace 50 kVA transformer with 100 kVA transformer	4	$7,500	$30,000
Replace 50 kVA transformer with 167 kVA transformer	4	$8,500	$34,000
Replace 75 kVA transformer with 167 kVA transformer	2	$8,500	$17,000
Replace 100 kVA transformer with 167 kVA transformer	5	$8,500	$42,500
Conductor	Feet	Unit Cost	Total
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	81	$5	$410
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	105	$5	$530
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	63	$5	$320
Voltage Regulation			Total
Install three, 300-amp voltage regulators for Circuit #1			$150,000
Fusing and Protection	Qty.	Unit Cost	Total
Replace three S&C 80E fuses with S&C 125E fuses	1	$860	$860
		25% Saturation Total	**$ 337,620**

Source: City of Corona Department of Water and Power

The required system improvements at a 25% saturation level for Level 2 EVSE installations is similar to those at a 20% saturation level with additional transformer replacements required due to high transformer loading. Conductor replacements and installation of voltage regulation at the WDAT are also recommended to limit voltage drop and maintain adequate service voltage levels. The replacement of fuses on the three phase primary distribution is also required due to load increases.

30% Saturation

30% Saturation			
Transformers	Qty.	Unit Cost	Total
Replace 25 kVA transformer with 75 kVA transformer	2	$6,500	$13,000
Replace 50 kVA transformer with 75 kVA transformer	12	$7,000	$84,000
Replace 50 kVA transformer with 100 kVA transformer	4	$7,500	$30,000
Replace 50 kVA transformer with 167 kVA transformer	4	$8,500	$34,000
Replace 75 kVA transformer with 167 kVA transformer	2	$8,500	$17,000
Replace 100 kVA transformer with 167 kVA transformer	7	$8,500	$59,500
Conductor	Feet	Unit Cost	Total
Replace 350 MCM Al UG with 500 MCM Al UG (3	197	$9	$1,770
Replace 350 MCM Al UG with 500 MCM Al UG (3	210	$9	$1,890
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	63	$5	$320
Replace 1/0 Al UG with 4/0 Al UG (3 conductor)	115	$5	$580
Voltage Regulation			Total
Install three, 300-amp voltage regulators for Circuit #1			$150,000
Fusing and Protection	Qty.	Unit Cost	Total
Replace three S&C 80E fuses with S&C 125E fuses	2	$860	$1,720
		30% Saturation Total	**$ 393,780**

Source: City of Corona Department of Water and Power

At the highest saturation level evaluated for Level 2 EVSE installations, transformer replacements, conductor replacements, installation of voltage regulation at the WDAT, and replacement of fuses in two locations are recommended to maintain adequate electric service. The conductor replacements identified at the 30% saturation level for Level 2 EVSE installations are primarily due to voltage drop on secondary conductor in excess of 3%.

General Distribution System Results

A cost summary is shown below for system improvements required at each saturation level.

General Distribution System Results

Saturation Levels	Level 1 Estimated Cost of System Improvements	Level 2 Estimated Cost of System Improvement
5%	$7,000	$48,000
10%	$13,000	$62,420
15%	$20,000	$245,540
20%	$20,000	$291,230
25%	$35,000	$337,620
30%	$35,000	$393,780

Source: City of Corona Department of Water and Power

As shown in the project tables and costs above, increasing system improvements are required with increasing saturation levels and most significant in Level 2 EVSE. There are several areas on the distribution system that are more sensitive to high saturation levels from Level 2 EVSE installations. These include longer single-phase lines and at secondary conductor locations downline from a transformer

serving a large number of customer meters. The following areas were identified as most sensitive to load increases and most likely to require upgrades:

- Transformers: 125027, 125014, 125022, 125013 and 125032
- Conductor: Downline from transformers 125021 and 125022

In general, the electric system components with the highest potential impact from EVSE load increases are those with the most customers connected downline. It is recommended to monitor these areas specifically to ensure the system is maintained within planning criteria limits.

With the studies run on the distribution system for 5% to 30% saturation levels of Level 1 and Level 2 EVSE, no issues were observed on the primary distribution system that prompted replacement of primary conductor. Low voltage below 118 volts (on a 120 volt base) was indicated on the single phase lines east of Cantada Dr. on primary distribution. This low voltage can be mitigated by installation of voltage regulation at the WDAT. The addition of voltage regulation also alleviates the problem with large portions of low voltage and high voltage drop conditions on the secondary distribution with increased saturation of Level 2 EVSE loads.

The existing WDAT relay settings were evaluated with the anticipated load increase due to the PEV charging load additions, up to Level 2 EVSE 30% saturation level. Taking into consideration the increased loading on Circuit #1 and the possible replacement of downline distribution fuses with 125 Amp fuses, no changes to the relay settings are anticipated due to the PEV charger stations.

The Dos Lagos residential neighborhood customers have 200 amp services. Based on the load flow analysis and load calculations, it is not anticipated that an installation of one Level 2 EVSE would necessitate a service upgrade for the customer.

The CDWP 2017-2021 Electric System Planning Study projected a peak demand at the Dos Lagos WDAT of 8,977 by year 2021. With a Level 2 EVSE saturation level of 30% on Circuit #1, the WDAT maximum peak demand could increase to approximately 11,090 kW by 2021. This does not exceed the 11,500 kW WDAT limit, but is very near the capacity. It is recommended that the loading on the WDAT be monitored with increasing PEV saturation levels, and additional capacity be requested from SCE as needed.

Other Considerations

This analysis evaluated a worst case condition with all EVSE locations running at maximum rated kW demand at a time coincident to the peak kW demand on the circuit. It is expected that the summer peak demand on the residential circuit occurs during the typical 4pm-8pm timeframe. The system improvements and associated costs detailed in the previous section, are directly tied to the system conditions during the peak kW demand on Circuit #1. If that peak demand is reduced or offset, the voltage and loading conditions would likely improve and reduce necessity of system improvements. One option for customers is to offset their electric usage by utilizing solar generation for PEV charging. For a larger power Level 2 charging such at the 19.2 kW EVSE evaluated in this study, this can be complicated by the large number of panels required, intermittency of solar generation, and time of use. Typical solar generation profiles indicate generation rapidly diminishes prior to sundown. Electric system demand can be very high during this time and corresponds to a convenient PEV charging schedule. Solar energy storage would be required to be most effective in reducing electric utility demand using solar power.

Implementation of time of use rates, can be an effective tool to reduce the number of customers charging PEV during the peak 4pm-8pm timeframe. Meter options include smart metering such as AMI meters for Level 2 EVSI to independently monitor usage and time-of-use.

Unbalanced voltage drop analysis was competed for this study. With a relatively even distribution of EVSE installations assumed, no load imbalance between phases were observed. There is a possibility of a system power quality issue occurring on one phase if Level 2 EVSE is installed at high saturation levels in one area. System issues that could be observed include fuse blowing on one phase, phase load imbalance, high neutral amps, high conductor and equipment loading, and voltage drop exceeding 3%. It is recommended to monitor any high concentration of Level 2 chargers on one single phase line and complete load balancing to mitigate issues. Another potential power quality issue for the electric distribution system is the harmonic distortion caused from the DC PEV chargers. It is recommended that CDWP include a requirement that all EVSE adhere to IEEE 519 requirements for total harmonic distortion.

PERMITTING, INSPECTIONS AND ZONING

Plug-in Electric Vehicle (PEV) owners have two options for home charging: Level 1 (120v) and Level 2 (240V). As the Level 1 EVSE uses a standard electrical outlet, it does not require a home upgrade, but some may find its longer charging times (9 to 17 hours) impractical. The Level 2 EVSE can fully charge most PEVs within 3 to 7 hours, but in most homes, it requires an electrical system upgrade to support it. To ensure that systems are properly upgraded, a permit and inspection from the homeowner's municipality is required. A permitting process also allows the City to track PEV charger usage to manage load and offer alternative rate classes to save homeowners money.

To better understand the current trends and practices in permitting, inspecting, and zoning EVSE installations, Schneider Engineering benchmarked the following cities and utility districts: City of Alameda, City of Anaheim, City of Palo Alto, City of Pasadena, Sacramento Municipal Utility District, City of San Jose, and City of Raleigh, NC. Best practices were also pulled from the Center for Sustainable Energy.

PERMITTING

Compared to other cities' permitting process, the City of Corona is slightly ahead of the curve with a separate permit for PEVs (Appendix F). In all cities benchmarked, Level 2 EVSE installation requires a standard residential electrical permit. Some cities have added a checkbox on the permit application to indicate that the permit was specifically for an EV. San Jose and Anaheim specify in their guidelines the need for a mechanical permit if the charger manufacturer required the use of mechanical ventilation.

Before reviewing a permit application, some cities provide resources to homeowners including information about finding a licensed electrician (Raleigh, NC), or requiring a free Meter Spot Report with a Utility Services official in which the official reviews the site and guidelines with the homeowner (Anaheim and Pasadena). Some cities, such as Alameda and Palo Alto, offer general installation guidelines for Level 2 EVSEs on their websites. These guidelines include references to all applicable sections of the California Electrical Code, specifically Article 625. A sample electrical plan for a Level 2 EVSE is often included in the guidelines.

Most cities aim to simplify the permitting process by offering permits over-the-counter or online. All cities allow for either the homeowner or the contractor to request the permit, and the City of Raleigh walks the requestor through the permit application to ensure speedy approval (generally 1 hour). All cities require the applicant to submit job-specific electrical and plot plans, including the location of the station, meter,

charger, receptacles, and the electrical load calculations. The fees for permit vary greatly across cities and depend on the cities' existing electrical fee schedules (from $62 to over $261). However, Anaheim offers to waive the fee as part of its PEV rebate program (rebates discussed in full later).

Recommendations

- ☐ Consider requiring a free Meter Spot Report as part of a public awareness/ education campaign. A Meter Spot Report helps homeowners understand their options in terms of upgrades and EVSE placement. It helps ensure a quicker turnaround for permit approval as the potential location and guidelines for installation have already been established. Homeowners have the opportunity to speak with Utility Services employees and ask questions, building a positive relationship between homeowners and the City.

- ☐ Consider including installation guidelines with a typical EVSE installation diagram and general requirements citing sections of the California Electrical Code such as, but not limited to:

    - o *EQUIPMENT PLACEMENT* - The EVSE shall be stored at a height of at least 18 inches above floor level for indoor locations and at least 24 inches above floor level for outdoor locations. (CEC Art 625.50).
    - o *POWER SUPPLY CORD* - Where the EVSE or charging system is fastened in place, the usable length of the output cable shall be measured from the cable exit of the electric vehicle supply equipment or charging system to the face of the electric vehicle connector. (CEC Art. 625.17. C.2).
    - o *PROTECTION FROM PHYSICAL DAMAGE* – EVSE shall be protected against vehicle impact damage when located in the path of a vehicle. In order to avoid the installation of a substantial pipe bollard as an equipment guard, locate the EVSE on a garage side wall, out of vehicular path. (CEC Art. 110.27(B))
    - o *IF MORE THAN 60 AMPS* - When equipment is rated at more than 60 amps or more than 150 volts to ground, the disconnect means shall be provided and installed in a readily accessible location and shall be capable of being locked on the open position. (CEC A r t .625.42 & article 110.25)
- ☐ Continue offering a separate PEV Charging Station Permit. The separate permit makes the process more straightforward for homeowners, though the current instructions for payment and submittal are slightly confusing. Consider providing a space to mark whether the applicant is the homeowner or contractor and the license information for the contractor.
- ☐ Continue requiring the current list of documentation. The City of Corona's submission requirements are on par with other cities, and no changes are recommended.
- ☐ Consider combining application packet with Mechanical Permit application. To make the application process simpler, consider adding an optional section for a mechanical permit for EVSE that requires mechanical installation.

INSPECTION

Upon completion of the project, the customer must request a final inspection. For most cities, this is performed by the city's building inspector. The City of Pasadena requires an inspection from their Water and Power Department's Electric Service Planning Division and a Final Electrical Panel Inspection from the

Building and Safety Division. Most cities offer inspections as soon as a day after the permit application is approved, and the Center for Sustainable Energy recommends that it be performed within 1 week of the completion of installation. San Jose is the only benchmarked city to specify an inspection fee: each hour of inspection is $251, but it is reduced by $40 if the applicant applies online.

Recommendations

- Make inspections easily available, preferably the day after permit approval, but no longer than one week after approval. Ensure that customers understand the need to have their charging station inspected after installation either as part of the Meter Spot Report or in the permit application packet. Currently, the web page for requesting inspections is down, and the fax form also contains a dead link. Update the website and fax form to ensure that all links lead requestors to the correct page.

- To track PEV-related load, consider encouraging users to register with the Water and Power Department. This can be done through the permitting process (which may delay the processing time) or by requiring an inspection with a CDWP official. The inspection may be a prerequisite for a rebate program and/or signing up for time-of-use rates.

- Develop an inspection checklist based on the Center for Sustainable Energy's example found in the Plug-in SD permitting and inspection best practices report.[4] The checklist is referenced in the Center for Sustainable Energy and the City of Campbell. This checklist provides a step-by-step guide for inspecting Level 2 chargers.

ZONING

Only Raleigh, NC and Anaheim mentioned any zoning restrictions for charging stations. Raleigh requires that applicants submit a certificate of appropriateness to protect the aesthetics of the city's historic district and designated historic landmarks. Anaheim requires approval from the Planning Department if the charger is visible to the public and that any chargers on the front or side of a house must not be visible to adjacent neighbors or from the street.

Recommendations

- Consider introducing zoning requirements for outdoor chargers to preserve neighborhoods' "curb appeal". Consider the following addition to zoning laws:
    - PEV charging equipment are not visible to the public, including adjacent neighbors
    - PEV charging equipment located in public view must have appropriate screening that will be reviewed by the Planning Division for approval. One of the following methods may be used:
        - All equipment painted to match the wall that the charger is mounted on

4 Inspection Checklist for Level 2 Chargers (https://energycenter.org/sites/default/files/docs/nav/transportation/plug-in_sd/Plug-in%20SD%20Permitting%20and%20Inspection%20Report.pdf)

  - Equipment is screened by a fence or perimeter block wall
  - Equipment is screened by substantial landscaping such as shrubbery that is evergreen

- It is recommended that the City add an option in the permit application packet for an inside or outside meter. For outside meters, the City should consider including outside placement as part of the Spot Meter Report and/or requiring that applications for outside chargers be submitted in person so that the applications may be reviewed by the Planning Division. Even if the City chooses to allow online or fax submissions, it should alert the applicant that the approval processes time will increase and provide an estimated time for completion.

ADDITIONAL CONSIDERATIONS

BUILDING CODES

The City of Los Angeles (not part of the benchmark group) has recently updated its building codes to require that all single-family homes feature a dedicated 240V outlet and circuit capacity for a Level 2 EVSE as well as additional requirements for multi-family housing and commercial buildings. This allows the city to promote green initiatives while saving money for customers who will not have to retrofit their electrical system for a Level 2 EVSE. It also prevents illegal or non-permitted upgrades as the system will have been inspected at the time of construction.

Recommendations

- Consider updating building codes to require new structures be "made-ready" for Level 2 EVSE. Requiring new homes to be "made-ready" will save homeowners money while promoting green initiatives for the City.

REBATE PROGRAMS

Rebate programs vary significantly from city to city. Most offer rebates for the cost of installing EVSE (ranging from $400 to $2,500), but Palo Alto offers up to $3,000 for electric service capacity fees that are over and above electric service connection fees directly related to EVSE installations. To qualify, customers must submit the contact information of their PEV charger retailer or contractor, a copy of the final invoice for installation, a copy of the completed Building Permit and Final Inspection, proof of payment of the final invoice, and a copy of the PEV's vehicle registration.

Three cities offer rebates for the direct cost of installing the PEV charger stations. Each city handles rebates slightly differently: Alameda offers up to $500 in the form of a reward card, Pasadena offers up to a $400 credit on the applicant's utility bill, and Sacramento Municipal Utility District (SMUD) offers a $599 cash incentive. Most programs only offer rebates for a single charger, but Anaheim offers up to $500 per charger for the first 5 chargers, up to $2,500 and a waiver for the permit fee. In all cases, the applicant must present receipts for the cost of the charger and its installation, proof that they are a city utility customer, and proof of ownership or lease of an EV. Some also require photographs of the installed charger and its serial number.

Some cities offer rebates for just the purchase of an electric vehicle. The City of Pasadena offers a $200 rebate to customers who purchase a qualifying PEV. Sacramento Municipal Utility District is participating

in a temporary rebate program with PEV dealerships. Through July 4th, any customer who presents their SMUD electricity bill may receive $10,000 credit for the purchase of a new BMW i3 or $3,000 for the purchase of a new Nissan LEAF.

Recommendations

- Consider a rebate program to encourage users to seek permits and part of the City's green initiatives. Depending on budgetary constraints, a $500 rebate for a single charger per residence is recommended. Consider enacting the following requirements for a rebate program:
  - EVSE be new, wall- or pedestal-mounted (non-portable), UL or ETL Listed or approved by the City
  - Proof of ownership or lease of an PEV
  - Proof that the owner is a customer of the CWPD
  - Invoice/proof that the system was installed by a licensed electrician
  - Proof of permit and/or final inspection
  - All EVSE purchase and installation receipts
  - Submitted within 180 days of installation

  Customers may be reimbursed up to $500 of their out-of-pocket expenses, and the City may also choose to consider waiving the fees for the permit.
- Provide information on state and federal incentives for buying electric vehicles. PEV owners can receive up to $7,500 in federal tax credits and up to $7,000 in rebates from the State of California. Provide links and information such as Plug In America's State Incentives Map[5] the California Clean Vehicle Rebate Project[6], and the Replace Your Ride Program (for low income residents[7]) to help customers explore other options available.
- If possible, seek out further refunds for customers such as purchase credits for new vehicles from local dealerships.

RATE STUDY

Electricity rates and tariff structures can substantially influence acceptance of Electric Vehicles (EVs). Because cost is such an important factor in the economic decision regarding the purchase of an EV, how rates and tariffs are implemented can either encourage or discourage the community's investment in EVs. As such, it is important to recognize the increased costs that increased PEV saturation imparts onto the distribution grid but simultaneously limit the inadvertent over collection of revenues from PEV owners to subsidize other customers on the system. Therefore, it is imperative to structure rates in such a way that they align with community goals while fairly charging customers for their contribution to the increase in costs on the system.

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5 Plug in America's State Incentives (https://pluginamerica.org/why-go-plug-in/state-federal-incentives/?location=ca)

6 California Clean Vehicle Rebate Project (https://cleanvehiclerebate.org/eng/community/savings)

7 Replace Your Ride Program (http://replaceyourride.com/)

RATE STRUCTURES

Determining an appropriate rate structure is imperative to establishing the foundation of rate and tariff design. Something as simple as understanding whether the PEV will be metered separately or metered as part of the greater residence can substantially influence how the cost allocation of facility upgrades need to be recovered from the PEV owner. There is not necessarily a wrong answer upon initial approach to designing rates for PEV customers, but by focusing on community goals, referencing comparable utilities, and acknowledging the impact on ratepayers, certain rate structures will become more feasible and more accepted prior to implementation.

Evaluating and comparing PEV rates by other utilities is key to understanding what is more likely to be accepted by customers. Even though utilities do not compete for customers, except under select market structures or infrastructure arrangements, customers still compare their bills and their rates to surrounding utilities to evaluate whether they are getting a "good deal" on their electric bill. Utilities doing something unique or complicated regarding rates, particularly residential rates, without clear benefits to the customer often experience substantial resistance throughout the implementation process. As such, Schneider Engineering (SE) evaluated various rate structures affecting EVs across California to determine already accepted rate structures and begin refining the potential rate structures available to the City of Corona.

It is important to consider the largest utility serving Southern California – Southern California Edison – as a key benchmarking utility. Other regional entities to review include the City of Riverside, the City of Anaheim, and the Los Angeles Department of Water and Power. SE also evaluated rates for EVs in the Sacramento Municipal Utility District (SMUD), City of Alameda, City of Palo Alto, and the City of Pasadena. Between these utilities, SE is confident that it is providing an accurate representation of common practices by both Investor Owned and Municipally Owned Utilities.

