



Cannon

Structures

Reliable Responsive Solutions

We have provided Reliable Responsive Solutions to clients for projects large and small since 1976.

Our team of professionals includes:

- Structural Engineers
- Civil Engineers
- Automation and Controls Engineers
- Process Engineers
- Mechanical Engineers
- Electrical Engineers
- Chemical Engineers
- Petroleum Engineers
- Surveyors
- GIS Specialists
- Funding Administrators
- Technicians and Designers

Safety

Ensuring safety is critical; it's not just about keeping records and maintaining programs. We are committed to providing a safe and healthful workplace, incorporating "best practices" in our policies and procedures, and identifying and correcting risks. Our safety programs and commitment to safety are intended to foster an injury-free, productive workplace. We are proud to have earned the industry's highest safety ratings, and our Experience Modification Rating (EMR) places us as a leader amongst our peers.

In addition to providing an enjoyable, safe, and healthful work environment, we encourage and support employee health and wellness through a variety of fitness-related company activities throughout the year.

Safety and wellness are more than just policies at Cannon—they are cornerstones to how we work in our facilities and yours.

Infrastructure

Projects



Veolia Pipe Rerouting Structural Analysis

San Luis Obispo, California

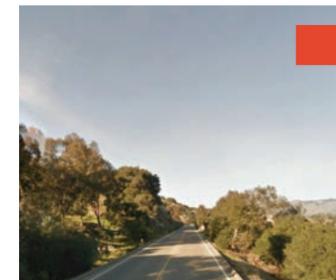
Veolia North America is a leading provider of environmental solutions in the energy, water, and waste markets. In order to provide maintenance and repair services on a request for services basis, Veolia requested Cannon's aid with instrumentation and control engineering at the Price Canyon facility in San Luis Obispo, California. An additional services agreement was made for a structural analysis to reroute piping at the facility to allow for maintenance and servicing of various components in the water plant, which treats excess water from the adjacent oil production facility. Work included site visits, assessment of new and existing pipe supports, and details for the routing of piping for temporary tank equipment.



Pismo Beach Bluff Stabilization

Shell Beach, California

As part of a \$2.3 million effort, the City of Pismo Beach undertook emergency actions to stabilize eroding bluffs in Shell Beach and to prevent future bluff failures. The stabilization efforts effectively protected a sewage pumping station, failure of which would have caused approximately 500 to 600 homes to be without sanitary sewer services. Cannon provided on-site observation and construction management services of a process that used tiebacks to secure and stabilize the bluff. To enhance aesthetic appeal and maintain visual continuity, the new seawall was sculpted and stained to blend with the natural bluffs.



Price Canyon Road Expansion

Pismo Beach, California

The widening of Price Canyon Road required a range of engineering solutions for expanding the roadway. Steep slopes, property lines, unusual geotechnical conditions, and environmental constraints resulted in a final design with multiple engineered structures along the corridor. Cannon provided the design for stepped, soil-nailed retaining walls. The design included the requirement to capture runoff from the hillside behind the wall and direct it to a storm drain system along the roadway. Cannon coordinated project work with the San Luis Obispo County engineering department, which provided engineering for the remainder of the project.



SLC FUT Enclosures

Lompoc, California

A private aerospace company maintains the launch facility at Space Launch Complex 6 at Vandenberg Air Force Base. The Fixed Utility Tower (FUT) provides support for equipment that braces rockets and payloads prior to launch. The client wanted to enclose portions of the FUT to shield equipment and engineers from the high winds and driven rain common to the site. Cannon included additional framing and siding details to provide the desired protection with the capability to resist the extreme loads associated with wind exposure and blast loads related to rocket launches.

New Construction

Projects

29 Palms Hotel Structural Design

29 Palms, California

Cannon provided structural design services for a 44,000 square foot, two-story hotel. The scope of work included drawings and calculations to support the design. The roof consisted of plywood over pre-fabricated wood trusses supported by a mix of wood and steel beams. The second floor included plywood over wood joists supported by a mix of wood and steel beams with wood stud walls. The foundation was concrete continuous wall footing, isolated column spread footings, and slab-on-grade. The lateral design consisted of plywood floor and roof diaphragms and wood shear walls designed to withstand wind and seismic forces to meet the code. The Porte Cochere, separate from the main structure, was designed with plywood over wood joists supported by wood and steel beams with cantilevered steel columns.



