

---

## INDUSTRIAL PROJECTS

### GOVERNMENT/UTILITIES

---

#### **Lydgate Substation Building, Lydgate, Kauai, Hawaii**

A 6,000 SF concrete masonry building with 18 foot tall walls. The walls had to withstand hurricane force winds while supporting an overhead crane. The roof members were red iron trusses that had to be engineered for the loads. The truss system was modeled in 3D to study the forces.

---

#### **Perini Corporation, Frame 6, 40 MW Simple Cycle Project, Nasiriyah, Iraq**

Project Engineer responsible for overall design coordination for work as design engineer for Perini Corporation in the installation of a GE Frame 6 gas turbine for a 40 MW crude burning frame 6 combustion turbine in Nasiriyah, Iraq. Mr. Murar spent 10 weeks on site providing engineering support during the construction process. The project was overseen by the United States Army and the DoD.



**Figure 1 - Generator Being Delivered in Iraq**

---

#### **Marine Corps Base, RCP Shelter Structure, Kaneohe, Hawaii**

Provided structural engineering support for RCP structures for a 600 square foot structure located in the VE coastal flood zone. Designed for hurricane and flood loads. Project consisted of a tapered glu lam timber framed structure.

---

#### **Department of Transportation, Storage Building, Walla Walla, Washington**

Structural Engineer responsible for foundation design for a 9,000-square-foot vehicle storage building. Mr. Murar had to work closely with the government agencies to assure that government standards for design were being met.

---

### GOVERNMENT/UTILITIES – Continued

#### **Benton County P.U.D., 25 MW Gas Turbine Peaking Plant, Washington**

Structural Engineer responsible for structural engineering and construction services for the Finley Combustion Turbine Plant, installed at a Benton County P.U.D. site in Washington. The combined-cycle generation plant is based on a Pratt & Whitney FT-8 Power Pac gas turbine in simple cycle.

#### **Malburg Project, City of Vernon, California**

Lead Structural Engineer for on a 138 MW natural gas-fired, combined-cycle electric generation facility. The project involved complex structures and foundations in a seismic zone 4. The foundation types included drilled concrete pier, large cooling tower basins and mass concrete isolated foundations.



**Figure 2 - Malburg HRSG's**

#### **Port of Columbia County, Office Complex, Dayton, Washington**

Structural Engineer responsible for the design a 7,000-square-foot office complex and 8,000-square-foot incubator business building. The project required foundation and concrete masonry design.

#### **School District #140, File Depository Room, Walla Walla, Washington**

Structural Engineer for the design of a steel and concrete file depository room estimated to have a 100-year life span. The project required modifications to existing steel beams, columns and foundations. Extensive concrete work was required to assure the depository was safe to fire and explosions.

---

### GENERATION

#### **Sheraton – Poipu Chiller Enclosure, Poipu, Kauai, Hawaii**

Retrofitted an existing structure built around a new chiller building to comply with the hurricane forces of the area. Performed a site visit and solutions to existing conditions to reinforce the existing structure.

#### **Mitsubishi Heavy Industries, Mindanao II Geothermal Project, Philippines**

Structural Engineer responsible for design of structures, vessel supports, and foundations for a 52MW geothermal power plant, the sister plant of the Mindanao I Power Plant completed in 1997. Provided on-site support during construction phase.



**Figure 3 - Mindanao II Geothermal Project**

#### **Mitsubishi Heavy Industries, Miravalles III Geothermal Project, Costa Rica**

Structural Engineer responsible for design of structures, vessel supports, and foundations for a 35MW geothermal power plant. Engineered a 300 foot x 100 foot x 60 foot tall steel building enclosing the turbine and generator. The steel building incorporated cross bracing and moment frames. The building site was in a zone 4 seismic area. Provided on-site support during construction phase.

#### **Mitsubishi Heavy Industries, Olkaria II Geothermal Project, Kenya**

Lead Structural Engineer responsible for the design of vessel and pipe supports and the equipment catwalks and platforms for a two-unit single-flash 64 MW geothermal power plant built by Mitsubishi in the Rift Valley of Kenya.



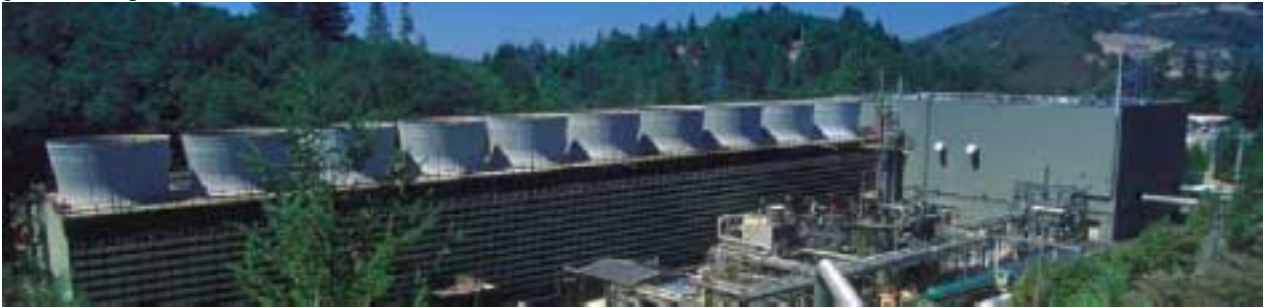
**Figure 4 - Olkaria II Project**

---

### GENERATION – Continued

#### **Calpine Corporation, Various Upgrade Projects, The Geysers Geothermal Field, California**

Structural Engineer involved in field and office engineering for various upgrade projects at an existing geothermal plant. Projects included work on inter/aftercoolers, heat exchangers, SO<sub>4</sub> removal structure, etc. The Geysers geothermal field, with approximately 1,100 MW of generation installed, is the largest geothermal power resource in the world.