Upon review of the advertised rate and tariff structures surrounding EV, several key trends emerged. For the most part, utilities fall into two categories – separately metering the PEV charger or metering the entire house.[8] Both metering arrangements offer distinct advantages and disadvantages. By separately metering EVs from the rest of the residence, Customers' home electricity bills remain unchanged; for those utilities with tiered rates, this is particularly important, as the addition of an electric vehicle will often place the customer in the highest tier for usage, billed at a very high rate than they otherwise might pay. However, the addition of another meter on the house offers several drawbacks – it increases the required installed infrastructure to serve the home and it increases the administrative burden on the utility due to the maintenance of an additional account. It can also affect the customer; depending on the billing system, customers may be subject to two utility bills to pay on a monthly basis rather than one. The single meter arrangement is an almost exact swap of the advantages and disadvantages from the

8 The Cities of Anaheim and Riverside and the Los Angeles Department of Water and Power both offer a separately metered time of use rate structure for EVs, while the Cities of Alameda and Pasadena, and Sacramento Utility District do not offer separate metering. Southern California Edison makes both metering arrangements available to customers.

multi-meter arrangement. Customers and utilities must only track and maintain a single account, but the increased energy consumption can impose a substantial burden on the end customer. In doing so, the Utility may end up substantially over collecting costs to serve the customer due to significant increase of kilowatt hours (kWh) sold.[9]

Under both metering structures, however, utilities have tended to recognize the benefits that charging EVs during off peak times can do through price reductions or rebates. These can be manifested by Time of Use rates, commonly used by the municipal utilities that have separate meters, or a rebate of some sort.[3] These rebates are in addition to various rebates relating to the installation of Level 2 charging infrastructure within the home.

An additional consideration regarding PEV tariffs is the application of the rate structure. Many municipal utilities follow their investor owned counterparts, including the City of Corona, to have a tiered baseline structure, where a baseline amount of energy is set based on mean regional kWh consumption patterns, with usage above the baseline tier is tied to progressively higher rates. These rates are very effective at encouraging conservation and energy efficiency and are designed to help recoup the costs of more expensive, less efficiently used distribution infrastructure. Because this tiered structure does not differentiate kWh consumption between 2:00 PM and 2:00 AM, customers can be penalized for being a more efficient user of energy, i.e., consuming more energy at night rather than during the day, rather than recognized for their benefits to the system. To correct for this inequity, many utilities have shifted to a Time of Use based rate; under this rate structure, the utility will publish rates that vary throughout the day, recognizing coincident peaking and the fact that a few intervals set the sizing needs for transformers, conductors, capacitor banks, and other distribution equipment.[10]

9 While the increase in kWh is normally associated with an increased cost to serve the end customer, justifying higher rates, due to the increased system coincidence factor, residential PEV chargers generally consume electricity at night, where there is very little probability of the system experiencing a coincident peak. As such, PEV chargers can be penalized for increasing the efficient utilization of their service rather than having it be recognized by the utility as a benefit.

10 The Cities of Anaheim and Riverside, SMUD, and the Los Angeles Department of Water and Power utilize these rates with their PEV customers to help encourage off peak charging and recognize that these customers are providing a benefit to the system by making use of distribution asset capacity that would otherwise be wasted during these intervals.

There are utilities that offer multiple rates to PEV residences, recognizing that usage pattern by residence may make one rate structure more attractive than the other. These utilities often provide warnings to customers that staying on the traditional tiered rate structure will likely lead to substantially increased electric bills. These utilities can go even further to offer multiple rates to PEV customers, including separate metering for the PEV charging equipment and a time of use rate.[11]

As the City of Corona begins consideration of unique electric rates for homes with electric vehicles, there are a wealth of rate options for the City to consider. The first decision the City will need to make is whether to pursue a single meter or multi-meter arrangement for PEV homes. Due to the extra administrative burden and costs for both the Utility and for customers, SE recommends pursuing a single meter arrangement for PEV homes.

The drawback to this metering arrangement is that the entire home must be placed on this rate structure. As such, any rate structure must recognize the benefits of nighttime PEV charging and the goals of the City to encourage conservation. Therefore, there are two primary options that are available to the City – maintaining the current tiered rate structure and adjusting the baseline charge to mitigate the cost impact to the customer or transition to a time of use rate. SE strongly discourages the City to pursue any rate structure that offers rebates to PEV residences, as the utility, at best, is refunding the customer their own money paid through an over collection of the rates or, at worst, subsidizing the PEV rate with revenues from other customer classes.[12] In either case, inefficiencies and complications are introduced that can add confusion for both the customer and the Utility.

COST ALLOCATION

By establishing a single meter rate structure, SE can determine the cost allocations to the new PEV residential rate class based on system upgrades and associated costs as determined and shown in Load Capacity Study. Cost allocation is the process by which various costs and assets of the utility are assigned to various rate classes based on kWh consumption, demand, and customer count. Because of the single meter rate recommendation, the system improvements required to support the various levels of PEV saturation can be directly attributed to this new rate class. However, given that these system upgrades will be available for use by the entire distribution system, not all the upgrade costs can be allocated solely towards the new rate class – some must be allocated toward the entire distribution system. Based on a 20-year flat line depreciation of assets related to the system upgrades, the cost methodology for various

11 Los Angeles allows customers to stay on their standard rate, informing customers that choosing to do so will likely increase their electric bill; the utility instead offers the customer the ability to switch to a time of use rate, or if the charging equipment is separately metered, a time of use rate with a rebate. Southern California Edison has similar rate options, but without the charging rebate; opting to offer an alternative time of use structure unique to just the electric vehicle meter

12 It is important to differentiate here between rebates for installing charging equipment in the home and rebates provided by the City on a dollar per kWh basis that are offered through various rate structures, such as SMUD. In this instance the rebates being discouraged are rebates under the rate structure and not rebates on charging infrastructure.

levels of PEV saturation is shown below. The cost allocation is not shown for all modeled saturation levels as the marginal cost increase proved to provide little difference to the next highest saturation level.

Table 1 - Cost Allocation by Saturation and Level Charger

	Level 1		Level 2	
	Total	Annual	Total	Annual
10% Saturation			$49,998	$2,500
20% Saturation			$218,229	$10,911
30% Saturation	$19,886	$994	$291,871	$ 14,594

Source: City of Corona Department of Water and Power

As demonstrated in Table 1, the total cost allocated to PEV residential customers begins to decline proportional to the total cost of the project. As there is an increase in system upgrades, so too is the proportion of allocation of facilities towards the entire system. Rather than one or two customers experiencing a benefit from the lower saturation levels, more of the system experiences increased benefits from increased transformer and conductor sizes. If meters and other costs were included to support a multi-meter billing structure for PEV residences, these costs could be substantially higher.

RATE DESIGN

Following the establishment of the Cost Allocation factors, rate structures and design can be considered. During the rate design process, the Utility looks to recover the costs associated with serving a particular class of customer, grouped by customer characteristics. In this particular study, SE examined just PEV residences, setting aside all other customers that the City serves. Corona is currently undergoing a system cost of service and rate study to establish cost allocation factors and rates for all of its customers. Should the City look to establish a multi-meter billing structure, this portion of the study would involve the development of a new Customer charge in addition to developing new energy rates. However, given the assumption of a single meter billing structure established earlier, the rate revisions considered here will look at the variable rate components, i.e., the Energy Charge, rather than the entire rate.

As discussed under Rate Structures, after isolating whether PEV charging equipment is going to be metered separately from the house, various rate options are eliminated. The two primarily available rate options available to residential PEV customers are the baseline tiered rates, Corona's current rate structure for residential customers, and Time of Use rates. As discussed earlier, there are drawbacks to each rate structure, some of which have been accounted for in variations to the proposed rate structures that follow.

The baseline tiered rate structure was first codified in California State law in 1976 via the Warren-Miller Lifeline Act (California Public Utility Commission, 2018); it was designed to help insulate Californians from fuel volatility and subsequent increases in utility bills. This rate structure has been charged to residential customers across the State ever since. Based on conversations with City staff, Corona inherited the rate structure from Southern California Edison when it purchased its distribution system. As such, those

residential customers served by the City of Corona have experienced very little rate change, particularly with regards to rate structure. Maintaining the current rate structure for all residential customers, regardless of whether they have PEV charging equipment in their home or not, is attractive for this reason.

However, the tiered rate offers several drawbacks to PEV residential customers. The primary one of these is that customers will see their total bill increase significantly due to the corresponding surge in kWh consumption that is directly attributable to the PEV charging. The secondary issue is that benefits from more efficient energy consumption cannot be recognized under this rate structure, as more kWh consumption is unequivocally tied usage during distribution system coincident peaks. Therefore, during the rate design process, it appears PEV residences ought to be charged more than their gas consuming residential counterparts solely because of the PEV charging. Both issues can be mitigated by adjusting the baseline component of the residential rate and otherwise maintaining the current electric rates.

By only adjusting the baseline value, to which all billing tiers are benchmarked, Residential PEV customers will not only be less exposed to the highest tier for energy, but also indirectly mitigate some of the coincidence factor associated with the higher usage.

Table 2 - Baseline by Saturation Level

	Baseline kWh
Current	470
30% Level 1	775
10% Level 2	760
20% Level 2	740
30% Level 2	745

Source: City of Corona Department of Water and Power

As shown in Table 2, the proposed adjusted baseline would not be a flat subsidy of estimated kWh consumed for charging purposes. Instead, it recognizes that there is a potential burden on the system while understanding that charging EVs generally take place at night. The added advantage to increasing the baseline is that subsequent rate tiers, which are tied to percentage consumption above the established baseline, receive an increase, too. Therefore, PEV residential customers would experience increased kWh bandwidths in each tier to accommodate the increased usage from the charging while still collecting for the added costs relating to system upgrades. Table 3 demonstrates the customer impact by maintaining the same rate structure, but by adjusting the baseline from 470 to a more appropriate value, the PEV customer experiences between $90 and $100 in savings – costs that would have been over collected and would likely need to be refunded to the customer through a rebate mechanism.

Table 3 - Customer Bill Impact by Adjusted Baseline

		Current Baseline Structure			Proposed Baseline Structure		
	Estimated kWh	Baseline kWh	Total Energy	Avg. Energy Price	Baseline kWh	Total Energy	Avg. Energy Price
30% Level 1	1252	470	$250.43	$0.200	775	$150.22	$0.120
10% Level 2	1252	470	$250.43	$0.200	760	$155.15	$0.124
20% Level 2	1252	470	$250.43	$0.200	740	$161.72	$0.129
30% Level 2	1252	470	$250.43	$0.200	745	$160.08	$0.128

Source: City of Corona Department of Water and Power

It is important to note that while the California Public Utility Commission sets the baseline values for the Investor Owned Utilities in the State, municipals, such as Corona, must have their rates approved by their governing body, not the State. Therefore, there is nothing amiss in using the State model and adjusting as necessary to fit the needs of the community. The baseline methodology has served California and its citizens well but adjusting the methodology to recognize the needs and challenges faced by residential customers and their serving utilities as necessary can ensure its continued viability as the electric distribution industry continues to rapidly change.

Due to time constraints, Time of Use rates were not able to be sufficiently evaluated for this draft report; this topic will be fully discussed and developed for the final report.

RECOMMENDATIONS

As the saturation of electric vehicles increases, it is important that utilities have rate structures that appropriately address both the potential costs and benefits of PEV saturation and ensure that all customers are treated fairly. Whether the City opts to pursue an adjusted baseline or a Time of Use rate, appropriate rate mechanisms will be in place to fairly treat EV. At this time, SE recommends implementing ***[See note below]*** as the City completes its cost of service and rate study. This rate structure meets the current and future goals of the City while ensuring fair cost recovery relating to PEV charging.

NOTE: This section to be completed as it will coincide with the completion of the greater cost of service and rate study. Whichever rate structure is recommended, it will be made to align with overall goals and policies.

APPENDICES

A. Study Area Map

B. Short Circuit Study Protective Device Coordination Study REV2, by Eaton, dated March 2016

C. System Planning Criteria

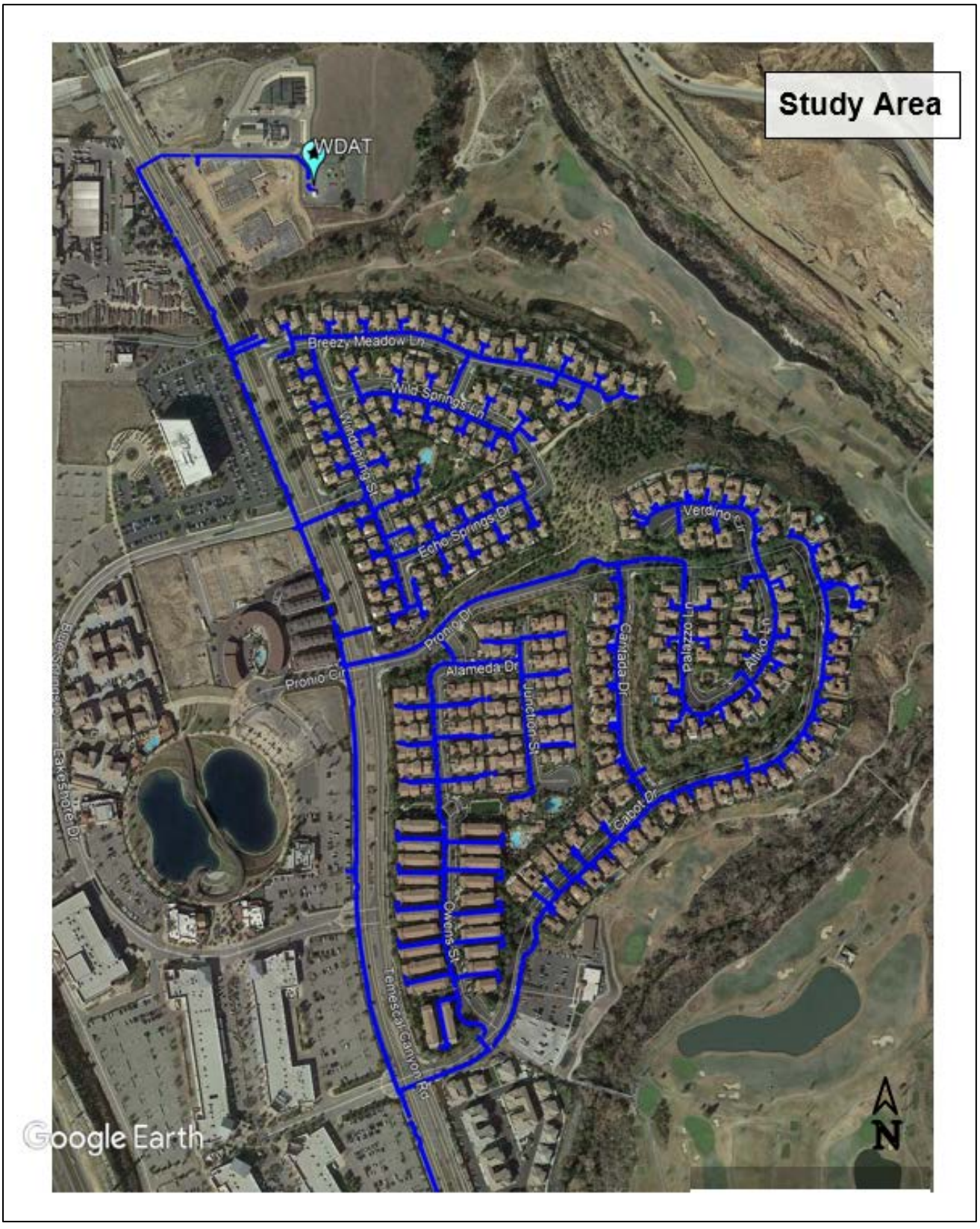
D. City of Corona Department of Water and Power Electric Energy Rules and Regulations for the Electric Utility Department

E. Unit Costs

F. Corona PEV Permit Guideline

APPENDIX A: Study Area Map

The figure below shows the study area for cost of service and rate study in a Dog Lagos neighborhood in Southeast Corona.



Source: Google Maps

APPENDIX B: Short Circuit Study Protective Device Coordination Study REV2, by Eaton, dated March 2016

The table below shows the recommended medium-voltage protective device settings that were used for WDAT Circuit #1 (residential).

Recommended Medium-Voltage Protective Device Settings

SWGR--10500 1				
Name/Type	Demi ption	A found Settings	Recommended Settings:	TCC#
RLY-52-M Electronic	BASLER BE1-S0/51B, Series 100 SACT. Phase	Phase Piclmp 4 (640A) C. Curve C 0.5 INST 25 (4000A) INST Delay,SW3-2 & -3 Neutral Piclmp 1.1(176A) L, Long Inverse 1 INST 25 (4000A) INST Delay, SW3-2 & -3 Both Off	Phase Piclmp 4 (640A) *L* . L:m·emely Inwrse INST 25 (4000A) INST Delay, SW3-2 & -3 Neutral Piclmp 1.1 (176A) L, Long Inverse 1 INST 25 (4000A) INST Delay, SW3-2 & -3 Both Off	01-CKT#I - Rec. 02-CKT#I-GND-Rec
RLY-52-01 Electronic	BASLER BE1-S0/51B, Series 100 SACT, Phase	Phase Piclmp 6 (480A) C, Curve C 0.5 INST 50(4000A) INST Delay,SW3-2 & -3 GND Piclmp 12 (120A) L, Long Inverse 0.5 INST 99 (990A) INST Delay, S\V3-2 & -3 Both Off	Phase Piclmp*6* (480A) *L* , Extremely Inwrse 0.80 INST 50 (4000A) INST Delay, SW3-2 & -3 GND Pickup 12 (120A) L. Long Inverse 0.5 INST 99 (990A) INST Delay, SW3-2 & -3 Both Off	01-CKT#I - Rec. 02-CKT#I-GND-Rec.

Source: City of Corona Department of Water and Power

APPENDIX C: System Planning Criteria

SYSTEM PLANNING CRITERIA

The electric system analysis described in this report is based upon the system planning guidelines stated below. A great deal of emphasis is placed on obtaining an accurate existing system database on which to base the engineering analysis and system improvement recommendations. Once an accurate system database has been obtained, a detailed engineering analysis is made of Circuit #1 to determine the system improvements needed to maintain reliable electric service with the addition of PEV charging stations in single family residential housing. Following is a description of the planning criteria used in the preparation of this Electric Vehicle Charging Installation Requirements and Rate Study.

Distribution System Planning Criteria

A. All Rules and criteria set forth in the City of Corona Department of Water and Power Electric Energy Rules and Regulations for the Electric Utility Department with last amended date of December 20, 2006 shall be used.

B. Voltage drop from the customer service transformer to customer meter is limited to 3%.

C. System power factors will be maintained above 96% lagging during peak load conditions.

D. Primary distribution voltage on a 120 volt base will be maintained between 126 volts and 118 volts. Secondary distribution service voltage on a 120 volt base will be maintained between 126 volts and 114 volts.

E. Customer transformers loading level will be limited. The tables below gives the specifications for customer transformers dependent on phase type.

Single Phase 120/240 V Padmount Transformer

KVA Rating	Maximum Allowable KVA	Maximum % loading
25	38	152%
50	66	132%
75	95	127%
100	122	122%
167	204	122%

Source: City of Corona Department of Water and Power

Three Phase 120/208 V Padmount Transformers

KVA Rating	Maximum Allowable KVA	Maximum % loading
75	98	131%
150	195	130%
300 [Load Factor 0-64%]	390	130%
300 [Load Factor 64-74%]	360	120%
300 [Load Factor 75-100%]	330	110%

Source: City of Corona Department of Water and Power

F. A conductor loading level of 100% of Maximum Ratings will be used as general guideline for highest conductor loading. Circuit reserve capacity for back up to neighboring circuits is not considered. Conductor ampacity ratings shown in the table below,

Conductor Ratings

Conductor	In Ducts (Amps)	Direct Burial (Amps)
1000 Al (15kV)	542	642
350 Al (15kV)	319	389
1/0 Al (15kV	155	218
#2 Al (15kV)	119	168
500 Al (600V)	395	495
350 Al (600V)	320	415
4/0 Al (600V)	240	315
1/0 Al (600V)	160	215
#2 Al (600V)	120	165

Source: City of Corona Department of Water and Power

Ampacities shown assume use of 100% load factor, 60 Hz current, 36" burial depth, 20°C ambient temperature, 90°C conductor temperature, earth RHO 90, insulation and shield RHO 400.

When these system planning criteria are not met, the following system improvements are considered:

1. Increase line conductor size.
2. Install voltage regulators.
3. Install capacitor banks.
4. Replace equipment with higher capacity equipment.
5. Convert 1Ø lines to 3Ø.
6. Transfer load to Circuit #2.

APPENDIX D: Electric Energy Rules and Regulations for the Electric Utility Department

CITY OF CORONA
DEPARTMENT OF WATER AND POWER
ELECTRIC ENERGY RULES AND REGULATIONS
FOR ELECTRIC UTLITIES DEPARTMENT

Adopted February 4, 2004
By Ordinance No. 2692
Amended October 20, 2004
By Resolution No. 2004-181
Amended May 18, 2005
By Resolution No. 2005-050
Amended February 1, 2006
By Resolution No. 2006-10
Amended April 19, 2006
By Resolution No. 2006-48
Amended December 20, 2006
By Resolution No. 2006-161

Rule 1 Definitions

For the purpose of these rules and rate schedules, the terms and expressions listed below shall have the meanings set forth as follows:

Agricultural Power Service: Agricultural power service is that portion of electric energy and service used by a person in connection with the production, harvesting, and preparation for market of agricultural and horticultural products, including poultry and livestock, on land owned and/or operated by such person for the production of agricultural products, but does not apply to processing of products raised by others.

