Executive Summary. The Mechanical Systems Team has addressed the challenges facing the design of 350 Mission. This submittal includes an executive summary, introduction, illustrations of how project goals were met, associated analyses, and justifications for design decisions. Additionally, the submittal includes appendices containing supporting documentation of detailed calculations, floor plans, sections, elevations, equipment data and references.

In this report, AEI Team 2 was required to address the integrative and collaborative aspects of the building's design, in addition to addressing sustainability, energy efficiency, immediate building reoccupation and the building budget as it pertains to the design of 350 Mission.

Shaped by the team design principles of ***Performance***, ***Endurance*** and ***Connectivity***, AEI Team 2 formed four mechanical design goals:

1. Achieve **Near-Net Zero Energy**, **Water**, **Waste** and **Emissions**, as per the Integration Narrative
2. Design **mechanical**, **plumbing** and **fire protection** systems which will maintain their performance and integrity after a major design-level earthquake
3. Utilize **Building Information Modeling** software, processes and workflows to ensure the highest level of performance possible
4. Design mechanical systems which **enhance the aesthetic and participative connectivity** of 350 Mission with the surrounding urban ecology

Building services which enable the aforementioned goals were designed and are elaborated upon below:

A. On-site Fuel Creation

- ***Thermophilic Anaerobic Digestion*** of municipal food waste and sewage creates bio-methane at an average rate of 73,300 ft^3 per day—this supplies enough fuel to 350 Mission to enable the building to **achieve Net Zero Energy**

B. On-site Energy Generation

- A ***310 kW Waukesha Internal Combustion (IC) Engine*** *uses on-site BioMethane to* create electricity, heating hot water, domestic hot water and process hot water

C. Heating and Cooling Plant

- Four **980 gpm Cooling Towers** use the low ambient wet-bulb to generate 67^F chilled water for **Radiant Ceiling Panels** and a **Thermal Slab**
- An **85-ton Absorption Chiller** provides chilled water to **100% Outside Air Units** to mitigate latent space loads
- A dedicated **20-ton Water-to-Wastewater Heat Pump** provides chilled water to the restaurant air handler
- Heat recovered from **Jacket Cooling** and **Exhaust Gas** is used for space heating, domestic hot water and maintaining the 135^F digester temperature
- A **2,500 MBH Boiler** meets peak heating loads

D. Office Design

- **Chilled Ceilings** provide sensible space cooling
- **100% Outdoor Air Units** remove latent loads and provide demand-controlled fresh air
- **Induction VAV Terminals** contain hot water coils which provide perimeter heat

E. Lobby Design

- A **Thermally-active Slab** provides sensible space heating and cooling
- **100% Outdoor Air Units** remove latent loads and provide demand-controlled fresh air
- Exhaust air from the first five office floors pressurizes the space against stack pressures

F. Restaurant Design

- A **Dedicated 100% Outdoor Air Unit** handles the large sensible and latent loads

G. Water Reclamation System

- An **AquaCELL** treats on-site and municipal blackwater in order to meet non-potable demand

The results of these systems are shown below, illustrating exemplary environmental performance.

ENERGY	WATER	WASTE	EMISSIONS
EUI: -0.02	GAL: 1,169,158	TONS: 321	$TONS_{CO2}$: 25
100% REDUCTION	84% REDUCTION	95% REDUCTION	99% REDUCTION