**Figure 5 - Calpine Geysers Project**

---

### FACILITIES

---

#### **Trane Corporation, El Dorado Resort Chiller Support, Kana'apali, Maui, Hawaii**

Designed the foundation and retaining walls for a new chiller located on Maui. The area required several site visits to determine the locations of existing utilities and pipe routing requirements. The retaining wall was poured monolithically with the mass concrete for the chiller foundation

---

#### **Chevron Richland Refinery Turbogeneration project, California**

Structural Engineer responsible with the design of structural elements for new 30 megawatt refinery cogeneration project. Designed the support for the pipe and electrical system distribution re-route. Designed the high pressure steam line for support on existing refinery pipe supports and new supports.



**Figure 6 - Chevron Richmond Refinery**

---

#### **Kilgarven Wind Farm, Kilgarven, Cork County, Ireland**

Structural Engineer responsible for the foundations of 45 meter and 60 meter tall wind turbines. 15 Vestas 3 MW turbines were installed. The overall project was 45 mega watts. Foundations were placed on previous peat bogs and had to be over excavated and improved. The foundations were modeled in 3D and the layouts were coordinated with the turbine manufacturer.

---

### FACILITIES – Continued

#### **Puna Geothermal Venture, New Well Interconnection, Paho, Hawaii**

Lead Structural Engineer responsible for platform and pipe support design for an additional resource well being added to an existing steam field supplying a geothermal power plant. The project required steel and foundation design for several access platforms and pipe supports.



**Figure 7 - Puna Wellhead Structure**

#### **Sun Power Corporation, Roof Certification, Hawaii**

Reviewed and provided calculations for existing buildings to verify the capacity for support of photovoltaic panels and equipment. Provided guidance to Sun Power for the best suitable locations of equipment strongest staging areas of the buildings. Projects included:

- Koyo, Kona, Big Island
- Macy's, Pearlridge, Honolulu, Oahu
- Macy's Oahu Distribution Center, Honolulu, Oahu-
- Macys Ka'ahumanu Mens and Womens, Kahului, Maui-
- Macy's Prince Kuhio Mall Mens and Womens, Hilo, Big Island
- Macy's Grove Farm Shopping Center, Lihue, Kauai
- Longs Drug, Kihei, Maui
- Longs Drug, Kula, Maui.

#### **Chevron/CABGOC, Takula Production and Pumping Platform Power System Expansion, Cabinda, Angola**

Structural Engineer responsible with the design of structural elements for new equipment and accesses for a power system expansion on an existing pumping and injection platform. The project required extensive steel design.

#### **Trane Corporation, Mid Pacific Institute Ice Tank Foundation, Honolulu, Hawaii**

Provided special inspection for tank foundations for a multiple ice tank facility. Provided inspections for reinforcement, subgrade preparation and formwork layout.

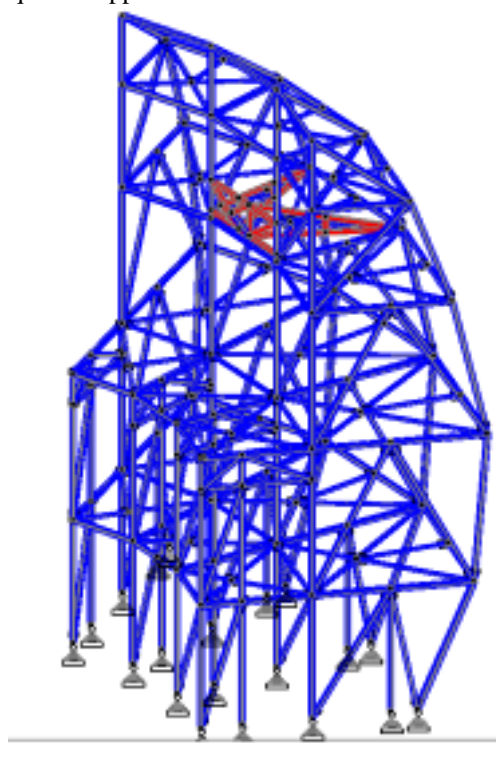
### FACILITIES – Continued

#### **Kona Blue Ice Silo Foundation, Kona, Hawaii**

Designed and inspected the foundation for a 45 foot silo used to store ice. Design of foundation was sized to resist hurricane forces and the highest seismic loads. The foundation was socketed into the intact lava rock to minimize mass concrete. The foundation was modeled in 3D to optimize the reinforcement and concrete.

#### **California Technical Institute of Technology Submillimeter Telescope, Mauna Kea, Hawaii**

Modeled a quadrant of the existing Caltech observatory to assess the capacity of the existing members to support a new jib crane. The crane was relocated to move equipment. A full report and of the findings and details were supplied for the required support.



**Figure 8 - Model of Portion of Caltech Observatory**