Applicant: A person or agency requesting the Utility to supply electric service and who will be responsible for all related charges.

Application: A written request to the Utility for electric service as distinguished from an inquiry as to the availability or charges for such service.

Billing Demand: The load or demand used for computing charges under Rate Schedules based on the size of the Customer's load or demand. It may be the connected load, the measured maximum demand, or a modification of either as provided for by the applicable Rate Schedule.

Billing Period: The time interval between two consecutive Meter readings that are taken for billing purposes.

City: Corona, California. The City is responsible for the management and operation of the Utility on behalf of the residents and businesses of the City of Corona.

City Council: City Council of the City of Corona, California.

Class of Service: Different classes of electric utility service are: General Lighting, Multiple-Phase Lighting, Combination Lighting and Power, Emergency Lighting, Single-Phase Power, Polyphase Power, Welding, X-ray, Fire Pump, Fire Alarm, and Stand-by Power (permitted only where stand-by and normal circuit conductors are in separate raceways and enclosures).

Commercial Developments: Consist of two (2) or more enterprises engaged in trade or the furnishing of services; e.g., shopping centers, sales enterprises, business offices, professional offices, and educational or governmental complexes.

Completed Application: An Application that satisfies all of the information and other requirements of the Tariff Schedules, including any required deposits.

Connected Load: The sum of the rated capacities of all of the Customer's equipment that can be connected to the Utility's lines at one time, as more fully described in the applicable Rate Schedules.

Customer: The person in whose name service is rendered as evidenced by the signature on the Application, contract, or agreement for that service or, in the absence of a signed instrument, by the receipt and payment of bills or Summary Bills regularly issued in his or her name regardless of the identity of the actual user of the service. A Customer may also be a party with whom the Utility is doing business with or without a billing relationship.

Customer's Mailing Address: The address specified in a Customer's Application or contract, or any other address subsequently given to the Utility by the Customer, to which any notice, bill or other communication is to be mailed.

Date of Presentation: The date upon which a bill or notice is Mailed, or delivered by the Utility, to the Customer.

Distribution Line Extension: New distribution facilities of the Utility that is a continuation of, or branch from, the nearest available existing permanent Distribution Line (including any facility rearrangements and relocations necessary to accommodate the Distribution Line Extension) to the point of connection of the last service. The Utility's Distribution Line Extension includes transmission underbuilds and converting an existing single-phase line to three-phase in order to furnish three-phase service to an Applicant, but excludes service transformers, Meters and services.

Distribution Lines: Overhead and underground facilities which are operated at distribution voltages, and which are designed to supply two (2) or more services.

Distribution System: Those distribution facilities owned, controlled, and operated by the Utility that are used to provide distribution service under the tariffs.

Domestic Service: Service for residential use at dwelling premises. Any service for other than residential use at a dwelling premises may be served through the domestic service Meter only where such non-domestic connected load does not exceed 300 watts for lighting or 2 hp for power.

Domestic Farm Services: Single-phase service for light or power will be considered domestic farm service provided:

The service is furnished through the farm operator's domestic Meter;

The service is used only for farming operations, in addition to domestic purposes, on the farm furnished the service;

Monthly billing: The total use on the domestic farm service Meter does not exceed 2,500 kilowatt-hours per month in each of three consecutive months or a total of 20,000 kilowatt-hours in any twelve consecutive months;

Bimonthly billing: The total use through the domestic farm service Meter does not exceed 10,000 kilowatt-hours in any two consecutive bimonthly periods or a total of 20,000 kilowatt-hours in any twelve consecutive months.

Domestic Heat Pump Customer: A Domestic Heat Pump Customer is one who has installed a central heat pump unit of not less than 3 hp (nameplate rating), which is used exclusively to heat and cool the domestic dwelling.

Electric Supply: Electric energy or power.

Electronic Transfer: Paperless exchange of data and/or funds, usually involving computer and telecommunication technology.

Energy Diversion: Electricity being received by a Customer without registering through a meter due to either tampering with the meter or bypassing the meter

General Manager: General Manager of the Department of Water and Power of the City (Utilities Department) or a designee.

General Service: Service to any lighting or power installation except those eligible for service on single-family or multifamily domestic, street lighting, outdoor area lighting, municipal, or stand-by schedules.

Heating Service: Service to any apparatus employing the resistance of conductors to transform electric energy into heat.

Hourly Metering: See Interval Metering.

HP: Horsepower

Independent System Operator (ISO): The California Independent System Operator Corporation, a nonprofit corporation that controls the transmission facilities of all participating transmission owners and dispatches certain generating units and loads. The ISO is responsible for the operation and control of the statewide transmission grid.

Industrial Developments: Consist of two (2) or more enterprises engaged in a process which creates a product or changes materials into another form or product.

Intermittent Service: Service which, in the opinion of the Utility, is subject to discontinuance for a time or at intervals.

Interval Metering: A metering device capable of recording minimum data required. Minimum data requirements may include 15-minute demand data required to bill the Utility's tariffs.

KW: Kilowatt.

KWh: Kilowatt hour.

Lighting Service: Service to any apparatus transforming electric energy into light for all visual purposes except those specified under Power Service.

Line Extension: All facilities, including transformer, Service Connection and Meter, required to extend electric service from the Utility's existing permanent facilities to the Point of Delivery to the Customer.

Mailed: Any notice or other communication will be considered "Mailed" when sent by electronic transfer or when it is enclosed in a sealed envelope, properly addressed, and deposited in any United States Post Office box, postage prepaid.

Maximum Demand: The average kilowatts during the specified time interval when the Customer's use is greatest in the billing period as indicated or recorded by the Utility's Meter.

Meter: The instrument used for measuring the electricity delivered to the Customer.

Meter Facilities: The necessary meter, instrument transformers, test facilities, data communication equipment, and other associated metering equipment.

Mobile Home: A Mobile Home is a structure designed for human habitation and for being moved on a street or highway under permit pursuant to the California Vehicle Code. Mobile Home also includes a manufactured home as defined in the California Health and Safety Code,

but does not include a Recreational Vehicle as defined herein or a commercial coach as defined in the California Health and Safety Code.

Mobile Home Park: A Mobile Home Park is an area of land where two or more Mobile Home sites are rented, and held out for rent, to accommodate Mobile Homes used for human habitation. A Mobile Home Park is not a Recreational Vehicle Park.

Multifamily Accommodation: An apartment building, duplex, Mobile Home Park, or any other group of permanent residential single-family dwellings located upon a single premises, providing the residential dwellings therein meet the requirements for a single-family accommodation. A multifamily accommodation does not include hotels, motels, residential hotels, guest or resort ranches, tourist camps, Recreational Vehicle Parks, campgrounds, halfway houses, rooming houses, boarding houses, institutions, dormitories, rest or nursing homes, military barracks, or any enterprise that includes or rents to either transient tenants or transient accommodations.

Multiple Occupancy Building: A building of multiple occupancy provided with continuous outer wall construction including, but not limited to, apartments, condominiums, townhouses and commercial buildings.

Municipal Service: Utility services supplied to City of Corona departments.

Nominal Voltage: The Nominal Voltage of a circuit is the approximate voltage between conductors in a circuit or system of a given class, assigned for the purpose of convenient designation. For any specific Nominal Voltage, the operating voltage actually existing at various points and at various times on the system is subject to normal distribution variation.

Otherwise Applicable Tariff (OAT): The Customer's regularly filed Rate Schedule under which service is rendered.

Paid or Payment: Funds received by Utility through postal service, Utility payment office, Utility authorized agent, or deposited in Utility account for Electronic Transfer.

Permanent Service: Service which, in the opinion of the Utility, is of a permanent and established character. This may be continuous, intermittent, or seasonal in nature.

Person: Any individual, partnership, corporation, public agency, or other organization operating as a single entity.

Point of Delivery: The point where conductors of the Utility are connected to the conductors of the Customer, regardless of the location of the Utility's Meters or transformers. Utility conductors may be owned, leased, or under license by the Utility, and the conductors of the Customer may be owned, leased, or under license by the Customer.

Power Factor: The ratio of the revenue producing current in a circuit to the total current in that circuit. In terms of power quantities, power factor is the ratio of kW (real power) to the total kVA (total power).

Power Service: Service to apparatus or equipment used for purposes other than lighting shall be considered as Power Service. Lamps or lights used for purposes which, in the opinion of the Utility, are not general illumination purposes are classed as Power Service, such as the following: motion picture projection, motion picture and television production, production of chemical reactions, sterilizing, drying, radiant heating, therapeutic, photographic processing,

production of stimulating the growth or yield of agricultural products, pilot or indicating lights on power control equipment, and lighting used as an aid in the operation of a motor-driven production machine for the purpose of checking tool settings or dial readings, measuring or inspecting the product while on the machine, when the lamps are installed as an integral part of the machine and energized from its power supply.

Premises: All of the real property and apparatus employed in a single enterprise on an integral parcel of land undivided, except in the case of industrial, agricultural, oil field, resort enterprises,

And public or quasi-public institutions, by a dedicated street, highway, or other public thoroughfare, or a railway. Automobile parking lots constituting a part of an adjacent to a single enterprise may be separated by an alley from the remainder of the premises served.

Property: A parcel of real property of record as shown in the County Assessor's maps on file in the Planning Department of the City of Corona.

Pull Box: An enclosure for joining conductors which also provides by its size, arrangement, and location the necessary facilities for pulling the conductors into place. This term as used here includes structures also known as "manhole," "hand hold," and "switch board pull section".

Qualified Contractor/Subcontractor (QC/S): An Applicant's contractor or subcontractor who:

1. Is licensed in California for the appropriate type of work such as, but not limited to, electrical and general;

2. Employs workmen properly certified for specific required skills such as, but not limited to, plastic fusion and welding. Electric workmen shall be properly qualified (qualified Electrical Worker, Qualified Person, etc.) as defined in State of California High Voltage Safety Orders (Title 8, Subchapter 5, Group 2);

3. Complies with applicable laws such as, but not limited to, Equal Opportunity regulations, OSHA and EPA.

Qualified Customer: As determined by the Utility, those Customers having met the criteria and supplied the facilities for electric service under the Utility's Tariff Schedules and/or having special skills and equipment necessary to participate with the Utility in business services.

Qualifying Recreational Vehicle (RV) Unit: A RV Unit that is used as a permanent single-family residence at the same location in any RV Park or on a single premises for at least nine months out of the year; is not used for recreational purposes; and is not removed from its space or location on a regular basis.

Quasi-public Institutions: Public utilities, educational institutions, and hospitals, whether publicly or privately owned, where the property, campus or hospital grounds extend over relatively large areas through which public streets may run.

Rate Area: A specified area within which a Rate Schedule or Schedules apply.

Rate Charges: Charges in the Rate Schedules may include the following:

Customer Charge: That portion of the charge for service which is a fixed amount without regard to Connected Load, demand, or energy consumption in accordance with the Rate Schedule.

Demand Charge: That portion of the charge for service which varies with the Billing Demand in accordance with the Rate Schedule.

Energy Charge: That portion of the charge for service which varies with the quantity of energy consumed in accordance with the Rate Schedule.

Minimum Charge: The least amount for which service will be rendered in accordance with the Rate Schedule.

Service Charge: That portion of the charge for service which is a fixed amount based on Connected Load in accordance with the Rate Schedule.

Standby Charge: That portion of the charge for Standby Service which is a fixed amount based on the maximum load the Utility stands ready to supply in accordance with the Rate Schedule.

Rate Schedule: May be one or more tariff pages setting forth the charges and conditions for a particular class or type of service at a given location. A Rate Schedule, as referred to herein, shall include all the wording on the applicable tariff page or pages, such as, but not limited to, the following: Schedule Number, Class of Service, Character or Applicability, Territory, Rates, Conditions, and reference to Rules.

Recreational Vehicle: A Recreational Vehicle (RV), as defined in the California Health and Safety Code, is a motor home, slide-in camper, park trailer or camping trailer, with or without motive power, designed for human habitation for recreational or emergency occupancy.

Recreational Vehicle Park: A Recreational Vehicle (RV) Park is an area or tract of land or a separate designated section within a Mobile Home Park where one or more lots are occupied by owners or users of recreational vehicles as defined herein.

Residential Hotel: A hotel establishment which leases Residential Units as permanent primary residences and at least 50% of its total Residential Units released for a minimum period of one month and each of said leased units is occupied for at least nine months of the year. Residential Hotels do not include establishments such as guest or resort hotels; resort motels or resort ranches; tourist camps; Recreational Vehicle Parks; trailer parks; halfway houses, rooming houses; boarding houses; dormitories; clubhouses; rest homes; convalescent homes; retirement homes; military barracks; or a house, apartment, or any other residential dwelling unit used by a single family, an organization, or a group of persons.

Residential Unit: A residential dwelling unit consisting of a room or group of rooms which do not qualify as single-family dwellings. Residential units may be used as permanent primary dwellings, as transient tenant accommodations, and by organizations or groups of persons. When such unit is used by a transient tenant, an organization, or a group of persons, use shall be non-domestic service.

Retailer: Any entity, whether it is a non-utility generator, aggregator, broker, or marketer, which offers electric power service to end-use Customers.

Rules: Tariff pages which set forth the application of all rates, charges and service when such applicability is not set forth in and as a part of the Rate Schedules.

Service Wires or Connection: The group of conductors, whether overhead or underground, necessary to connect the service entrance conductors of the Customer to the Utility's supply line, regardless of the location of the Utility's Meters or transformers. An overhead service connection, sometimes referred to as a "service drop," is the group of conductors between the Customer's building or other permanent support and the Utility's adjacent pole.

Service Extension: Consists of the service wires or connections as above defined.

Single Enterprise: A separate business or other individual activity carried on by a Customer. The term does not apply to associations or combinations of Customers.

Single-Family Dwelling or Accommodation: A house, apartment, flat, or any other residential unit which contains cooking facilities (not necessarily electric) and which is used as a residence by a single family.

Small Customer/Applicant: Applicants for service and Customers served under Domestic Rate Schedules and Schedules GS-1, LS-3, and TC-1.

Small Commercial Customer: Customer served under Schedule GS-1.

Standby Service: Service supplied to Customers who normally obtain their power requirements from sources other than the Utility. Under this service, the Utility provides a permanent Service Connection to supply the Customer's contracted load in accordance with the provisions of the standby schedule

Street Lighting Service: Service to any lighting apparatus used primarily for the illumination of streets, alleys, highways, or other public ways.

Summary Bill: A Customer account statement that includes charges for multiple service accounts.

Swimming Pool: A permanently installed Swimming Pool, above or below ground, with permanently installed pump, motor, filtering equipment and automatic timer to control the operation of the pumping equipment. The pump motor must be rated at a minimum of 3/4 hp.

Tariff Page: An individual page of the Tariff Schedules.

Tariff Schedules: The entire body of effective rates, rentals, charges, and Rules collectively of the Utility, as set forth herein, and including title page, preliminary statement, Rate Schedules, lists of contracts and deviations, Rules and sample forms.

Tariff Sheet: An individual sheet of the Tariff Schedules.

Temporary Service: Service for enterprises or activities which are temporary in character or where it is known in advance that service will be of limited duration. Service, which in the opinion of the Utility, is for operations of a speculative character or the permanency of which has not been established, also is considered Temporary Service.

Tract or Subdivision: An area for family dwellings which may be identified by filed subdivision plans or as an area in which a group of dwellings may be constructed about the

same time, either by a large scale builder or by several builders working on a coordinated basis.

Utility: Department of Water and Power of the City of Corona.

Utility Operating Convenience: The term refers to the utilization, under certain circumstances, or facilities or practices not ordinarily employed which contributes to the overall efficiency of Utility operations; it does not refer to Customer convenience nor to the use of facilities or adoption of practices required to comply with applicable laws, ordinances, rules or regulations, or similar requirements of public authorities.

Violence: Types of Violence are to include, but are not limited to death or injury with a weapon, inflicting bodily harm, allowing animals to attack, physically detaining an employee against his/her will, and/or tearing employee's clothing.

Water Suppliers: Establishments primarily engaged in distributing water for sale for domestic, commercial, and industrial use.

X-ray Service: Service to any apparatus transforming electric energy into radiation similar to light but having wavelengths from .0006 to 2 angstroms.

Zone: Zones are defined by zip code for purposes of establishing discretionary service fees.

Rule 2 Description of Electric Service

A. General.

1. The character of electric service available at any particular location should be ascertained by inquiry at the Utility's office.

2. The Rate Schedules included herein are applicable to both electric service and Utility services provided beyond the Utility's Point of Delivery.

3. The Rate Schedules included herein are applicable for service where the Customer purchases its entire electrical requirements from the Utility, except where such schedules specifically provide otherwise, and are not applicable where a part of the Customer's electrical requirements are supplied from some other source.

4. The Rate Schedules included herein are applicable for service provided from overhead distribution facilities (or where underground distribution facilities are provided for the Utility's operating convenience) except where schedules specifically provide otherwise.

5. Alternating current service of approximately 60-cycle frequency will be supplied.

6. Voltages referred to in the Tariff Schedules are nominal voltages.

7. Service will be supplied at one standard voltage for each class of service. Each service shall have a service main disconnecting device with an ampere rating equal to or less than the ampere rating of the underground pull section and the service conductors. The total ampere rating of the service main disconnecting devices including taps to underground pull section shall be equal or less than the ampere rating of the service conductors.

B. Phase and Voltage Specifications.

1. Customer Service Voltages.

a. Under all normal load conditions, distribution circuits will be operated so as to maintain secondary service voltage levels to customers within a specific voltage range. The voltage range is given in the table below.

Customer Service Voltages

Nominal Two-Wire and Multi-Wire Service Voltage	Minimum Voltage to All Services	Maximum Service Voltage on Residential and Commercial Distribution Circuits	Maximum Service Voltage on Agricultural and Industrial Distribution Circuits
120	114	120	126
208	197	208	218
240	228	240	252
277	263	277	291
480	456	480	504

Source: City of Corona department of Water and Power

b. Exceptions to Voltage Limits. Voltage may be outside the limits specified when the variations:

(1) Arise from the temporary action of the elements.

(2) Are infrequent momentary fluctuations of a short duration.

(3) Arise from service interruptions.

(4) Arise from temporary separation of parts of the system from the main system.

(5) Are from causes beyond the control of the Utility.

2. Customer Utilization Voltages.

a. All Customer-owned utilization equipment must be designed and rated in accordance with the following utilization voltages specified by the American National Standard C84.1 if Customer equipment is to give fully satisfactory performance. The table below gives the nominal, minimum, and maximum utilization voltage for customer owned equipment.

Customer Utilization Voltages

Nominal Utilization Voltage	Minimum Utilization Voltage	Maximum Utilization Voltage
120	110	125
208	191	216
240	220	250
277	254	289
480	440	500

Source: City of Corona Department of Water and Power

b. The difference between service and utilization voltages are allowances for voltage drop in Customer wiring. The maximum allowance is 4 volts (120 volt base) for secondary service.

c. Minimum utilization voltages from American National Standard C84.1 shown for Customer information by the Utility has no control over voltage drop in Customer's wiring.

d. The minimum utilization voltages shown in a. above, apply for circuits supplying lighting loads. The minimum secondary utilization voltages specified by American National Standard C84.1 for circuits not supplying lighting loads by 90 percent of nominal voltages (180 volts on 120 volt base) for normal service.

e. Motor used on 208 volt systems should be rated 200 volts or (for small single-phase motors) 115 volts. Motors rated 230 volts will not perform satisfactorily on these systems and should not be used. Motors rated 220 volts are no longer standard, but many of them were installed on existing 208 volt systems on the assumption that the utilization voltage would not be less than 187 volts (90 percent of 208 volts).

3. Single-phase Service.

a. General. The table below give voltage, minimum load requirement, and maximum load requirement for single-phase service.

Single-Phase Service

Voltage	Minimum Load Required	Maximum Load Allowed
120 volts	None	1-15 amp and 1-20 amp branch circuit
120/240 or 240 volts	None	400 amp main switch
240/480 volts	15kVA	200 amp main switch
2,400 volts or over	Varies with location	40 amp main switch

Source: City of Corona Department of Water and Power

b. The maximum size 120 volt single-phase motor allowed is 1 hp and the maximum size 240 volt, or higher voltage, single-phase motor allowed is 10 hp.

c. Where three-phase service is supplied from a four-wire wye-connected 120/208 volt service, the maximum demand allowed is 1,000 kVA.

d. Service to all loads of 1,000 kVA maximum demand, or over, must be approved by the Utility as to adequacy of facilities for service.

e. Loads on three-phase service must be balanced between phases in accordance with good engineering practice.

f. Three-phase service may be supplied to installations having a proposed main service switch in excess of the switch capacities specified above

Provided approval of the Utility has first been obtained as to the number and size of switches, circuits and related facilities. Such service will be supplied from two or three separate service connections at one location. Energy supplied in this manner will be totalized for billing purposes. The loads will be balanced as closely as practicable between the services.

