

CASE STUDY / TRUCK DEPOT ELECTRIFICATION

AN ELECTRIFIED FUTURE FOR CARGO SHIPPING SERVICES

As part of an overall program aimed at accelerating the adoption of medium- to heavy-duty electric vehicles, the Port of Oakland embarked on a project to provide its depot with the electrical infrastructure needed to support these vehicles.



ADDING MULTIPLE CHARGING STATIONS REQUIRED STRATEGIC DESIGN CONSIDERATIONS

With both electrical and civil design elements at play, development of new charging infrastructure took a thoughtful approach.

PROJECT STATS

CLIENT

Port of Oakland

LOCATION

Oakland, California

10

CHARGING STATIONS
INSTALLED

NEW

12-kV_{TO} 480-kV

UNIT SUBSTATION

NEW

12-kV

SERVICE DROP DESIGN

CHALLENGE

The Port of Oakland serves a massive number of people – 34 million within a seven-hour drive of the facility alone. Always looking for ways to better provide shipping services to its customers, the port embarked on a fast-track program to adopt and put into use a fleet of electric vehicles (EVs).

To achieve this goal and support the addition of EVs to its fleet, the port planned to install a truck-charging depot: 10 truck-charging stations and associated electrical infrastructure with the ability to expand to five more chargers as future needs grow. Our team provided consultant design services for this effort.

The biggest challenge with this project was the need to minimize electrical load impacts on the existing 15-kV substation that serves the electrical truck charging equipment. There also was an additional need to create a flexible installation solution that could be scaled up to meet future load growth.

SOLUTION

To reduce electrical load, designs included light poles with photovoltaic panels and storage batteries to reduce the amount of energy consumed by auxiliary loads. Past load studies were utilized to appropriately size new load infrastructure. A time-based power sharing system was developed to allow for complete charging of the proposed vehicles while reducing electrical load impacts.





To meet installation flexibility and expansion needs, the design also included a 15-kV service drop, which can be used as a splice point for future expansion. A transformer vault or pad with multiple anchor bolt locations allows for future upsizing, and the replacement of the transformer and distribution equipment was designed with oversized bussing and spare feeder conduit. Finally, spare conduit stub-ups from the 480-kV switchboard were integrated into the design to mitigate reworking.

Finally, our team provided project management and construction assistance services by developing and maintaining the design phase of the project schedule; developing a construction cost estimate and schedule to support bid review; and providing construction administration and support services.

RESULTS

The additional demands of the electrical and civil design were met in multiple ways:

- A new 1.5 MVA unit substation provides an overall upgrade to the electrical supply while a new 12-kV service lateral and service drop offers updated infrastructure to handle the new load. Site selection, development and optimization for the depot were also performed, including water management and drainage planning.
- Site lighting systems consisting of wooden or steel pole-mounted light fixtures and control devices were installed. Layout was determined by facility lighting calculations. Power pole structural analysis and foundation design was also performed.

- Most important to the electrical design, the electric truck charger installation for TransPower electric vehicle supply equipment included alternating current branch circuit and conduit. Ten stations were installed in an existing parking area. Also installed were equipment pads and foundations — per equipment manufacturers' specifications — as well as bollards and guardrails to protect the equipment.

Our design work led to construction beginning in summer 2020 and extended into January, as we reviewed submittals and answered requests for proposals. Also among our tasks: creation of as-built drawings of the new system.

The Port of Oakland has a good understanding of what the electrified future will look like, and this new endeavor helps get the organization off to a good start toward its goal of introducing an EV fleet.



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