EXECUTIVE SUMMARY

The following report details the lighting and electrical systems designs of 350 Mission, San Francisco, CA.

AEVITAS is an integrated design team, composed of representatives from the construction, structural, electrical, and mechanical disciplines. With the end goal of designing a net-zero high-rise building in the heart of San Francisco, AEVITAS developed the overarching attitude of [ZEROimpact], encompassing four focus areas of [ZEROinterruption], [ZEROenergy], [ZEROwaste], and [ZEROemissions]. Through a unified effort, AEVITAS achieved the design goals set forth at the beginning of the process. Information about the design of 350 Mission can be found in AEVITAS' reports and are summarized in Table 1.

TABLE 1: SYSTEM OVERVIEW BREAKDOWN

ARCHITECTURAL	Floor Plan Changes, Vestibule Addition, Integrated Public Art Piece
FAÇADE	Natural Ventilation Louvers, Seismic Connections, Electrochromic Glazing
MECHANICAL	Radiant Floor System, Natural Ventilation Louvers, Dedicated Outdoor Air System
LIGHTING	LED Lighting, DALI Controls Responsive to Daylighting and Occupancy, Task Lighting
ENERGY GENERATION	Onsite Solar Array, Offsite Solar Array, Human Waste to Power Converter
ELECTRICAL	AC and DC Distribution, Natural Gas-Powered Fuel Cells, Dual Electrical Risers
STRUCTURAL	Steel Superstructure, Braced Frame Core, Composite Beams and Deck, Outrigger System, Concrete Substructure
CONSTRUCTION	Production Planning, Matrix Scheduling, Waste Management, BIM Execution Planning, Site Planning

The lighting and electrical design strove to increase efficiency and decrease total energy consumption, and this was achieved through the use of a number of different strategies. The design focused on the lobby and a typical office floor, as well as whole-building systems design.

The desire to optimize daylighting and thermal properties of the glazing led to a façade design that benefitted both the mechanical systems and lighting design. Electrochromic glass is used on the façade of all office floors in place of shades to preserve views to the exterior and offer maximum flexibility to the occupants. Daylight photosensor dimming results in savings for the entire building, exceeding 100,000 kWh annually.

Efficient lighting design decisions, such as task lighting, resulted in a building lighting power density (LPD) of 0.434 W/sf, well below the 0.728 W/sf allowed by California Title 24 and CALGreen space-by-space method.

The building's electrical system features natural gas-powered fuel cells and both AC and DC distribution, designed to minimize conversion losses. The DC system feeds a server room that supports virtual computing on the office floors, saving almost 600,000 kWh of computer loads annually.

Taking the building's location in a seismic region into account, both the lighting and electrical design make special accommodations to ensure the safety of its occupants. The lighting follows guidelines for seismic design laid out by the California Department of General Services. The electrical system features dual emergency risers to give the building an added level of redundancy in a seismic event.

Energy is generated via onsite and offsite solar arrays, as well as an onsite human waste-to-power converter. These systems combined generate 5,544,000 kWh of energy annually, which is more than enough to cover the building's total expected annual consumption of 5,264,570 kWh.

350 Mission adheres to the traditional definition of net-zero by returning as much energy to the grid as it consumes in a year, and it also meets the broader goals defined by AEVITAS by minimizing emissions and waste and by creating a design that responds to the earthquake-prone environment to ensure continuity of operation even after a seismic event. Lifecycle cost analyses determined a payback period of 10.6 years for the mechanical systems and energy generation equipment.

The final building design successfully responds to the project requirements and achieves the project goals through the use of innovative and efficient design techniques.