4. Combined Single-phase Service and Three-phase Service.

   a. Service may be supplied at 120/208 four-wire wye-connected where the Utility does not maintain four-wire secondary poly-phase mains provided: (1) written application is made for such service by the Customer; (2) the Customer's load is of such a size as to require an individual transformer installation of not less than 15kVA of transformer capacity; and (3) a Customer provides space acceptable to the Utility on this premises to accommodate the installation of the Utility's facilities when, in the opinion of the Utility, such space is considered necessary.

   b. Service may be supplied at 120/240 volts four-wire delta-connected where the Utility does not maintain four-wire secondary polyphase mains provided: (1) written application is made for such service by the Customer; (2) the Customer's load is of such a size as to require an individual transformer installation of not less than 15kVA of transformer capacity; (3) the unbalance between phases is less than100 kW; and (4) the Customer provides space acceptable to the Utility on his premises to accommodate the installation of the Utility's facilities when, in the opinion of the Utility, such space is considered necessary.

   c. The maximum demand allowances for combined single-phase and three-phase are as set forth in B.3 above.

5. At the option of the Utility, the above voltage and phase specifications may be modified because of the service conditions at the location involved.

C. Motor Protection and Equipment.

Customer's motor equipment must conform to the following requirements:

1. Motors that cannot be safely subjected to full rated voltage on starting or that drive machinery of such a nature that the machinery, itself, or the product it handles will not permit the motor to resume normal speed upon restoration of normal supply voltage shall be equipped with devices that will disconnect them from the line upon failure of supply voltage and that will prevent the automatic reconnection of the motors upon restoration of normal supply voltage.

2. All motors of 1 hp or larger shall be equipped with thermal relays, fuses, or other automatic overcurrent interrupting devices to disconnect completely such motors from the line as a protection against damage due to overheating.

3. Three-phase motors driving elevators, hoists, tramways, cranes, conveyers, or

other equipment, which would create hazard to life in the event of uncontrolled reversal of motor rotation, shall be provided with reverse-phase and open-phase protection to disconnect completely the motors from the line in the event of phase reversal or loss of one phase.

4. Wind machines thermostatically controlled with automatic reclosing switches must be equipped with suitable time-delay devices, as hereinafter specified, at the Customer's expense, to permit the required adjustment of the time of re-closure after interruption of service.

   A suitable time-delay device, within the meaning of this rule, is a relay or other type of equipment that can be preset to delay with various time intervals the re-closing of the automatic switches (and the consequent starting up of the electric motors on the wind machines) and to stagger the reconnection of the load on the Utility's system, and such device must be constructed so as effectively to permit a variable overall time interval of not less than five minutes with adjustable time increments of not greater than ten seconds. The particular setting to be utilized for each separate installation is to be determined by the Utility from time to time in accordance with its operating requirements, and the Customer is to obtain from the Utility the setting for each installation as thus determined.

D. Allowable Motor Starting Currents.

1. The starting current drawn from the Utility's lines shall be considered the nameplate locked rotor current or that guaranteed by the manufacturer. At its option the Utility may determine the starting current by test, using a stop ammeter with not more than 15% overswing or an oscillograph, disregarding the value shown for the first 10 cycles subsequent to energizing the motor.

   If the starting current for a single motor exceeds the value stated in the following tables, reduced voltage starting or other suitable means must be employed at the Customer's expense, to limit the current to the value specified, except where specified exemptions are provided in Section D.2, 3 and 4.

Table 1 shows the standard nominal voltages of the utility for an alternating current for single-phase motors and what allowable rotor currents is. Table 2 shows alternating current for three-phase motors and what is allowable for locked rotor currents.

TABLE 1 Alternating Current – Single-phase Motors Allowable Locked Rotor Currents

Rated Size	120 Volts	240 Volts
1 hp and less	50 amperes	36 amperes
1 ½ hp		48 amperes
2 hp		60 amperes
3 hp		80 amperes
5 hp		120 amperes
7 ½ hp		170 amperes
10 hp		220 amperes

Source: City of Corona Department of Water and Power

TABLE 2 Alternating Current – Three-phase Motors Allowable Locked Rotor Currents

Rated Size	120 Volts	480 Volts	2,400 Volts
3 hp	64 amperes	32 amperes	
5 hp	92 amperes	46 amperes	
7 ½ hp	127 amperes	63 amperes	
10 hp	162 amperes	81 amperes	
15 hp	232 amperes	116 amperes	
20 hp	290 amperes	145 amperes	
25 hp	365 amperes	183 amperes	
30 hp	435 amperes	218 amperes	
40 hp	580 amperes	290 amperes	
50 hp	725 amperes	363 amperes	70 amperes
60 hp		435 amperes	87 amperes
75 hp		535 amperes	107 amperes
100 hp		725 amperes	142 amperes

Source: City of Corona Department of Water and Power

Over 100 hp – the Utility should be consulted for allowable locked rotor currents.

2. Where service conditions permit, subject to the Utility's approval, reduced- voltage starters may be omitted in the original installation until such time as the Utility may order the installation of a reduced-voltage starter to be made, and, similarly, the Utility may at any time require starting current values lower than set forth herein where conditions at any point on its system require such reduction to avoid interference with service.

3. Reduced-voltage starters may be omitted on any motor of a group installation provided that its starting current does not exceed the allowable starting current of the largest motor of the group.

4. A reduced-voltage starter may be omitted on any motor in a group installation provided that its starting current does not exceed three (3) times the maximum demand in amperes of the entire installation.

E. Interference with Service.

1. Customers who operate equipment which causes detrimental voltage fluctuations (such as, but limited to, hoists, welders, radio transmitters, X-ray apparatus, elevator motors, compressors, and furnaces) must reasonably limit such fluctuations upon request by the Utility. The Customer will be required to pay for whatever corrective measures are necessary.

2. Prior to the installation of any new arc furnace or design modification of an existing furnace, the Customer shall provide basic design information for the installation to aid the Utility in determining a method of service and the allowable level of load fluctuations.

3. Any Customer who superimposes a current of any frequency upon any part of his electrical system, other than the current supplied by the Utility shall, at his expense, prevent the transmission of such current beyond his electrical system.

F. Power Factor.

The Utility may require the Customer to provide, at his own expense, equipment to increase the operating power factor of each complete unit of neon, fluorescent, or other gaseous tube lighting equipment to not less than 90%, lagging or leading.

G. Wave Form.

The Utility may require that the wave form of current drawn by equipment of any kind be in conformity with good engineering practice.

H. Welder Service.

1. Rating of Welders. Electric welders will be rated for billing purposes as follows:

a. Generator Arc Welders. The horsepower rating of the motor driving a motor generator type arc welder will be taken as the horsepower rating of the welder.

b. Transformer Arc Welders. Nameplate maximum kVA input (at rated output amperes) will be taken as the rating of transformer type arc welders.

c. Resistance Welders. Resistance welder ratings will be determined by multiplying the welder transformer nameplate rating (at 50% duty cycle) by the appropriate factor listed below:

Resistance Welder Ratings

		Factor	
Type of Welder	Transformer Nameplate Rating @ 50% Duty Cycle	Utility-Owned Distribution Transformer	Customer- Owned Distribution Transformer
Rocker Arm, Press or Projection Spot	20 kVA or less	.60	.50
Rocker Arm or Press Spot	Over 20 kVA, incl.		
Projection Spot	21 to 75 kVA, incl.	.80	.60
Flash or Butt	100 kVa or over		
Seam or Portable Gun	All sizes		
Flash or Butt	67 to 100 kVA, incl.	*	
Project Spot	Over 75kVA		
Flash or Butt	66 kVA or less	1.20	.90

Source: City of Corona Department of Water and Power

* Each flash or butt welder in this group will be rated at 80 kVA where the distribution transformer is owned by the Utility or 60 kVA where the distribution transformer is owned by the Customer.

d. Ratings prescribed by a., b., and c., above normally will be determined from nameplate data or from data supplied by the manufacturer. If such data are not available or are believed by either the Utility or Customer to be unreliable, the rating will be determined by test.

e. If established by seals approved by the Utility, the welder rating may be limited by the sealing of taps which provide capacity greater than the selected tap and/or by the interlocking lockout of one or more welders with other welders.

f. When conversion of units is required for tariff application, one welder kVA will be taken as one horsepower for tariffs stated on a horsepower basis and one welder kVA will be taken as one kilowatt for tariffs stated on a kilowatt basis.

2. Billing of Welders. Welders will be billed at the regular rates and conditions of the tariffs on which they are served subject to the following provisions:

a. Connected Load Type of Schedule. Welder load will be included as part of the connected load with ratings as determined under section 1., above, based on maximum load that can be connected at any one time, and no allowance will be made for diversity between welders.

b. Demand Metered Type of Schedule. Where resistance welders are served on these schedules, the computation of diversified resistance welder load shall be made as follows:

Multiply the individual resistance welder ratings, as prescribed in Section 1. c. to 1.f. inclusive, above, by the following factors and add the results thus obtained:

1.0 times the rating of the largest welder
0.8 times the rating of the next largest welder
0.6 times the rating of the next largest welder
0.4 times the rating of the next largest welder
0.2 times the rating of all additional welders

If this computed diversified resistance welder load is greater than the metered demand, the diversified resistance welder load will be used in lieu of the metered demand for rate computation purposes.

Rule 3 Request for Service

A. Application for Service.

All Applicants for electric service have given implied consent to receive such service only upon agreeing to comply with the rules and regulations of the Utility.

Applicants may obtain electric service on active service connection by contacting the Utility's Billing Division by telephone or in person. If it is requested that service be turned on other than two (2) hours prior to the close of business, legal holidays excepted, a charge shall be incurred for after-hours service. The charge for the after-hours service is set forth in the Rate Schedule.

Pertinent information will be requested from the Applicant to establish credit which shall include, but not be limited to, a social security number and/or tax identification number. In lieu of providing a social security number or tax identification number, the Applicant shall pay a cash deposit equal to three (3) times the average monthly bill and sign an application form provided by the Utility in advance of receiving electric service. After the Customer has paid bills for service for twelve (12) consecutive months, without having received a delinquent notice, the deposit shall be credited towards any outstanding charges. All other deposits shall be retained by the Utility until the electric service has been terminated at the request of the Customer or by the Utility pursuant to these rules and regulations. Upon service termination, the Utility shall credit the deposit towards payment of any outstanding charges due and owing by the Customer. After the Utility has made such credit, any remaining portion shall be refunded to the Customer.

If an existing electric service connection is found to be inactive at the time of application, which may include but not limited to, damages to the connection and/or replacement of the Meter, an assessment will be made of the electric service connection and a fee shall be charged on a time and material basis to recover the cost of re-establishing the service to an active status.

A new account setup fee shall be charged to offset the cost of creating accounting and computer records, reading the Meter and/or turning on the electric service and shall be included on the first utility bill of all new accounts. The charge for the new account setup fee is set forth in the Rate Schedule.

The Application is a request for service and does not in itself bind the Utility to serve except under its filed tariff, nor does it bind the Applicant/Customer to take service for a longer period than the minimum requirements of the Rate Schedule. A contract will be required as stated in Rule 4 or in any applicable tariff.

Upon acceptance and approval of the Application, the Utility agrees to furnish and the Applicant agrees to take electric service in accordance with the Utility's applicable Tariff Schedule. These Tariff Schedules constitute the terms and conditions of the agreement between the Utility and the Applicant/Customer for public utility electric service provided, unless agreed otherwise in writing.

B. Individual Liability for Joint Service.

Two or more persons who join in one Application or contract for service shall be jointly and severally liable hereunder and shall be billed by means of a single periodic bill mailed to the person designated on the Application to receive the bill. Whether or not the Utility obtained a joint application, where two or more persons occupy the same premises, they shall be jointly and severally liable for bills for electric energy supplied.

C. Change in Customer's Equipment or Operations.

Customers shall give the Utility written notice of the extent and nature of any material change in the size, character, or extent of the utilizing equipment or operations for which the Utility is supplying service before making any such change.

D. Refusal to Provide Service.

Utility may disconnect or refuse to provide service to the Applicant if the conditions upon the Applicant's premises indicate that false, incomplete, or inaccurate information was provided to Utility or the acts of the Applicant or anyone on the premises creates an unsafe situation for Utility's employee. Utility shall provide the Applicant the reason for such refusal.

Rule 4 Contracts

Contract Requirements.

A. When Service Contracts are required.

A contract or agreement to take and pay for electric service will not be required as a condition precedent to service except:

1. Where required by provisions contained in the Tariff Schedules, in which case the term of the contract will be that specified.

2. Where it is necessary to install a line extension , in which case a contract for a period of three (3) years may be required; except that, when temporary service is to be supplied under the provisions of Rule 13, the contract will cover the period of contemplated operations, but not longer than three (3) years.

3. Where street lighting service is requested, in which case a contract will be required for a period of not less than one (1) year and not more than five (5) years.

    a. Such contracts may include a provision that they will remain in effect from year to year thereafter, until terminated by either party.

B. When Facilities Contracts are required.

A contract or agreement to pay for the use, installation, or removal of facilities including, but not limited to, line extensions, street light installations, will be required:

1. Where the provisions of the Tariff Schedules so specify, in which case the terms of the contract will be governed thereby.

2. Where any Applicant or Customer desires new or increased distribution facilities for Temporary Service, in which case the Utility shall require such person to pay to the Utility, in advance or otherwise, the estimated cost installed, plus the estimated cost of removal, less the estimated salvage of the facilities necessary for furnishing service in accordance with the provisions of Rule 13.

3. Where a person, whether or not a Customer, desires to have the Utility modify, rearrange, relocate, or remove any of its facilities, the Utility if it agrees to make such changes shall require the person, at whose request the changes are made, to agree to pay, in advance or otherwise, the cost to the Utility of making the changes.

4. Where the Applicant requests and the Applicant agrees to install electric facilities under the special provisions of a contract form on file with the Utility for installations which have been determined by the Utility to be uneconomic under its filed Rules.

Rule 5 Special Information on Forms

A. Contracts.

Each agreement or contract form for electric service or installation of facilities will contain the following provision: “This contract shall at all times be subject to such changes or modifications by the City Council of Corona as said City Council may, from time to time, direct in the exercise of its jurisdiction.”

B. Customer’s Bill.

Information required to be printed on each bill or Summary Bill for electric service shall include, but not be limited to; the billing date, due date, reading dates, Meter readings, bill amount, Customer service contact information, Customer name, service address, account number, Customer number and summary of procedures to dispute the bill.

C. Discontinuance of Service Notice.

Every Discontinuance of Service Notice for nonpayment of a delinquent domestic account, as provided for in Rule 8 shall include, but not be limited to, Customer name, service address, account number, Customer number, amount of delinquency, due date, disconnect date, and billing period of delinquency.

Rule 6 Established and Re-establishment of Service

A. Establishment of Credit - All Classes of Service.

Pertinent information will be requested from the Applicant to establish credit which shall include, but not be limited to, a social security number and/or tax identification number. In lieu of providing a social security number or tax identification number, the Applicant shall pay a cash deposit equal to three (3) times the average monthly bill and sign an Application form provided by the Utility in advance of receiving electric service.

B. Re-establishment of Credit – All Classes of Service.

If the Utility has made a service call to disconnect the service for non-payment of a delinquent bill, an additional charge shall be made to return service. Additionally, a deposit equal to three times the monthly bill shall be required.

C. Service Turn-On Charge

1. A service turn-on charge shall not be made for turning on electric service during normal working hours and for the following workday. There will be a charge for same day and after hours turn-on of service or special appointment turn-on service (the special appointment turn-on charge will apply if a specific time is requested and will not apply to the normal four hour window appointment) when specifically requested by the Customer. A service charge will be assessed for each additional field visit required to complete the service turn-on order.

    a. After hours for fee assessment purposes are legal holidays and hours outside the following time periods: 8:00 a.m. to 4:00 p.m. Monday through Friday.

2. Requests for additional services or modifications of existing services will be charged a fee for the services performed as determined by the Utility.

3. The Utility shall not be liable for any loss or damage caused by the improper installation, maintenance or malfunction of any electric apparatus or appliance, or for damage caused by turning on and off of electric service by the Utility.

Rule 7 Deposits

A. General.

Deposits will be required when a Customer is otherwise unable to satisfactorily establish or re-establish credit, as set forth in Rule 6.

B. Amount of Deposit.

The amount of deposit required to establish or re-establish credit for electric service is three times (3x) the estimated average monthly bill.

In the event that a Customer of the Utility has diverted electricity ("energy theft"), a separate deposit shall be assessed. This deposit shall be twice the amount of the estimated loss to the utility resulting from the diversion, but in no case shall the amount be less than the minimum diversion deposit.

C. Return of Deposit.

Deposits may be returned after the Customer has paid bills for service for twelve (12) consecutive months, without having received a delinquent notice. The deposit shall be credited towards any outstanding charges.

All other deposits shall be retained by the Utility until the electric service has been terminated at the request of the Customer or by the Utility pursuant to these rules and regulations. Upon service termination, the Utility shall credit the deposit towards payment of any outstanding charges due and owing by the Customer. After the Utility has made such credit, any remaining portion shall be refunded to the Customer.

Rule 8 Notices

A. Notices to Customers.

When notices from the Utility to a Customer are required, they will normally be given in writing, either mailed to the address specified in the Customer's Application for service or to any address subsequently specified by the Customer or delivered to him or her or posted in the local newspaper of record, except that in emergencies the Utility may give notices in the manner most suitable under the existing conditions (radio, television, telephone, etc.).

Where Utility service is provided to residential users through a master Meter, Utility shall make good faith efforts to inform the actual users of the Utility services when the account is in arrears. All procedures as required by law shall be exercised.

B. Notices from Customers.

Notices from a Customer to the Utility may be given by written communication mailed to the Utility's office or may be given orally by the Customer or the Customer's authorized agent at the Utility's office except when written notice is specifically required in Tariff Schedules or in any written agreement.

Rule 9 Rendering Payment of Bills

A. Rendering of Bills.

1. Billing Period. Bills for electric service will be rendered bimonthly, monthly or as otherwise provided in the Tariff Schedules. Electric Meters shall be read as nearly as possible at regular intervals. Such regular Meter readings normally shall be monthly, but may be at other intervals as established at the discretion of the Utility.

2. Metered Service.

   a. Bills for metered service will be based on Meter registrations. Meters will be read as required for the preparation of regular bills, opening bills and closing bills.

   b. If, because of unusual conditions or for reasons beyond its control, the Utility is unable to read the Meter on the scheduled reading date, the Utility may bill the Customer or those deriving the benefit of service for estimated consumption during the Billing Period, and make any necessary corrections when a reading is obtained. Estimated consumption for this purpose will be calculated considering the Customer's prior usage, the Utility's experience with other Customers of the same class in that area, and the general characteristics of the Customer's operations. Adjustments for any underestimation or overestimation of a Customer's consumption will be reflected on the first regularly scheduled bill rendered and based on an actual reading following any periods when estimation was required. When a service start date can be reliably estimated, the undercharge can be computed back to that date, exclusive of Rule 17. Access to the Meter, sufficient to permit it being read, shall be provided by the Customer as a prerequisite to the Utility making any adjustment of consumption billed on an estimated basis.

3. Un-metered Service. A flat rate may be applied upon request (in writing) where the Applicant for service has a fixed Connected Load to be operated over a fixed number of hours during a Billing Period, and where the following conditions are met:

   a. Provision has been made to prevent any additional consumption on the service.

   b. The point of interconnection of the service is approved by the Utility.

   c. Such service may be supplied under any appropriate Rate Schedule at the Utility's operating convenience and all conditions of the Rate Schedule shall apply, including the power cost adjustment.

4. Pro rata Computation. All bills for electric service rendered will be computed in accordance with the applicable thirty-day Rate Schedule, but the size of the

energy blocks and the amount of the Customer, Service, Demand or Minimum Charge specified therein will be prorated on the basis of the ratio of the number of days service has been rendered to the number of days in an average month of thirty (30) days.

B. Readings of Separate Meters Not Combined.

For the purpose of billing, each Meter upon the Customer's premises will be considered separately, and the readings of two (2) or more Meters will not be combined, except as follows:

1. Where combinations of Meter readings are specifically provided for in the Tariff Schedules.

2. Where the Utility's operating convenience requires the use of more than one Meter.

C. Payment of Bills.

Electric bills, including service and penalty charges, are due and payable upon deposit by Utility in the United States mail ("date billed"), and shall be delinquent thirty (30) calendar days after said date. Upon delinquency, the Utility shall mail a second billing in the form of a delinquent notice. A ten percent (10%) penalty shall be assessed on that bill and a date of discontinuance of electric service, forty-six (46) days after the date billed, shall be noted. Thirty nine (39) days after the date billed, a notice of shutoff of electric service shall be mailed to the billing address of the Customer. A processing charge may be assessed on that notice and a date of discontinuance of electric service shall again be noted. All delinquent accounts, with the exception of Multiple Occupancy Buildings and
Mobile Home Parks, unpaid at the close of business of the forty-fifth (45^{th}) calendar day after the date billed shall have electric service discontinued on the forty-sixth (46^{th}) day after said date without further notice. Prior to terminating electric service to Multiple Occupancy Buildings and Mobile Home Parks, all procedures as required by law will be exercised.

D. Returned Check Charge.

The Utility may require payment of a returned check charge equal to that permitted under law for any check returned from the bank unpaid, as set forth in the Corona Municipal Code, Section 3.02.040 Schedule of Fees and Service Charges. If the returned item was returned for payment on a prior 48-hour notice of disconnection, service may be terminated without further notice.

Rule 10 Disputed Bills

A. Customers who feel their bill is in error will first contact the Utility Billing Division by phone or in writing within five (5) days after receiving the bill to attempt to resolve the disputed bill. Failure to do so will authorize discontinuance of service in accordance with Rule 11.

B. If, after contact with the Utility Billing Division, the Customer believes the bill is still incorrect, the Customer must, within ten (10) days after receiving the explanation from the Utility Billing Division, send his/her remittance for the entire amount of the disputed bill along with a written statement setting forth the reasons why the Customer believes the bill is incorrect to: General Manager, City of Corona Department of Water and Power, 730 Corporation Yard Way, Corona, California 92880.

C. Failure of the Customer to file a written statement with the General Manager within ten (10) days after receipt of the explanation from the Customer Service Division will constitute acceptance by the Customer of the bill as rendered, and authorize discontinuance of service in accordance with Rule 11.

D. Upon timely receipt of the written statement, the General Manager or his designee will review the basis of the billed amount and communicate the results of the review and decision to the Customer.

E. If before completion of the General Manager's review, additional bills become due which the Customer wishes to dispute, the Customer will not be required to file the dispute with the Utility Billing Division, as stated above, but will be required to send his/her remittance for the entire amount of the additional bills disputed to: General Manager, City of Corona Department of Water & Power, 730 Corporation Yard Way, Corona, California 92880, and file additional written statements within ten (10) days after receipt of such bills setting forth the reasons why the Customer believes the additional bills are incorrect. Failure to do so will authorize discontinuance of service in accordance with Rule 11.

Rule 11 Discontinuance and Restoration of Service

A. Past Due Bills.

Electric bills, including service and penalty charges, are due and payable upon deposit by Utility in the United States mail ("date billed"), and shall be delinquent thirty (30) calendar days after said date. Upon delinquency, the Utility shall mail a second billing in the form of a delinquent notice. A ten percent (10%) penalty shall be assessed on that bill and a date of discontinuance of electric service, forty-six (46) days after the date billed, shall be noted. Thirty-nine (39) days after the date billed, a notice of shutoff of electric service will be mailed to the billing address of the Customer. A processing charge will be assessed on that notice and a date of discontinuance of electric service shall again be noted. The charge for this notice is set forth in the Schedule of User/Service Fees for Electric Usage.

B. Nonpayment of Bills.

1. All delinquent accounts, with the exception of Multiple Occupancy Buildings and Mobile Home Parks, unpaid at the close of business on the forty-fifth (45^{th}) calendar day after the date billed shall have electric service discontinued on the forty-sixth (46^{th}) day after said date without further notice. Prior to terminating electric service to Multiple Occupancy Buildings and Mobile Home Parks, all procedures as required by law will be exercised.

   Any Customer who contests a bill and has initiated a complaint or requested an investigation within five (5) days of receiving said bill shall not have service discontinued for non-payment during the pendency of an investigation by the Utility of such Customer's dispute or complaint provided the Customer also keeps current the account for Utility services as charges accrue in each subsequent billing period. Services shall not be discontinued for non-payment for any Customer complying with an amortization agreement entered into with the Utility, provided the Customer also keeps current the account for Utility services as charges accrue in each subsequent billing period. If a Customer fails to comply with an amortization agreement, the Utility will give a 7-day discontinuance of service notice before discontinuing service, but such notice shall not entitle the Customer to further investigation by Utility.

2. Utility services to a Customer will not be discontinued for non-payment when the Customer has established to the satisfaction of the Utility that such termination would be especially dangerous to the health of the Customer or a full time resident of the Customer's household. Certification from a licensed physician, public health nurse, or a social worker may be required by the Utility. The Utility

   Shall make available to Customers, upon request, information regarding agencies and/or organizations that may provide financial assistance.

3. If a Customer is receiving more than one (1) service, any or all services may be discontinued when any service, regardless of location, is discontinued for non-payment. However, residential service will not be discontinued because of non-

payment of bills for other classes of service.

4. Under no circumstances may service be discontinued for non-payment of a bill to correct previously billed incorrect charges for a period in excess of the preceding three (3) months, unless such incorrect charges have resulted from the Customer not abiding by the Tariff Schedules.

5. On any Saturday, Sunday, legal holiday recognized by the Utility, or at any time during which the business office of the Utility is not open to the public, service will not be discontinued by reason of delinquency in payment for Utility services.

C. Unsafe Equipment.

The Utility may refuse or discontinue service to a Customer if any part of the Customer's wiring or other equipment, or the use thereof, shall be determined by the Utility to be unsafe or in violation of applicable laws, ordinances, rules or regulations of public authorities, or if any condition existing upon the Customer's premises shall be thus determined to endanger the Utility's service facilities, until it shall have been put in a safe condition or the violation remedied. The Utility does not assume any responsibility for inspecting or repairing the Customer's wiring or other equipment or any part thereof and assumes no liability therefore.

D. Service Detrimental to Other Customers.

The Utility will not provide service to utilizing equipment, the operation of which will be detrimental to the service of the Utility or its other Customers, and will discontinue electric service to any Customer who shall continue to operate such equipment after having been given notice by the Utility to cease so doing.

E. Fraud.

The Utility may refuse or discontinue service if the acts of the Customer or the conditions upon the Customer's premises are such as to indicate an intent to defraud the Utility. A fee will be collected for the investigation of acts of fraud and/or diversion.

F. Failure to Establish or Re-establish Credit.

If, for an Applicant's convenience, the Utility should provide service before credit is established or should continue service to a Customer when credit has not been re-established in accordance with Rule 6, and the Customer fails to establish or re-establish credit, the Utility may discontinue service.

G. Non-compliance.

Except as otherwise specifically provided in this Rule 11, the Utility may discontinue service to a Customer for non-compliance with Tariff Schedules if, after written notice of at least five (5) days, the Customer has not complied with the notice. The Utility may dispense with the giving of such notice in the event there exists in the Utility's opinion a dangerous condition, thus rendering the immediate discontinuance of service to the premises imperative.

H. Unsafe Environment.

If the customer or anyone on the premises inflicts violence, as defined in Rule 1, or threatens with present ability to inflict violence upon an employee of the Utility or its subcontractors, the Utility may discontinue service to a customer after written notice of at least five (5) days. The discontinuance of service may be avoided if the customer agrees to meet with the General Manager and/or law enforcement and the customer agrees to cease from any act of violence.

I. Customer's Request for Service Discontinuance.

When a Customer desires to terminate responsibility for service, the Customer shall give the Utility not less than one (1) days' notice of this intention, state the date on which the Customer wishes the termination to become effective, and provide the Utility with the address to which the closing bill should be mailed. A Customer may be held responsible for all service furnished at the premises until one (1) day after receipt of such notice by the Utility or until the date of termination specified in the notice, whichever date is later.

J. Restoration - Reconnection Charge.

The Utility will require payment of a reconnection charge for each incident in which the service(s) were disconnected before restoring service that has been disconnected for non- payment of bills or for failure otherwise to comply with Tariff Schedules. If service(s) have been illegally restored or damaged due to tampering, the Customer must pay all damage charges prior to reconnection. The Customer and/or beneficiary of service are responsible for all damage charges whether or not service is reconnected.

In case the Customer places a request on a day when maximum workload has been scheduled, an additional charge will be made.

Rule 12 Rates and Optional Rates

A. Effective Rates.

The rates charged by the Utility for electric service are those on file with the Utility's General Manager and legally in effect. A copy of complete Tariff Schedules as filed with the General Manager, shall be maintained for public inspection at the office of the Utility.

B. Optional Rates.

1. Where there are two or more Rate Schedules, rates, or optional provisions applicable to the class of service requested by the Applicant, the Utility or its authorized employees will call Applicant's attention, at the time Application is made, to the several schedules, and the Applicant must designate which Rate Schedule, rate, or optional provision the Customer desires. When the Customer notifies the Utility of any material change in the size, character, or extent of utilizing equipment or operations, in accordance with Section C of Rule 3, the Utility will, within a reasonable time, advise the Customer of the resulting rate options. In the absence of the notification provided for in Section C of Rule 3, the Utility assumes no responsibility for advising the Customer of lower optional rates under other existing schedules, rates, or optional provisions available as a result of the Customer's changes in equipment or operations.

2. When an Applicant for new service has applied for service under a mutually agreed upon Rate Schedule, the Rate Schedule will remain in effect for a minimum of three (3) billing periods to determine the accuracy of the application of the rate.

C. New or Revised Rates.

Should new or revised rates be established after the time Application is made, the Utility will, within a reasonable time, use such means as may be practicable to bring them to the attention of those of its Customers who may be affected thereby.

D. Change of Rate Schedule.

1. A change to another applicable Rate Schedule, rate, or optional provision will be made only where the Customer elects to make such change, or where in the opinion of the Utility, another Rate Schedule is more applicable.

2. Should a Customer so elect, the change will be made, provided:

   a. A change has not been made effective during the past twelve-months' period; or

   b. The change is made to, or from, a new or revised Rate Schedule; or

   c. There has been a change in the Customer's operating conditions for that service which, in the opinion of the Utility, justifies the change; and

d. The change is not made more often than once in twelve (12) months where service is being supplied under a schedule containing an annual fixed charge or an annual minimum charge; and

e. The Customer has made the request by written notice to the Utility.

3. The change will become effective for the Billing Period during which the Customer has requested the change and is not subject to a retroactive adjustment, except when such change is the result of a Utility error, in accordance with Rule 17.

E. Power Cost Adjustment Factor (PCAF)

The PCAF is a charge per kWh which is used (1) to adjust the Utility's electric rates for the actual cost of purchasing and generating electric power and energy to service the Utility's Customers, and (2) to minimize fluctuations in rates.

The energy charge per kWh in each Rate Schedule recovers the costs of purchasing and delivering power and energy from all suppliers of power and energy, other suppliers, and the cost of power from the Utility's owned generating resources.

The PCAF will reflect all changes in energy costs, including the following:

1. Changes in any component of the wholesale rate.

2. Changes in transmission and wheeling payments.

3. Changes in scheduling and dispatching payments.

4. Changes in contract incremental costs.

5. Changes in economy energy purchases.

6. Changes in take-or-pay obligations.

7. Changes in cogenerated power purchases.

The PCAF as set forth in the Tariff Schedule shall be applied to kWh sold on and after the effective date, as also set forth below, and continuing thereafter until a new PCAF becomes effective. The amount to be added to or subtracted from each bill due to the

CAF shall be calculated by multiplying the number of kWh for which the bill is rendered by the applicable PCAF.

The PCAF, which may be either positive or negative, will be reviewed and revised quarterly to reflect (1) actual changes in excess of a plus or minus ten percent (10%) of the amount stated in the energy charge included in the Tariff Schedule.

The City Council shall have responsibility for establishing the PCAF and its effective date.

F. Change of Law Adjustment Factor (CLAF)

Change in Law means any change, modification, revision, or adoption of (1) any law, rule, regulation, order, writ, judgment, decree, resolution, ordinance, or other legal or regulatory determination by any court, regulatory agency or governmental authority of competent jurisdiction, or (2) any law, rule, regulation, order, writ, judgment, decree, resolution, ordinance, or other legal or regulatory determination, or interpretation thereof, which has been adopted, enacted, released or promulgated, which results in either partial or wholly new or different application of a pre-existing law. The CLAF is a charge or credit per kWh which is used to adjust the Utility's electric rates for the impact of Changes in Law that would materially change the Utility's revenue or expenses.

The CLAF as set forth in the Tariff Schedule shall be applied to each kWh sold on and after the effective date, or also set forth below, and continuing thereafter until a new CLAF becomes effective. The amount to be added to or subtracted from each bill due to the CLAF shall be calculated by multiplying the number of kWh for which the bill is rendered by the applicable CLAF.

The CLAF, which may be either positive or negative, will be reviewed and revised quarterly to reflect actual changes in excess of a plus or minus ten percent (10%) of the amount stated in the Tariff Schedule.

The City Council shall have the responsibility for establishing the CLAF and its effective date.

G. Interconnection.

Unless otherwise stated in the Rate Schedule, the Rate Schedules of the Utility are applicable only for service supplied entirely by the Utility without interconnection, except that any interconnection may be double-throw switch where necessary to meet the minimum requirements for emergencies.

H. Definitions for Rule 12.

Billing Demand: The Billing Demand shall be the kilowatts of Maximum Demand, determined to the nearest kW. The Demand Charge shall include the following billing components. The Time Related Component shall be for the kilowatts of Maximum Demand recorded during (or established for) the monthly billing period. The Facilities Related Component shall be for the greater of the kilowatts of Maximum Demand recorded during (or established for) the monthly billing period or 50% of the highest Maximum Demand established in the preceding eleven (11) months (Ratcheted Demand). However, when the Utility determines the Customer's Meter will record little or no energy use for extended periods of time or when the Customer's Meter has not recorded a Maximum Demand in the preceding eleven (11) months, the Facilities Related Component of the Demand Charge may be established at fifty percent (50%) of the Customer's Connected Load.

Excess Transformer Capacity: Excess Transformer Capacity is the amount of transformer capacity requested by a Customer in excess of that which the Utility would normally install to serve the Customer's Maximum Demand.

Holidays: Holidays are New Year's Day (January 1), Washington's Birthday (third Monday in February), Memorial Day (last Monday in May), Independence Day (July 4), Labor Day (first Monday in September), Veteran's Day (November 11), Thanksgiving Day (fourth Thursday in November), and Christmas (December 25). When any Holiday listed above falls on Sunday, the following Monday will be recognized as an off-peak period. No change will be made for Holidays falling on Saturday.

Maximum Demand: Maximum Demands shall be established for the On-Peak, Mid-Peak, and Off-Peak periods. The Maximum Demand for each period shall be the measured maximum average kilowatt input indicated or recorded by instruments, during any 15-minute metered interval, but, where applicable, not less than the diversified resistance welder load computed in accordance with the section designated Welder Service in Rule 2. Where the demand is intermittent or subject to violent fluctuations, a 5-minute interval may be used.

Power Factor Adjustment: When the Maximum Demand is expected or has exceeded 200 kW for three (3) consecutive months, kilovar metering will be installed as soon as practical, and, thereafter, until the Maximum Demand has been less than 150 kW for twelve (12) consecutive months, the billing will be increased each month for power factor for service metered and delivered at the applicable voltage level, based on the per kilovar of maximum Reactive Demand imposed on the Utility. The reactive demand will be determined as follows:

1. For Customers with metering used for billing that measures reactive demand. The maximum reactive demand shall be the highest measured maximum average kilovar demand indicated or recorded by metering during any 15-minute metered

Interval in the month. The kilovars shall be determined to the nearest unit. A device will be installed on each kilovar Meter to prevent reverse operation of the Meter.

2. For Customers with metering used for billing that measures kilovar-hours instead of reactive demand. The kilovars of reactive demand shall be calculated by multiplying the kilowatts of measured Maximum Demand by the ratio of the kilovar-hours to the kilowatt hours. Demands in kilowatts and kilovars shall be determined to the nearest unit. A ratchet device will be installed on the kilovar- hour Meter to prevent its reverse operation on leading power factors.

Summer Season: The Summer Season shall commence at 12:00 a.m. on June 1st and continue until 12:00 a.m. on October 1st of each year. A pro rata computation will be made for seasonal billing purposes.

Temporary Discontinuance Service: Where the use of energy is seasonal or intermittent, no adjustments will be made for a temporary discontinuance of service. Any Customer, prior to resuming service within twelve (12) months after such service was discontinued, will be required to pay all charges which would have been billed if service had not been discontinued.

Time Period: Time periods are defined as follows:

On-Peak:	Noon to 6:00 p.m. summer weekdays except holidays
Mid-Peak:	8:00 a.m. to Noon and 6:00 p.m. to 11:00 p.m. summer weekdays except holidays. 8:00 a.m. to 9:00 p.m. winter weekdays except holidays
Off-Peak:	All other hours.

Winter Season: The Winter Season shall commence at 12:00 a.m. on October 1st of each year and continue until 12:00 a.m. on June 1st of the following year. A pro rata computation will be made for seasonal billing purposes.

Rule 13 Temporary Service

A. Establishment of Temporary Service.

Utility shall, if no undue hardship to its existing Customers will result therefrom, furnish Temporary Service under the following conditions:

1. The Applicant shall pay, in advance or otherwise as required by Utility, the estimated cost installed, plus the estimated cost of removal, less the estimated salvage, of the facilities necessary for furnishing service.

2. The Applicant shall establish credit as required by Rule 6, except that the amount of deposit prescribed in Rule 7 shall not exceed the estimated bill for the duration of service.

B. Applicant Design.

Applicant shall design that portion of the temporary facilities in accordance with the same Applicant design provisions outlined in Rule 15.

C. Change to Permanent Status.

1. A Customer will retain temporary status as long as the Utility deems the facilities to be speculative in character, of questionable permanency, or where it is known in advance that service will be of limited duration.

2. If at any time the character of a temporary Customer's operations changes so that in the opinion of the Utility the Customer may be classified as permanent, the Customer shall be required to take permanent service.

Rule 14 Variations in the Quality or Supply of Electricity

A. Quality.

The Utility does not give any warranty, expressed or implied, as to the quality, adequacy, safety, or other characteristics of the electricity and/or electric service provided by the Utility.

B. Shortages, Brownouts, Interruptions, Spikes, Surges.

1. The Utility will exercise reasonable diligence (1) to furnish a continuous and sufficient supply of electricity to its Customers and (2) to minimize the occurrence of shortages, brownouts, interruptions, spikes, surges, or other electricity delivery problems; however, the Utility cannot and does not guarantee a continuous or sufficient supply, or freedom from such conditions which may affect the quality of the electricity provided.

2. The Utility will not be liable for variations in the quality of electricity supplied, nor for failure to supply a continuous or sufficient supply of electricity, nor will it be liable for variations in the quality of electricity supplied, nor for damage or loss occasioned by such failure to supply, or by shortages, brownouts, interruptions, spikes, surges, or other electricity delivery problems.

3. Whenever, in the operation of the Utility's electric plants, properties, and/or systems, interruption in the delivery of electricity to Customers results from or is occasioned by causes other than the exercise by the Utility of its right to suspend temporarily the delivery of electricity for the purpose of making repairs or improvements to its system, notice of any such interruption will not be given to the Customers of the Utility, but the Utility will exercise reasonable diligence to reinstate delivery of electricity.

C. Temporary Suspension for Repairs.

1. The Utility, whenever it shall find it necessary for the purpose of making repairs or improvements to its system, shall have the right to suspend temporarily the delivery of electricity. In all cases, to the extent circumstances so allow, reasonable notice will be given to the Customer. Such repairs or improvements will be made as rapidly as practicable, consistent with prudent utility practices. To the extent practicable and consistent with prudent utility practices, the Utility will minimize the inconvenience to its Customers.

2. When it is necessary to suspend temporarily the delivery of electricity for repairs or improvements to the system in accordance with Rule 14, Section C.1 above, and the Customer requests that such suspension of service occur at other than during normal Utility working hours, the Utility reserves the right to receive, in advance, the total estimated labor-related costs to be incurred by the Utility for performing the work during non-regular Utility work hours. The Customer shall also pay any additional cost actually incurred in excess of the estimated costs.

D. Apportionment of Supply During Time of Shortage.

Should a shortage of supply ever occur, the Utility will apportion its available supply of electricity among its Customers as authorized or directed by the Utility in the manner determined at the General Manager's discretion, to be equitable under prevailing conditions. The decision of the General Manager shall be final in such matters.

Rule 15 Line Extensions

APPLICABILITY: This rule is applicable to extension of electric Distribution Lines of the Utility's standard voltages (less than 34 kV) necessary to furnish permanent electric service to Applicants and will be made in accordance with the following provisions:

A. General.

1. Distribution Line Extension Basis.

a. Design. The Applicant will be responsible for planning, designing, and engineering Distribution Line Extensions using the Utility's standards for material, design, and construction.

b. Ownership. The Distribution Line Extension facilities installed under the provisions of this rule, shall be owned, operated, and maintained by the Utility, except for Substructures and enclosures that are on, under, within, or part of a building or structure.

c. Private Lines. The Utility shall not be required to serve any Applicant from Distribution Line Extension facilities that are not owned, operated, and maintained by the Utility.

2. Distribution Line Extension Locations.

a. The Utility will own, operate and maintain Distribution Line Extension facilities only:

(1) Along public streets, alleys, roads, highways and other publicly dedicated ways and places which the Utility has the legal right to occupy; and

(2) On public lands and private property across which rights-of-way and permits satisfactory to the Utility may be obtained without cost to or condemnation by the Utility.

b. Normal Route of Line. The length and normal route of a Distribution Line Extension will be determined by the Utility and considered as the distance along the shortest, most practical, available, and acceptable route which is clear of obstructions from the Utility's nearest permanent and available distribution facility to the point from which the service facilities will be connected.

3. Underground Distribution Line Extensions.

a. Underground Required. The Utility, by authority of the City Council, has declared itself an "underground" utility. Consistent with this declaration, underground Distribution Line Extensions shall be installed where required to comply with applicable laws and ordinances of the City of Corona and where the Utility maintains or desires to maintain underground distribution facilities. For example, underground Distribution Line Extensions are required for all

new: (1) Residential Subdivisions, (2) Residential Developments, (3) Commercial Developments, (4) Industrial Developments, and (5) locations that are in proximity to and visible from designated Scenic Areas. The requirements to underground lines set forth in this paragraph shall not apply where it is impractical to build underground lines, as determined by the Utility, and approved by the General Manager.

b. Underground Optional. When requested by Applicant and agreed upon by the Utility, underground Distribution Line Extensions may be installed in areas where it is not required, as provided in Section A.3.a.

4. Overhead Distribution Line Extensions. Overhead Distribution Line Extensions may be installed only where underground extensions are not required as provided in Section A.3.a.

5. Temporary Service. Facilities installed for Temporary Service or for operations of speculative character or questionable permanency shall be made in accordance with the fundamental installation and ownership provisions of this rule and the provisions of Rule 13.

6. Services. Service facilities connected to the Distribution Lines to serve an Applicant's premises will be installed, owned and maintained as provided in Rule 16.

7. Street Lights. Street lights and appurtenant facilities shall be installed in accordance with the service provisions of the applicable street light schedule.

8. Contracts. Each Applicant requesting a Distribution Line Extension may be required to execute a written contract(s), prior to performing any work on the Distribution Line Extension.

B. Installation Responsibilities.

1. Underground Distribution Line Extensions.

a. In accordance with the Utility approved design, specifications, and requirements, using Qualified Contractor's (see Section E, Applicant Installation.) Applicant is responsible for:

(1) Excavation. All necessary Trenching, backfilling, and other digging as required;

(2) Substructure and Conduits. Furnishing, installing, and upon acceptance by the Utility, conveying to the Utility ownership of all necessary installed Substructures and Conduits, including Feeder Conduits and related Substructures required to extend to and within subdivisions and developments; and

(3) Protective Structures. Furnishing, installing, and upon acceptance by the Utility, conveying to the Utility ownership of all necessary

Protective Structures.

(4) Furnishing and installing cables, switches, transformers, and other distribution facilities required to complete the Distribution Line Extension.

b. Utility Responsibility. Providing plan check review and approval and inspection service to verify Applicant's performance.

2. Overhead Distribution Line Extensions. The Applicant is responsible for furnishing and installing all facilities required for the Distribution Pole Line Extension.

C. Contributions or Advances by Applicant.

1. General. Contributions or Advances by an Applicant to the Utility for the installation of a Distribution Line Extension to receive Utility service consists of such things as cash payments, the value of facilities deeded to the Utility, and the value of Excavation performed by Applicant.

2. Project-Specific Cost Estimates. The Applicant's total estimated installed cost will be based on a project-specific estimated cost.

3. Cash Advance. A cash Advance will be required for all plan check and inspection fees to complete a Distribution Line Extension.

4. Applicant shall contribute or Advance, before the start of the Applicant's construction, the following:

a. Underground Amount. The Utility's total estimated Applicant installed cost, to complete the underground Distribution Line Extension (including transformers, and including Betterments) for:

(1) Cabling. The Utility's estimated value of any necessary Cabling (including distribution transformers, switches and other distribution facilities) installed by the Utility to complete the underground Distribution Line Extension. This includes the cost of conversion of existing single-phase lines to three-phase lines, if required; plus

(2) Substructures. The Utility's estimated value of Substructures installed by Applicant and deeded to the Utility as required.

b. Overhead Amount. The Utility's total estimated Applicant installed cost, to complete the overhead Distribution Line Extension (including distribution transformers and excluding Betterments) for:

(1) Pole Line. All necessary facilities required for an overhead Distribution Pole Line Extension and, if required, the conversion of existing single-phase lines to three-phase lines; plus

c. Other Amounts. The Utility's estimated value of Excavation, Conduits, and Protective Structures required by the Applicant for the Distribution Line Extension under Section B.1.a.

5. Joint Applicants. The total Contribution or Advance from a group of Applicants will be apportioned among the members of the group in such manner as they may mutually agree.

D. Applicant Design for New Installations.

The Distribution Line Extension shall be designed by Applicant's qualified contractor or sub-contractor in accordance with the Utility approved design and construction standards. All Applicant design work of electric facilities must be performed by or under the direction of a licensed professional engineer and all design work submitted to the Utility must be certified by an appropriately licensed professional engineer, consistent with the applicable federal, state, and local, including City of Corona, codes and ordinances. The Applicant design applies to Applicant for new service and is available for replacement, reinforcement, or relocation of existing systems. Under this installation, the following applies:

1. Applicant shall notify the Utility, in a manner acceptable to the Utility.

2. Applicant designs shall conform to all applicable federal, state and local, including City of Corona, codes and ordinances for Utility installations design (such as, but not limited to the California Business and Professions Code).

3. The Utility may require Applicant designers to meet the Utility's prequalification requirements prior to participating in Applicant design.

4. Applicant designers shall obtain Utility design and construction standards and specifications prior to performing Applicant design. The Utility may charge for any of these services.

5. The Utility will perform plan check on each Applicant design project at the expense to Applicant.

6. The Utility shall perform all the Utility's project accounting and cost estimating.

E. Applicant Installation.

1. The Distribution Line Extension shall be installed by Applicant's qualified contractor or sub-contractor in accordance with the Utility approved design and specifications. All Applicant installation work for electric facilities must be performed by a qualified Contractor and approved by the Utility consistent with the applicable federal, state, and local, including City of Corona, codes and ordinances. Under this installation, the following applies:

a. The Utility's total estimated Applicant installed project cost will apply regardless of whom Applicant selects to perform the installation.

b. Upon acceptance by the Utility, ownership of all such facilities will transfer to the Utility.

c. Applicant shall pay to the Utility any Utility costs associated with the Distribution Line Extension, including the estimated costs of design, administration, and installation of any additional facilities and labor necessary to complete the Distribution Line Extension.

d. Applicant shall pay to the Utility the cost of inspection.

f. Only duly authorized employees of the Utility are allowed to connect to, disconnect from, or perform any work upon the Utility's facilities.

2. Minimum Contractor Qualifications. Applicant's contractor or subcontractor (QC/S) shall:

a. Be licensed in California for the appropriate type of work (electrical and general, etc.).

b. Employ workmen properly qualified for specific skills required (Qualified Electrical Worker, Qualified Person, etc.) as defined in State of California High Voltage Safety Orders (Title 8, Chapter 4, Subchapter 5, Group 2).

c. Comply with applicable laws (Equal Opportunity Regulations, OSHA, EPA, etc.).

3. Other Contractor Qualifications. An Applicant for service who intends to employ a QC/S also should consider whether the QC/S:

a. Is technically competent.

b. Has access to proper equipment.

c. Demonstrates financial responsibility commensurate with the scope of the contract.

d. Has adequate insurance coverage (worker's compensation, liability, property damage, etc.).

e. Is able to furnish a surety bond for performance of the contract, if required.

F. Special Conditions.

1. Facility Relocation or Rearrangement. Any relocation or rearrangement of the Utility's existing facilities, at the request of, or to meet the convenience of an Applicant or Customer, and agreed upon by the Utility, shall be performed by the Applicant. Where new facilities can be constructed in a separate location, before abandonment or removal of any existing facilities, and Applicant requests

to perform the new construction work, it can be performed under the applicable provisions of Section E, Applicant Installation.

In all instances, the Utility shall abandon or remove its existing facilities at the option of the Utility. Applicant or Customer shall be responsible for the costs of all related relocation, rearrangement and removal work.

I. Definitions for Rule 15.

Advance: Cash payment made to the Utility prior to the initiation of any work done by the Utility.

Applicant: A person or agency requesting the Utility to deliver/supply electric service.

Betterment: Facilities installed by Applicant at the request of the Utility in addition to those required under Section B.1.a.

Cabling: Conductors (including cable-in-conduit, if used), connectors, switches, as required by the Utility for primary, secondary, and service installations.

Commercial Development: Two (2) or more enterprises engaged in trade or the furnishing of services, (e.g., shopping centers, sales enterprises, business offices, professional offices, and educational or governmental complexes) located on a single parcel or on two (2) or more contiguous parcels of land.

Conduit: Ducts, pipes or tubes of certain metals, plastics and other materials acceptable to the Utility (including pull wires and concrete encasement where required) for the installation and protection of electric wires or cables.

Contribution: In-kind services and the value of all property conveyed to the Utility at any time during the Utility's work on an extension which is part of the Utility's total estimated installed cost of its facilities, or cash payments.

Distribution Line Extension: A new distribution facility of the Utility that is a continuation of, or branches from, the nearest available existing permanent Distribution Line (including any facility rearrangements and relocations necessary to accommodate the Distribution Line Extension) to the point of connection of the last service. The Utility's Distribution Line Extension includes transmission under builds and converting an existing single-phase line to three-phase in order to furnish three-phase service to an Applicant, but excludes service transformers, Meters and services.

Distribution Lines: Overhead and underground facilities which are operated at distribution voltages, and which are designed to supply two (2) or more services.

Excavation: All necessary Trenching, backfilling, and other digging to install Distribution Line Extension facilities, including furnishing of any imported backfill material and disposal of spoil as required, surface repair and replacement, landscape repair and replacement.

Feeder Conduit: Conduit for such uses as part of a backbone system to provide for future anticipated load growth outside the subdivision involved, to provide for future anticipated load growth in the existing subdivision and the existing subdivisions in close proximity, to balance loads between substations, to interconnect the service to the subdivision with service to subsequent developments outside the subdivision, and to provide the flexibility and versatility of modifying or supplying emergency backup power to the area involved.

Industrial Development: Two (2) or more enterprises engaged in a process which creates a product or changes material into another form or product and located on a single parcel or on two (2) or more contiguous parcels of land.

Pole Line: Poles, cross-arms, insulators, conductors, switches, guy-wires, and other related equipment used in the construction of an electric overhead line.

Protective Structures: Fences, retaining walls (in lieu of grading), sound barriers, posts, or barricades and other structures as required by the Utility to protect distribution equipment.

Residential Development: Five (5) or more dwelling units in two (2) or more buildings located on a single parcel of land.

Residential Subdivision: An area of five (5) or more lots for residential dwelling units which may be identified by filed subdivision plans or an area in which a group of dwellings may be constructed about the same time, either by a builder or several builders working on a coordinated basis.

Seasonal Service: Electric service to establishments which are occupied seasonally or intermittently, such as seasonal resorts, cottages, or other part-time establishments.

Scenic Areas: An area such as a scenic highway, a state or national park or other area determined by a governmental agency to be of unusual scenic interest to the general public. Scenic highways are officially designated under the California Scenic Highway Program established pursuant to Paragraph 320 of the Public Utilities Code. State or national parks or other areas of unusual scenic interest to the general public are determined by the appropriate governmental agency. "In proximity to" shall mean within 1,000 feet from each edge of the right-of-way of designated scenic highways and from the boundaries of designated parks and scenic areas. "Visible from" shall mean that overhead distribution facilities could be seen by motorists or pedestrians traveling along scenic highways or visiting parks or scenic areas.

Substructures: The surface and subsurface structures which are necessary to contain or support the Utility's electric facilities. This includes, but is not limited to, such things as splice boxes, Pull Boxes, equipment vaults and enclosures, foundations or pads for surface-mounted equipment.

Trenching: See Excavation

Rule 16 Electric Service

APPLICABILITY: This rule is applicable to both (1) Utility Service Facilities[1] that extend from the Utility's Distribution Line facilities to the Service Delivery Point, and (2) service related equipment required of Applicant on Applicant's Premises to receive electric service.

A. General.

1. Design. The Applicant will be responsible for planning, designing, and engineering Service Extensions using the Utility approved standards for design, materials and construction in accordance with the Applicant design provisions of Rule 15.

2. Service Facilities. The Utility's Service Facilities shall consist of (a) primary or secondary underground or overhead service conductors, (b) poles to support overhead service conductors, (c) service transformers, (d) Utility-owned Metering equipment, and (e) other Utility-owned service related equipment.

3. Ownership of Facilities. Service Facilities installed under the provisions of this rule shall be owned, operated, and maintained by the Utility if they are (a) located in the street, road or a public right-of-way area, (b) installed by the Applicant under section D.2 below on Applicant's Premises for the purpose of the delivery of electric energy to Applicant, or (c) installed by Applicant under the provisions of this rule, and conveyed to the Utility.

4. Private Lines. The Utility shall not be required to connect Service Facilities to or serve any Applicant from electric facilities that are not owned, operated, and maintained by the Utility.

5. Temporary Service Facilities. Service Facilities installed for Temporary Service or for operations of speculative character or questionable permanency shall be made in accordance with the fundamental installation and ownership provisions of this rule, except that all charges and refunds shall be made under the provisions of Rule 13.

6. Street Lights. Street light services and appurtenant facilities shall be installed in accordance with the service provisions of the applicable street light schedule.

7. Contracts. Each Applicant requesting service may be required to execute a written contract(s) prior to the Applicant performing its work to establish service. Such contract(s) shall be in the form provided by the Utility or otherwise acceptable and approved by the Utility.

8. Distribution Line Extension. Whenever the Utility's Distribution System is not complete to the point designated by the Utility where the Service Extension is to be connected to the Utility's Distribution System, the extension of Distribution Line facilities will be installed by the Applicant in accordance with Rule 15.

9. Rights-of-Way. Rights-of-way or easements may be required by the Service Facilities on Applicant's property to serve only Applicant.

   a. Service Facilities. If the Service Facilities must cross property owned by a third party to serve Applicant, the Utility may, at its option, install such Service Facilities after appropriate rights-of-way or easements, satisfactory to the Utility, are obtained without cost to the Utility; or

   b. Distribution Line Extensions. If the Utility's facilities installed on Applicant's property, or third-party property, will be or are designed to serve adjacent property, then the Utility may, at its option, install its facilities under Rule 15, after appropriate rights-of-way or easements, satisfactory to the Utility, are obtained without cost to the Utility.

   c. Clearances. Any necessary rights-of-way or easements for the Utility's facilities shall have provisions to maintain legal clearances from adjacent structures.

   d. The Customer shall exercise reasonable care to prevent the facilities of the Utility upon the premises from being damaged or destroyed, and shall not relocate or otherwise interfere with them and if, any defect is discovered, shall promptly notify the Utility.

10. Access to Applicant's Premises. The Utility shall, at all times, have the right to enter and leave Applicant's Premises for any purpose connected with the furnishing of electric service (Meter reading, inspection, testing, routine repairs, replacement, maintenance, emergency work, etc.) and the exercise of any and all rights secured to it by law, or under the Utility's Tariff Schedules. These rights include, but are not limited to:

   a. The use of a Utility-approved locking device, if Applicant desires to prevent unauthorized access to the Utility's facilities;

   b. Safe and ready access for Utility personnel free from unrestrained animals;

   c. Unobstructed ready access for the Utility's vehicles and equipment to install, remove, repair, or maintain its facilities;

   d. Removal of any and all of its property installed on Applicant's Premises after the termination of service.

11. Service Connections. Only personnel duly authorized by the Utility are allowed to connect or disconnect service conductors to or from the Utility's Distribution Lines, remove Meters unless otherwise allowed pursuant to Utility Tariff Schedules, remove Utility-owned Service Facilities, or perform any work upon Utility-owned existing facilities.

12. Due to the long lead time for engineering, material acquisition, crew scheduling and construction, application for service must be made as far in advance as

possible. After receipt of fees, service charges and deposits and clearance from the inspection agency having jurisdiction, the Utility shall endeavor to complete within a reasonable time the inspection and approval of the necessary facilities installed by the Applicant. However, the Utility shall not be liable for any delays encountered in completing the installed facilities.

13. If, for any reason of the Applicant, installation of a service cannot be accomplished during standard working hours, the Applicant shall pay in advance the estimated cost of the Utility overtime, to the extent that it exceeds any costs included in other Applicant charges.

14. The Applicant shall be obligated to provide facilities adequate to serve only the load initially specified and connected, regardless of the rating of the service equipment, service switch or breaker. Increased loads will be considered as new installations and the Customer shall pay the net cost of any changes required in the Utility facilities in accordance with and may be required to make specified changes in the services facilities or equipment to accommodate the increased load or the type of service to be supplied by the Utility.

B. Metering Facilities.

1. General.

a. Meter All Usage. Delivery of all electric power and energy will be metered, unless otherwise provided for by the Utility's Tariff Schedules or by other applicable laws.

b. Meter Location. All Meters and associated metering equipment shall be located at some protected location on Applicant's Premises as approved by the Utility.

2. Number of Meters. Normally only one Meter will be installed for a single-family residence or a single non-residential enterprise on a single Premises, except:

a. When otherwise required or allowed under the Utility's Tariff Schedules.

b. At the option of and as determined by the Utility, for its operating convenience, consistent with its engineering design; or

c. When required by law or local ordinance;

d. When additional services are granted by the Utility.

A single Meter is required for each single enterprise operating in one building or group of buildings or other development on a single Premises such as, but not limited to, a commercial business, school campus, industrial manufacturer, or recreational vehicle park, unless otherwise approved by the Utility.

3. Multiple Occupancy. In a building with two or more tenants, or where more than

one Meter is furnished on the same Premises, the Meters normally shall be grouped at one central location, or as otherwise specified by the Utility, and each Meter position or socket shall be clearly and permanently marked by Applicant, Customer, or owner of the Premises to indicate the particular unit, occupancy, or load supplied by it.

a. Residential. For revenue billing, electric service shall be individually metered to every Residential Unit in a residential building or group of buildings or other development with multiple tenants such as, but not limited to, apartment buildings, mobile home parks, etc., except as may be specified in Rule 18 and applicable Rate Schedules.

b. Non-residential. For revenue billing, electric service shall be individually metered to each tenant in a non-residential building or group of buildings or other development on a single Premises with multiple tenants or enterprises (such as, but not limited to, an office building or shopping center complex). Alternative metering arrangements as determined by the Utility may be allowed only as specified in Rule 18 and applicable Rate Schedules.

C. Service Extensions.

1. General Location. The location of the Service Extension shall extend:

a. Public Right-of-way Area: From the point of connection at the Distribution Line to Applicant's nearest property line abutting upon any street, highway, road, or right-of-way, along which it already has, or will install distribution facilities; and

b. Private Party: On private property, along the shortest, most practical and available route (clear of obstructions) as necessary to reach a Service Delivery Point designated by the Utility.

2. Number of Service Extensions. The Utility will not normally provide more than one Service Extension, including associated facilities, either overhead or underground for any one building or group of buildings, for a single enterprise on a single Premises, except:

a. Tariff Schedules. Where otherwise allowed or required under the Utility's Tariff Schedules; or

b. Utility Convenience. At the option of and as determined by the Utility, for its operating convenience, consistent with its engineering design for different voltage and phase classification, or when replacing an existing service; or

c. Ordinance. Where required by City of Corona ordinance or other applicable law, for such things as fire pumps, fire alarm systems, etc.

d. Other. The Utility may charge for additional services provided under this

paragraph, as Special or Added Facilities.

3. Underground Installations. Underground Service Extensions will be installed:

a. Underground Required. Underground Service Extensions (1) shall be installed where required to comply with applicable Tariff Schedules, laws, City of Corona ordinances, or similar requirements of governmental authorities having jurisdiction, and (2) may be necessary as determined by the Utility where Applicant's load requires a separate transformer installation of 300 kVa or greater.

b. Underground Optional. An underground Service Extension may be installed in an area where it is not otherwise required and when requested by Applicant and agreed upon by the Utility.

4. Overhead Installations. Overhead Service Extensions are permitted except under the circumstances specified in Section C.3.a above.

5. Unusual Site Conditions. In cases where Applicant's building is located a considerable distance from the available Distribution Line or where there is an obstruction or other deterrent obstacle or hazard such as plowed land, ditches, or inaccessible security areas between the Utility's Distribution Line and Applicant's building or facility to be served that would prevent the Utility from prudently installing, owning, and maintaining its Service Facilities, the Utility may at its discretion, waive the normal Service Delivery Point location. In such cases, the Service Delivery Point will be at such other location on Applicant's property as may be mutually agreed upon; or, alternatively, the Service Delivery Point may be located at or near Applicant's property line as close as practical to the available Distribution Line.

D. Responsibilities for New Service Extensions.

1. Applicant Responsibility. In accordance with the Utility's design, specifications, and requirements for the installation of Service Extensions, subject to the Utility's inspection and approval, Applicant is responsible for:

a. Service Extensions.

(1) Clear Route. Providing (or paying for) a route on any private property that is clear of obstructions which would inhibit the construction of either underground or overhead Service Extensions.

(2) Excavation. All necessary Trenching, backfilling, and other digging as required including permit fees.

(3) Conduit and Substructures.

(a) Furnishing, installing, owning, and maintaining all Conduits

(including pull ropes) and Substructures on Applicant's Premises.

(b) Installing (or paying for) any Conduits and Substructures in Utility's Franchise Area (or rights-of-way, if applicable) as necessary to install the Service Extension.

(c) Conveying ownership to the Utility upon its acceptance of those Conduits and Substructures not on Applicant's Premises.

(4) Protective Structures. Furnishing, installing, owning, and maintaining all necessary Protective Structures as specified by the Utility for Utility's facilities on Applicant's Premises.

(5) Furnishing and installing all cables, transformers, and electrical apparatus and terminating all required components to provide a complete, safe and reliable electrical service extension.

b. Applicant's Facility Design and Operation. Applicant shall be solely responsible to plan, design, install, own, maintain, and operate facilities and equipment beyond the Service Delivery Point (except for Utility- owned metering facilities) in order to properly receive and utilize the type of electric service available from the Utility. Refer to Rule 2 for a description, among other things, of:

(1) Available service delivery voltages and the technical requirements and conditions to qualify for them;

(2) Customer utilization voltages;

(3) Load balancing requirements;

(4) Requirements for installing electrical protective devices;

(5) Loads that may cause service interference to others; and

(6) Motor starting limitations.

c. Required Service Equipment. Applicant shall, at its sole liability, risk, and expense, be responsible to furnish, install, own, maintain, inspect, and keep in good and safe condition, all facilities of any kind or character on Applicant's Premises that are not the responsibility of the Utility but are required by the Utility for Applicant to receive service. Such facilities shall include but are not limited to the overhead or underground termination equipment, Conduits, service entrance conductors from the Service Delivery Point to the location of the Utility's metering facilities, connectors, Meter sockets, Meter and instrument transformer housing, service switches, circuit breakers, fuses, relays, wire ways, metered conductors, machinery and apparatus of any kind

or character. Detailed information on the Utility's service equipment requirements will be furnished by the Utility.

d. Coordination of Electrical Protective Devices. When, as determined by the Utility, Applicant's load is of sufficient size as to require coordination of response time characteristics between Applicant's electrical protective devices (circuit breakers, fuses, relays, etc.) and those of the Utility, it shall be Applicant's responsibility to provide such coordination in accordance with Rule 2.

e. Liability. The Utility shall incur no liability whatsoever, for any damage, loss or injury occasioned by:

(1) Applicant-owned equipment or Applicant's transmission and delivery of energy; or

(2) The negligence, omission of proper protective devices, want of proper care, or wrongful act of Applicant, or any agents, employees, or licensees of Applicant, on the part of Applicant in installing, maintaining, using, operating, or interfering with any such conductors, lines, machinery, or apparatus.

f. Facility Tampering. Applicant shall provide a suitable means acceptable to the Utility for placing its seals on Meter rings and covers of service enclosures and instrument transformer enclosures which protect unmetered energized conductors installed by Applicant. All Utility-owned Meters and enclosure covers will be sealed only by the Utility's authorized employees and such seals shall be broken only by the Utility's authorized employees. However, in an emergency, the Utility may allow a public authority or other appropriate party to break the seal. Any unauthorized tampering with Utility-owned seals or connection of Applicant-owned facilities to unmetered conductors at any time is prohibited and is subject to the provisions of Rule 11 for Unauthorized Use.

g. Transformer Installations on Applicant's Premises. Transformer installations on Applicant's Premises shall be as specified by the Utility and in accordance with the following applicable provisions:

(1) Space for Transformers. Applicant shall provide space on Applicant's Premises at a location approved by the Utility for a standard transformer installation including any necessary switches, capacitors, and electric protective equipment where required if (a) in an overhead area, the Utility determines that the load to be served is such that a separate transformer installation, or (b) if the Utility determines that the installation of a pad mounted or subsurface transformer of any size is required on Applicant's Premises to serve only Applicant.

(2) Pad Mounted Equipment. In the Applicant's standard installation,

Applicant shall furnish, install, own, and maintain, at its expense, Substructures and any required Protective Structures as specified by the Utility for the proper installation of the transformer, switches, capacitors, etc., as determined by the Utility.

(3) Single Utility-Owned Customer Substation. When the Utility elects for its operating convenience to supply Applicant from a transmission line and install a Utility-owned substation on Applicant's Premises, Applicant shall furnish, install, own and maintain at its expense the necessary site improvements as specified by the Utility for the proper installation of the transformer. Such improvements shall include but are not limited to a concrete pad or foundation, grounding system, fences and gates, access road, grading, and paving as required, etc. Detailed information on the Utility's requirements for a single Customer substation will be furnished by the Utility.

(4) Transformer Room or Vault. Where Applicant requests and the Utility approves the installation of the transformer(s) in a vault or room on Applicant's Premises, rather than the Utility's standard pad mounted installation:

(a) The room or vault on Applicant's Premises shall be furnished, installed, owned, and maintained by Applicant and shall meet the Utility's specifications for such things as access, ventilation, drainage, grounding system, etc.

(b) If space cannot be provided on Applicant's Premises for the installation of a transformer on either a pad or in a room or vault, a vault will be installed at Applicant's expense in the street near the property line. It shall be Applicant's responsibility to install (or pay for) such vault if not restricted by governmental authority having jurisdiction, and Applicant shall convey ownership of the vault to the Utility upon its acceptance. The additional facilities shall be treated as Special or Added Facilities under the provisions of Rule 2.

(c) If the Applicant's installed cost for the transformer in the room or vault is more costly than the standard pad mounted transformer installation, the additional costs shall be paid by Applicant.

(5) Transformer Lifting Requirements. Where the Applicant has installed or agrees to install, transformers at locations where the Applicant cannot use its standard transformer lifting equipment and special lifting facilities are required to install or remove the transformers on Applicant's Premises, Applicant shall, at its expense, (a) furnish, install, own, and maintain permanent lifting facilities and be responsible for lifting the transformer to and from its permanent position, or (b)

provide (or pay for) portable lifting facilities acceptable to the Utility for installing or removing the transformers. Rights-of-way and space provisions shall be provided by Applicant such that access and required clearances from adjacent structures can be maintained.

(6) Overhead Transformers. In remote areas or in areas not zoned for residential or commercial use or for underground services, pad mounted transformers are preferred for installation on Applicant's Premises; however, where the Utility determines that it is not practical to install a transformer on a pad, in a room or vault, the Applicant may furnish a pole-type structure for an installation not exceeding 500 kVA.

h. Building Code Requirements. Any service equipment and other related equipment owned by Applicant, as well as any vault, room, enclosure, or lifting facilities for the installation of transformers shall conform with applicable laws, codes, and ordinances of all governmental authorities having jurisdiction.

i. Reasonable Care. Applicant shall exercise reasonable care to prevent the Utility's Service Extension, other Utility facilities, and Meters owned by the Utility or others on the Applicant's Premises from being damaged or destroyed, and shall refrain from interfering with the Utility's operation of the facilities and shall notify the Utility of any obvious defect. Applicant may be required to provide and install suitable mechanical protection (barrier posts, etc.) as required by the Utility.

2. Utility Responsibility.

a. Service, Meter and Transformers. The Utility will operate, own, and maintain the following Service Facilities as applicable after Applicant meets all requirements to receive service:

(1) Underground Service. A set of service conductors to supply Permanent Service from the Distribution Line source to the Service Delivery Point approved by the Utility.

(2) Riser Materials. Any necessary pole riser material for connecting underground services to an overhead Distribution Line.

(3) Overhead Service. A set of overhead service conductors and support poles to supply permanent service from a Distribution Line source to a suitable support at the Service Delivery Point approved by the Utility. Such support shall be of a type and located such that service wires may be installed in accordance with good engineering practice and in compliance with all applicable laws, ordinances, rules, and regulations including those governing clearances and points of attachment.

(4) Metering. When the Meter is owned by the Utility, the Utility will be responsible for the necessary instrument transformers where

required, test facilities, Meters, associated metering equipment, and the metering enclosures when the Utility elects to locate metering equipment at a point that is not accessible to Applicant.

(5) Transformer. The transformer where required, including any necessary switches, capacitors, electrical protective equipment, etc. When either a pad mounted or overhead transformer is installed on Applicant's Premises, the Service Extension shall include the primary conductors from the connection point at the distribution supply line to the transformer and the secondary conductors, if any, from the transformer to the Service Delivery Point.

b. Special Conduit Installations. The Utility shall own and maintain service Conduits only if: (1) they are located in the same trench with distribution facilities, and (2) when it is necessary to locate Conduits on property other than that owned by Applicant, as determined by the Utility, or as may be required by local authorities.

c. Government Inspection. The Utility will establish electric service to Applicant following notice from the governmental authority having jurisdiction that the Applicant-owned facilities have been installed and inspected in accordance with any applicable laws, codes, ordinances, rules, or regulations, and are safe to energize.

d. Applicant-Performed Work. The Applicant shall install that portion of the new Service Extension in accordance with the same provisions outlined in Rule 15.

E. Payments by Applicant.

1. Payments. Applicant is responsible to pay the Utility the following costs as applicable under this rule and in advance of the Applicant commencing its work:

a. All Plan Check Fees.

b. All Inspection Fees.

c. All Temporary Power Fees.

F. Existing Service Facilities.

1. Service Reinforcement.

a. Utility Owned. When the Utility determines that its existing Service Facilities require replacement, the existing Service Facilities shall be

replaced as a new Service Extension under the provisions of this rule.

b. Applicant-Owned. When the Utility determines that existing Applicant-owned Service Facilities (installed under a prior rule) require replacement, such replacement shall be accomplished under the provisions for a new Service Extension, except that if the Utility determines that any portion of Applicant's existing service conductors can be utilized by the Utility, Applicant will convey any such usable part to the Utility.

Applicant will replace or reinforce that portion of the Service Extension which Applicant will continue to own under the provisions of this rule for new services.

2. Service Relocation or Rearrangement.

a. Utility Convenience. When, in the judgment of the Utility, the relocation or rearrangement of a service, including Utility-owned transformers, is necessary for the maintenance of adequate service or for the operating convenience of the Utility, the Utility normally will perform such work at its own expense, except as provided in Sections F.2.b. and F.5.

b. Applicant Convenience. Any relocation or rearrangement of the Utility's existing Service Facilities at the request of Applicant (aesthetics, building additions, remodeling, etc.) and agreed upon by the Utility shall be performed in accordance with Section D above except that Applicant shall pay the Utility its total estimated costs.

In all instances, the Utility shall abandon or remove its existing facilities, at the option of the Utility, rendered idle by the relocation or rearrangement.

3. Impaired Access and Clearances. Whenever the Utility determines that:

a. Access. Its existing Service Facilities have become inaccessible for inspecting, operating, maintenance, Meter reading, or testing; or

b. Clearances. A hazardous condition exists or any of the required clearances between the existing Service Facilities and any object becomes impaired under any applicable laws, ordinances, Rules, or regulations of the Utility or other public authorities, then the following applies.

c. Corrective Action. Applicant or owner shall, at Applicant's or owner's expense, either correct the access or clearance infractions to relocate its facilities to a new location which is acceptable to the Utility. Applicant or owner shall also be responsible for the expense to relocate any equipment which Applicant owns and maintains. Failure to comply with corrective measures within a reasonable time may result in discontinuance of service.

4. Overhead to Underground Service Conversions.

a. Where an existing overhead Distribution Line is replaced by an underground Distribution System, new underground services will be installed under Rule 16.

b. Applicant Convenience Where overhead services are replaced by underground services for Applicant's convenience, Applicant shall perform all Excavation, furnish and install all Substructures, and pay the total cost to complete the new service and remove the overhead facilities.

5. Damaged Facilities. When the Utility's facilities are damaged by others, the repair will be made by the Utility at the expense of the party responsible for the damage. Applicants are responsible for repairing their own facilities.

6. Subdivision of Premises. When the Utility's Service Facilities are located on private property and such private property is subsequently subdivided into separate Premises with ownership divested to other than Applicant or Customer, the subdivider is required to provide the Utility with adequate rights-of-way satisfactory to the Utility for its existing facilities and to notify property owners of the subdivided Premises of the existence of the rights-of-way.

When adequate rights-of-way are not granted as a result of the property subdivision, the Utility shall have the right, upon written notice to Applicant, to discontinue service without obligation or liability. The existing owner, Applicant, or Customer shall pay to the Utility the total estimated cost of any required relocation or removal of the Utility's facilities. A new electric service will be re- established in accordance with the provisions of Section D above for new service and the provisions of any other applicable Utility Rules.

G. Definitions for Rule 16.

Applicant: A person or agency requesting the Utility to supply electric service.

Customer: The person in whose name service is rendered as evidenced by the signature on the Application, contract, or agreement for that service or, in the absence of a signed instrument, by the receipt and payment of bills or Summary Bills regularly issued in his or her name regardless of the identity of the actual user of the service. A Customer may also be a party with whom the Utility is doing business with or without a billing relationship.

Conduit: Ducts, pipes, or tubes of certain metals, plastics or other materials acceptable to the Utility (including pull wires and concrete encasement where required) for the installation and protection of electric wires and cables.

Distribution Lines: The Utility's overhead and underground facilities which are operated at distribution voltages as set forth in the Utility's Rule 2 and which are designed to supply two (2) or more services.

Excavation: All necessary Trenching, backfilling, and other digging as required to install Service Extensions including furnishing of any imported backfill material, concrete encasement to protect conduit, and disposal of spoil as required, surface repair and replacement, landscape repair and replacement.

Meter: The instrument used for measuring the electricity delivered to the Customer.

Permanent Service: Service which, in the opinion of the Utility, is of a permanent and established character. This may be continuous, intermittent, or seasonal in nature.

Premises: All of the real property and apparatus employed in a single enterprise on an integral parcel of land undivided, excepting in the case of industrial, agricultural, oil field, resort enterprises, and public or quasi-public institutions, by a dedicated street, highway or public thoroughfare or a railway. Automobile parking lots constituting a part of and adjacent to a single enterprise may be separated by an alley from the remainder of the Premises served.

Protective Structures: Fences, retaining walls (in lieu of grading), sound barriers, posts, barricades and other structures as required by the Utility.

Residential Unit: A residential dwelling unit consisting of a room or group of rooms which do not qualify as single-family dwellings. Residential units may be used as permanent primary dwellings, as transient tenant accommodations, and by organizations or groups of persons. When such unit is used by a transient tenant, an organization, or a group of persons, use shall be non-domestic service.

Service Delivery Point: Where the Utility's Service Facilities are connected to either Applicant's conductors or other service termination facility designated and approved by the Utility.

Service Extension: The overhead and underground primary or secondary facilities (including, but not limited to Utility-owned Service Facilities and Applicant-owned service facilities) extending from the point of connection at the Distribution Line to the Service Delivery Point. When an underground Service Extension is supplied from a Utility-designated overhead pole, the beginning point of connection to the Utility's Distribution Line shall be where the Service Extension is connected to the Utility's overhead Distribution Line conductors.

Substructures: The surface and subsurface structures which are necessary to contain or support the Utility's electric facilities. This includes but is not limited to splice boxes, Pull Boxes, equipment vaults and enclosures, foundations or pads for surface-mounted equipment.

Temporary Service: Service for enterprises or activities which are temporary in character or where it is known in advance that service will be of limited duration. Service, which in the opinion of the Utility, is for operations of a speculative character or the permanency of which has not been established, also is considered Temporary Service.

Trenching: See Excavation.

Rule 17 Adjustment of Bills and Meter Tests

A. General.

Estimated Usage: When regular, accurate Meter readings are not available or the electric usage has not been accurately measured, Utility may estimate the Customer's energy usage for billing purposes on the basis of information including, but not limited to, the physical condition of the metering equipment, available Meter readings, records of historical use, and the general characteristics of the Customer's load and operation.

B. Meter Tests.

1. Prior to Installation. Every Meter will be tested at or prior to the time of installation, and no Meter will be placed in service if found to register more than one percent (1%) fast or one percent (1%) slow.

2. On Customer Request. A Customer may, on notice of not less than one week, require the Utility to test the Meter for the Customer's service.

   No charge will be made for such test, but should a Customer demand a test within four (4) months after installation or more often than once in six (6) months, a deposit will be required to cover the cost of the test. This deposit will be returned if the Meter is found to register more than two percent (2%) fast or two percent (2%) slow. The amount of the deposit will be dependent on the type of Meter to be tested.

   A Customer shall have the right to require the Utility to conduct the test in the Customer's presence or in the presence of an expert or other representative appointed by the Customer. The results of the test will be furnished to the Customer within a reasonable time after completion of the test.

C. Adjustment of Bills for Meter Error.

A Meter Error is incorrect kilowatt-hour, kilovar-hour, or demand registration resulting from a malfunctioning or defective Meter. It does not include Billing Error, Unauthorized Use, or an error in registration caused by Meter tampering by an unauthorized person. It also does not include conditions such as grounds, shorts, incorrect Meter readings, Meter dial-overs, improper load wiring (including other Customers' circuits connected to the wiring), accounting errors, switched Meters, improper Customer wiring, blown fuse in one energized conductor, or incorrect Meter sizing.

Where, as the result of a Meter test, a Meter is found to be non-registering or incorrectly registering, Utility may render an adjusted bill to the Customer for the amount of the undercharge, and shall issue a refund or credit to the Customer for the amount of the overcharge, computed back to the date that Utility determines the Meter Error commenced, except that the period of adjustment shall not exceed three (3) years. Such adjusted bill shall be computed in accordance with the following:

1. Fast Meters. When any Meter is tested and found to be registering more than two percent (2%) fast, the Utility will refund to the Customer the amount of the

overcharge, based on corrected Meter readings or Utility's estimate of the energy usage either for the known period of Meter Error or, if the period of error is not known, for the period during which the Meter was in use, not to exceed three (3) months.

2. Slow Meters. If a Meter for residential service is found to be registering more than twenty-five percent (25%) slow, or any Meter for other class of service is found to be registering more than two percent (2%) slow, Utility may bill the Customer for the amount of the undercharge based on corrected Meter readings or Utility estimate of the energy usage either for the known period of Meter Error or, if the period of Meter Error is not known for the period the Meter was in use, not exceeding three (3) months in the case of a residential service to a Utility-metered Single-Family Dwelling or Accommodation as defined in Rule 1 and three (3) years for all other services.

3. Non-registering Meters. When any Meter is tested and found to be non-registering, the Utility may bill the Customer for the estimate of electricity consumed but not registered, not exceeding three (3) months in the case of residential service to a Utility-metered Single-Family Dwelling or Accommodation as defined in Rule 1 and three (3) years for all other service. Bills for this purpose will be estimated by the Utility.

D. Adjustment of Bills for Billing Error.

A Billing Error is an error by Utility which results in incorrect billing charges to the Customer. Billing Errors may include incorrect Meter reads or clerical errors by a Utility representative such as applying the wrong rate, wrong billing factor, or an incorrect calculation. Billing Error does not include a Meter Error or Unauthorized Use, nor any error in billing resulting from Meter dial over caused by other than Utility; switched or mismarked Meters by other than Utility; improper Customer wiring; blown fuse in one energized conductor; inaccessible Meter; failure of the Customer to notify Utility of changes in the Customer's equipment or operation; or failure of the Customer to take advantage of a rate or condition of service or which the Customer is eligible.

Where Utility overcharges or undercharges a Customer as the result of a Billing Error, Utility may render an adjusted bill for the amount of the undercharge, and shall issue a refund or credit to the Customer for the amount of the overcharge for the period of the billing error, but not exceeding three (3) years in the case of an overcharge, and, in the

case of an undercharge, not exceeding three (3) months for residential service to a Utility- metered Single-Family Dwelling or Accommodation as defined in Rule 1 and three (3) years for all other service.

1. The Utility is authorized to refund a credit balance.

E. Adjustment of Bills for Unauthorized Use.

Unauthorized Use is the use of energy in noncompliance with Utility's tariffs or applicable law. It includes, but is not limited to Meter tampering, unauthorized

connection or reconnection, theft, fraud, intentional use of energy whereby Utility is denied full compensation for electric service provided.

Where the Utility determines that there has been Unauthorized Use of electric service, Utility may bill the Customer for Utility's estimate of such Unauthorized Use. However, such estimated bill shall indicate Unauthorized Use for the most recent three (3) years and, separately, Unauthorized Use beyond the three-year period for collection as provided by law.

Nothing in this Rule shall be interpreted as limiting Utility's rights under any provision of any applicable law.

1. Actual Usage.

   If accurate Meter readings from a remote check Meter are available for the Unauthorized Use period, they will be used for billing purposes.

2. Estimated Usage.

   If the electric usage has not been accurately measured, Utility may estimate the energy usage for billing purposes. The basis for the estimate may include, without limitation, the physical condition of the Metering equipment, available Meter readings, records of historical use, or the general characteristics of the load and operation of the Customer or person being billed, with consideration of any appropriate seasonal adjustment.

   Estimated bills for the Unauthorized Use period may be determined by Utility based on one or more of the following, without limitation:

   a. Accurately-metered use from a remote check Meter during the Unauthorized Use period;

   b. The known percent error in metering attributable to the Unauthorized Use;

   c. Accurately-metered use prior to the onset of the Unauthorized Use;

d. The equipment and hours of operation of the Customer or person being billed;

e. Accurately-measured subsequent use of thirty (30) days or more (if available);

f. Annual use profile of at least five (5) Customers with similar Connected Load, Premises load profiles, hours or energy use, etc. (percent of annual use); or

g. Other reasonable and supportable billing methodology when none of the aforementioned billing techniques are appropriate under the circumstances.

3. Recovery of Associated Costs.

Utility may recover from the Customer the associated costs resulting from the Unauthorized Use including both investigative and equipment damage costs. Investigative costs include time and material spent for investigation, bookkeeping, film and film development, and other costs of gathering evidence. Equipment damage costs include the cost of replacing the Utility-owned equipment damaged by the Customer.

4. Discontinuance of Service.

In accordance with the provisions of Rule 11, where Utility determines Unauthorized Use is occurring, Utility may refuse or discontinue service without further notice.

If any part of the Customer's wiring or any other equipment, or the use thereof, is determined by Utility or any other authorized public agency to be unsafe or in violation of applicable laws, ordinances, rules or regulations of public authorities, or is in such condition as to endanger Utility Service Facilities, Utility may discontinue service without further notice.

Utility may also discontinue service in accordance with the provisions of its tariffs, for nonpayment of a delinquent billing for Unauthorized Use and for associated costs, including nonpayment under an amortization agreement.

F. Limitation on Adjustment of Bills for Energy Use.

For any error in billing not defined as Billing Error, Meter Error, or Unauthorized Use, Utility is not required to adjust the bill. However, any billing adjustment not specifically covered in the tariffs for an undercharge or overcharge shall not exceed three (3) years.

Rule 18 Supply to Premises and Resale

A. Separate Metering.

Separate Premises will not be supplied through the same Meter, nor will the electric loads of such separately metered Premises be aggregated physically, electronically or otherwise except as may be specifically provided for in the Rate Schedule.

B. Other Uses or Premises.

A Customer shall not use electricity received from the Utility upon other Premises, except for Utility's operating convenience, nor for other purposes than those specified in the Customer's Application or in the Rate Schedule applied.

C. Customer with Multiple Service Accounts/Meters at a Single Premises.

When a Customer (single enterprise) occupies a single Premises with multiple service accounts/Meters, the readings of such Meters shall not be combined for billing purposes except as provided for in Rule 9. However, if the Customer physically aggregates the electric loads of such multiple service accounts/Meters into a single service account (master-Meter), the account will be provided service under an applicable Rate Schedule.

D. Use by Others.

A Customer shall not charge for electricity received from the Utility and used by any other person, except:

1. Where the charge to tenants is absorbed in the rental for the premises of space occupied; or

2. Where the charge to domestic or non-domestic tenants is absorbed in the rental for the Premises or space occupied, is not separately identified, and does not vary with electrical usage;

3. Where the Customer is the owner, lessee, or operator of a multifamily accommodation and electricity is submetered and resold to tenants at the same rates that the Utility would charge for the service if supplied directly. In such cases, the owner, lessee, or operator shall furnish, install, maintain, and test the submeters. This electrical usage applies only to the single-family dwelling and excludes other electrical usage, such as swimming pools, recreation rooms, or laundry facilities which are used in common by tenants; or

4. As provided in Section E below.

All energy use, including use by others, supplied through a single Utility Meter is the responsibility of the Customer of record.

E. Resale of Electricity.

Resale of electricity or submetering of electricity for the purpose of resale is prohibited, except as provided for under Section D.3 above.

Violation of any provision of this Rule shall result in discontinuance of electricity or refusal to provide service, in accordance with Rule 11.

APPENDIX E: Unit Costs

CDWP Unit Costs

Voltage Regulation at WDAT		Cost
Install three, 200A voltage regulators on Circuit 1	$	150,000
Install three, 300A voltage regulators on Circuit 1	$	150,000

Transformer Replacement (includes fuse replacement)		Cost
Replace one 25 kVA transformer with 50 kVA transformer	$	6,000
Replace one 25 kVA transformer with 75 kVA transformer	$	6,500
Replace one 50 kVA transformer with 75 kVA transformer	$	7,000
Replace one 50 kVA transformer with 100 kVA transformer	$	7,500
Replace one 75 kVA transformer with 100 kVA transformer	$	8,000
Replace one 50 kVA transformer with 167 kVA transformer	$	8,500
Replace one 75 kVA transformer with 167 kVA transformer	$	8,500
Replace one 100 kVA transformer with 167 kVA transformer	$	8,500

Conductor Replacement (in 3" conduits)		Per Foot
Replace 1Ø, 1/0 Al UG (3 conductor) with 1Ø, 4/0 Al UG (3 conductor)	$	5
Replace 1Ø, 350 MCM Al UG (3 conductor) with 1Ø, 500 MCM Al UG (3 conductor)	$	9

Fuse Replacement		Cost
Replace three S&C 80E fuses with three S&C 125E fuses (PME 1115002)	$	855

* All costs are to include labor and material.

www.CoronaCA.gov

APPENDIX F: Corona PEV Permit Guideline

City of Corona

Community Development Department

Building Division

Electric Vehicle Charging Stations: Expedited Online Permits

To be eligible for expedited online submittal and plan check, an applicant for an electric vehicle charging station permit must provide this completed application and checklist, along with the plans in PDF file format (plans must conform to these guidelines to be eligible for online submittal and review) and submit to SolarEXP@CoronaCA.gov, and pay the required plan check fees. The subject line in the e-mail submittal must start with the project street address (for example: *"100 S. Main St. - EVCS submittal").*

The plan check fees must be paid at the Corona Store prior to plan review by going to the Corona Store online[13]. The applicant shall coordinate the project with the applicable utility company and process any required plans, forms, or fees. Please see exhibit at the end of these guidelines for a general map of areas served by the City of Corona Department of Water and Power.

Application

Project Address: __

Electric service provider: Southern California Edison (SCE) ☐

City of Corona Department of Water and Power (DWP) ☐

(See requirements in these guidelines for DWP customers)

Type of Project: Single Family Residential ☐ Multifamily/Commercial/Industrial ☐

Number of Chargers Installing: _

Type of Charger: AC ☐ DC ☐

Voltage: ____

Amps: _____

Scope of Work: ☐Plug EVCS into existing 120V, 15 or 20 Amp receptacle (no permit required, however please consult with a licensed professional)

☐ Extend existing circuit and add outlet (see guidelines for load calculations)

_____

13 Corona Online Store (https://secure.ci.corona.ca.us/e-commerce/login.cfm)

☐ Add dedicated EV circuit

Proposed electric service panel size (Amps): _

Panel upgrade required: No ☐ Yes ☐ (Separate Building Permit and fees required)

Line side tap or Second electric meter: No ☐ Yes ☐ (Requires additional fees and for DWP customers, separate application and review)

Mechanical ventilation required: No ☐ Yes ☐ (Separate Building Permit and fees required)

Payment ID # (from Corona Store):
Applicant Name:
Applicant Address:
Applicant Phone:
Applicant Email:

Checklist and Guidelines

Plans for a proposed EVCS shall include at a minimum the following:

1. Site Vicinity Plan
2. Overall Site Plan
3. Enlarged Site Plan or Floor Plan
4. Single Line Diagram
5. Panel Schedules
6. Electrical Load Calculations
7. Charger and equipment manufacturer's specification sheets
8. Details, Elevation Views, and Mechanical Plans as needed

All sheets shall include a title block indicating the project address, designer, dates of plan revisions and other relevant information, and shall be numbered (example: 1 of 12). All sheets shall be stamped and signed by a California licensed electrical engineer or a California licensed C-10 electrical contractor. The signature may be electronic. The installation shall comply with all codes in effect and the plans must list the applicable codes, e.g. 2016 California Electrical Code, 2016 California Building Code, etc.

1. ☐Site Vicinity Plan - Must show the location of the project in the city, in relation to city boundary lines, major roadways, and nearest cross streets.

Note: The City of Corona does not serve the communities of El Cerrito, Home Gardens, Coronita, or Temescal Canyon (under County jurisdiction.) Addresses may be verified online.[14]

2. ☐Overall Site Plan - Must depict the entire site and show the location on the property where all work will be performed. Must be dimensioned and show all structures, accessible paths of travel, parking spaces, circulation paths, location of equipment, driveways, etc. If a multifamily/commercial/industrial project, parking calculations must be provided and must indicate compliance with CBC Chapter 11 Accessibility requirements and CAL Green Mandatory Measures.

3. ☐Enlarged Site Plan or Floor Plan - Must be dimensioned and show the proposed location of the EVCS and related equipment and their working space, electrical panels, disconnects, EV parking spaces, signage, conduits, outlets, fans, bollards if electrical equipment is located in the path of a vehicle, access aisles, doorways, and paths of travel. EV supply equipment rated more than 60 amps or more than 150 volts shall have a readily accessible disconnect, capable of being locked open, within site of the equipment.

4. ☐Single Line Diagram - Must indicate size and rating of existing and proposed service(s), voltage configuration, etc. Must show all panels and equipment and indicate their

14 Address verification (http://www7.discovercorona.com/utilities/Address_Verification.cfm)

size and rating; overcurrent protective device ratings for all circuits and panels supplying EVSE; conductor type, size, and material feeding EVCS and include ampacity derating calculations for any conditions that may apply; conduit type, size, and material with conduit fill calculations; how grounding of all equipment is to be provided including the number, type, and size of grounding electrodes and conductors. For multifamily/commercial/industrial projects, fault current ratings of all equipment shall be indicated and shall be fully rated or calculations shall be provided for series rated systems. Meters for EVSE need to be labeled with the same address as the building installed at along with the designation EV (for example, "*200 S. Main St. EV*").

5. ☐**Panel Schedules** - Must be provided for all electrical panels supplying power to the EVCS. Must indicate the panel's name/ID, voltage, ampacity, and AIC ratings. Must indicate the name and number of all new and existing circuits and their corresponding ampacity. Existing panels must have space available for an additional breaker(s). *For single family dwelling projects only, the attached Panel Schedule Template may be used and attached with the submittal.*

6. ☐**Electrical Load Calculations** - Must be provided for all panels supplying power to the EVCS. Must clearly indicate how compliance is achieved with CEC Article 220. Overcurrent protection devices for feeders and circuits supplying EVCS shall be rated for continuous duty and shall be rated for not less than 125% of the maximum load of the EV supply equipment. Where noncontinuous loads are supplied from the same feeder or branch circuit, the overcurrent device shall be rated for 100% of the noncontinuous loads plus 125% of the continuous loads. *For single family dwelling projects only, the attached Electrical Load Worksheet may be used and attached with the submittal.*

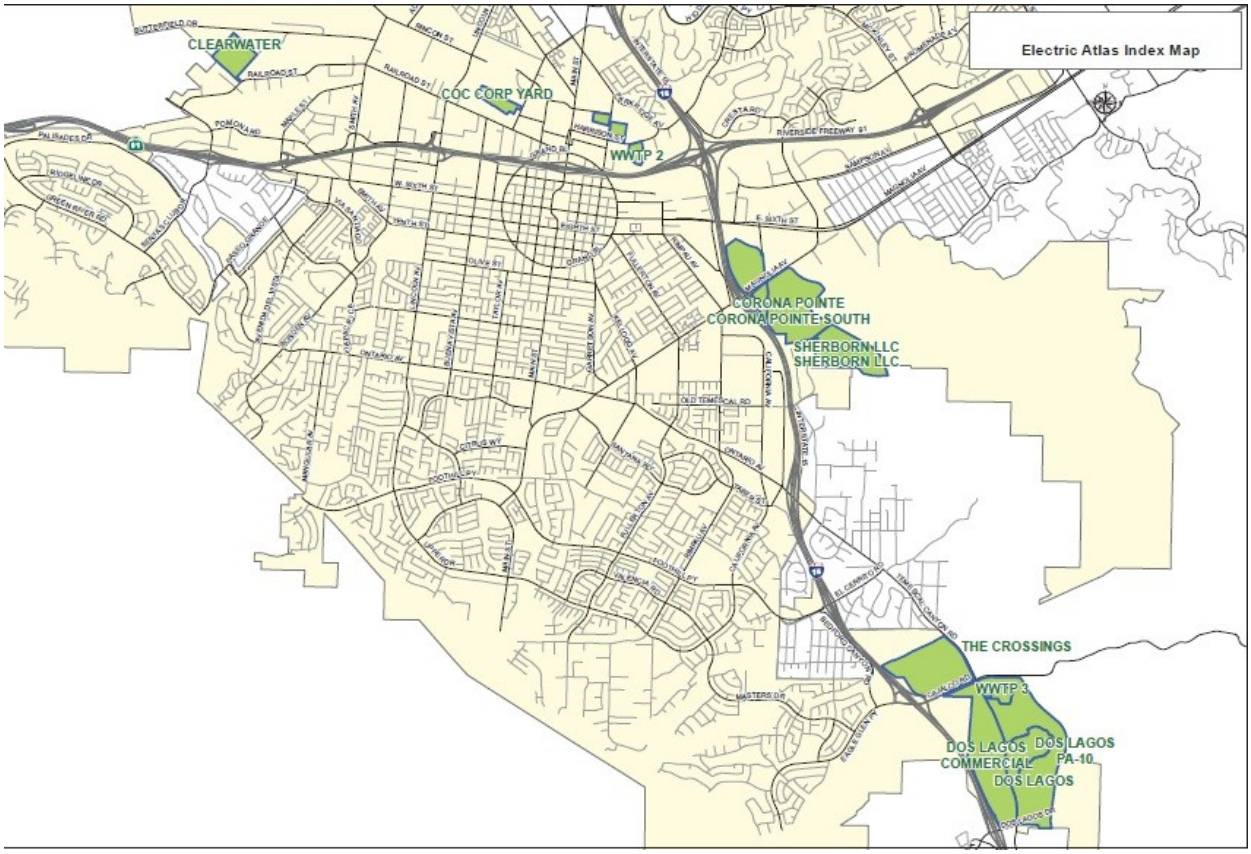
7. ☐**Charger Manufacturer's Specifications** - Cut sheets must be provided for all equipment installed for the EVCS indicating their size, rating, listing, and environment rated for, etc. The manufacturer's installation instructions for all equipment must be provided on the jobsite.

8. ☐**Details, Elevations, and Mechanical Plans** - May be needed depending on the scope and complexity of the EVSE project. Trenching details must be provided indicating the depth of cover for underground conduits (CEC Table 300.5). Structural details may be provided for equipment mounting, and are required for trenching undermining foundations. Details or Elevations must be provided for multifamily/commercial/industrial projects indicating the height of connector coupling means and other operable parts (CEC 625.50 and CBC 11B-812.2). Mechanical Plans may be needed if ventilation is required for the type of EVSE being installed showing compliance with CEC Article 625.50, the California Mechanical Code, and California Building Code.

Department of Water and Power

Below is a map that shows general areas of the city that have electrical service provided by the City of Corona Department of Water and Power. If your EVCS project will have a line side tap or additional electric meter and is located in these areas, an application for interconnect and the applicable plans will need to be submitted directly to DWP at 755 Public Safety Way or by emailing a digital set to Curtis.Showalter@CoronaCA.gov. To verify the serving utility or to obtain more information about the DWP application and interconnection process please contact them at 951-736-2234.

Electrical Atlas Index Map



Source: City of Corona Department of Water and Power

By signing below, the applicant confirms that they have read and understood the above guidelines, has verified that the plans conform to the above requirements and are eligible to receive expedited review, has verified the project is within city limits, has verified the serving the serving electric utility and that the plans conform to the utility's interconnect policies, acknowledges that the plans conform to the utility's interconnect policies, acknowledges that the standard review process is available for projects not eligible for expedited review, and affirms that all information provided is true and accurate.

PERMIT # ADDRESS:

CITY OF CORONA BUILDING DIVISION

PANELSCHEDULE TEMPLATE

*For Single Family Dwelling projects only

PANELBOARD SCHEDULE					VOLT MAIN BREAKER SIZE AMP				
CKT			VA	BRKR	CKT			VA	BRKR
NO	USAGE	QTY	PHASE A	A/ PLS	NO	USAGE	QTY	PHASE A	A/ PLS
1					2				
3					4				
5					6				
7					8				
9					10				
11					12				
13					14				
15					16				
17					18				
19					20				
21					22				
23					24				
25					26				
	PHASE VA SUBTOTALS		0			PHASE VA SUBTOTALS		0	
						PHASE VA TOTALS		0	
						PANELBOARD VA TOTAL			
						LCL (25%)			
						PANELBOARD AMPS TOTAL			

* Indicates GFI type circuit breaker

EQUIPMENT TAG

LOCATION VOLTAGE
MAIN
BREAKER

MOUNTING
TYPE
PHASE
WIRE

Source: City of Corona Department of Water and Power

Electrical Load Worksheet

The following worksheet may be used to calculate electrical loads for EVCS installed at *existing* **Single Family Dwellings only.** For other occupancies or projects with different scopes of work, load calculations are required to be prepared by a licensed electrical engineer or electrical contractor displaying conformance with the applicable code requirements and load calculation methodology.

INSTRUCTIONS: Review the list of electrical loads in the table below and check (☐) all that exist in the home. For each item checked, fill in the corresponding "Watts Used" (refer to the "Typical Usage" column.) If multiple instances of the load exist be sure to multiply the load by the number of instances. Add up all of the numbers in the "Watts Used" column and write that number in the "TOTAL WATTS" space at the bottom of the table.

Loads shown are estimates; actual loads may vary. For a more precise analysis, use the nameplate ratings of appliances and other loads. This is a voluntary compliance alternative and the applicant may wish to consult with a licensed electrical professional. Use of this electrical load calculation worksheet is at the user's risk and carries no implied guarantee of accuracy. This worksheet assumes that the existing electrical system at the premises is code-compliant, sized properly, and in good functioning order with no signs of damage or disrepair.

Electrical Load Worksheet

Check All Applicable Loads	Description of Load	Typical Usage	Watts Used
GENERAL LIGHTING AND RECEPTACLE OUTLET CIRCUITS			
☐	Multiply the dwelling square footage by 3	3 watts/sq. ft.	
KITCHEN CIRCUITS			
☐	Kitchen circuits	3,000 watts	3,000 (minimum)
	Electric oven	2,000 watts	
	Electric stove top	5,000 watts	
	Microwave	1,500 watts	
	Garbage disposal under kitchen sink	1,000 watts	
	Automatic dishwasher	3,500 watts	
	Garbage compactor	1,000 watts	
	Instantaneous hot water at sink	1,500 watts	
LAUNDRY CIRCUIT			
☐	Laundry circuit	1,500 watts	1,500 (minimum)
	Electric clothes dryer	5,000 watts	
HEATING AND AIR CONDITIONING CIRCUITS			
	Central heating (gas) and air conditioning	6,000 watts	
	Window mounted A/C	1,000 watts	
	Whole-house or attic fan	500 watts	
	Evaporative cooler	500 watts	
OTHER ELECTRICAL LOADS			
	Electric water heater (storage type)	4,000 watts	
	Electric tankless water heater	15,000 watts	
	Swimming pool or spa	3,500 watts	
	Other (describe):		
	Other:		
	Other:		
ELECTRIC VEHICLE CHARGER CIRCUIT			
☐	EVCS rating in Amps X 125% X Volts		

Source: City of Corona Department of Water and Power

TOTAL WATTS =

To determine the minimum size service panel and main service breaker needed (measured in amps), take Total Watts from above and divide by 240. Example: 30,000 watts / 240 volts equals 125 amp main service needed.

Size of existing Main Service Breaker =_____Size needed from calculation above = _____