Northwest Professional Office Plaza

Bakersfield, California

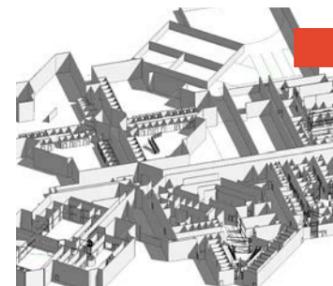
This project featured twelve buildings on campus for mixed use of office and medical tenants. There were three distinct building envelope plans. The buildings were wood-framed construction with plywood shear panels, steel columns, and wood diaphragm roofs. Cannon provided full design and construction administration services. In addition, Cannon provided engineering services for the buildings to design the attachment of medical and other equipment to the building structure.



Santa Barbara County North Branch Jail Schematic Design

Santa Maria, California

The County of Santa Barbara Northern Branch Jail Project is located near Santa Maria, California. The project includes a 376-bed jail facility, 32 of which are medical or mental health beds located in a specialized housing unit. The facility was built on a portion of a 50-acre property located at the crossroads of Black and Betteravia. The total project budget was estimated to be \$96.1 million, including site acquisition, planning, and soft costs. Cannon was contracted by Rosser International, Inc. to assist with schematic design, design development, construction documents, and construction administration.



Moylan Terrace

San Luis Obispo, California

Cannon was selected to provide structural design services for an affordable, 81-unit housing project for the Housing Authority of San Luis Obispo. The Moylan Terrace project consists of units of six unique two- and three-story layouts configured into two building types that feature two separate roof slope configurations. Cannon provided structural calculations, plan, and detail drawings sufficient to acquire a permit to construct the structural portions of the project.



Industrial Structures

Projects



PG&E DCPD Bravo Building

Avila, California

In response to the Fukushima Daiichi nuclear event, the nuclear energy industry developed a diverse, flexible approach (FLEX) to implement lessons learned from Fukushima and address Nuclear Regulatory Commission recommendations. Warehouse Bravo at the Diablo Canyon Power Plant (DCPP) is an existing 30,000 square foot metal building constructed on an engineered foundation. Pacific Gas & Electric (PG&E) desired to use the building as a FLEX equipment storage facility. The project required the preservation of some of the building's original components while increasing the lateral load resisting capacity and increasing HVAC capacities. A partial second floor was added to the structure for housing the fire brigade. The structural scope included evaluation of the original structure and the design of new and strengthened elements, including steel moment and braced frames.



SLC-4 Consulting

Vandenberg, California

A private space company leased SLC-4 East at Vandenberg Air Force Base for use as a launch facility. Significant renovations were needed to make SLC-4 viable for rocket configurations. Cannon provided structural engineering services for both approach and launch table components, including analysis of existing structures and capacities and design and integration of new structures. Design challenges included the following: extreme loadings on the launch table; wind, seismic and gravity loads; thrust loads prior to release; and engine thrust extreme pressure loads. Cannon also provided a 3D scan of the original structure to establish dimensions. Survey services integrated the scanned volume, owner-developed layout dimensions, and NAD83 and NAVD88 coordinate systems.



Paramount Processing Building

Lost Hills, California

Paramount Farming, a major crop processing company and a leading grower of almonds and pistachios, needed of a new facility to process produce. Facility requirements included non-combustible construction and aspects of blast design engineering. An approximately 40,000 square foot building was constructed with tilt-up concrete panels, a precast double-tee roof, conveyor systems, and other equipment supported on foundations or hung from the structure. Cannon was selected to provide the structural engineering for the new facility, which was divided into two separate processing spaces.



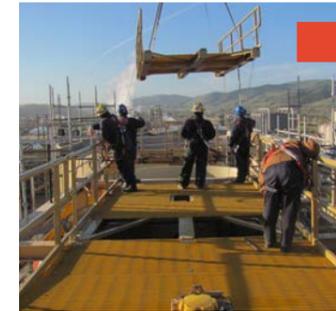
Crockett Cogeneration Plant Fuel Gas Compressor

Crockett, California

Cannon assisted, supported, designed, and integrated the new fuel gas compressor into the cogeneration plant to provide reliable fuel gas pressure to the plant's 240 megawatt electric power generator. In addition, Cannon assisted in providing the specifications and locating the compressor, designed the foundation for the compressor skid, and designed the electrical infrastructure. Automation features included a Modbus multi-drop network, data formats with Invensys engineer to interface the compressor and related systems into the Foxboro DCS system, interfaces throughout the plant to make the control system usable, assistance with startup and fine tuning of the remote control, and gas compressor monitoring.

Structural Rehabilitation

Projects



San Ardo Reactor Tank Platform

San Ardo, California

Corrosion on the platform grating and framing over the reactor tanks reached levels that made the platform unsafe for occupancy, putting the mixing motors at risk. The purpose of this work was to design and implement new framing to support the mixing motors, controls, and platform grating, and to have a higher resistance to corrosion. The scope of services included structural services, safety/compliance services, project management, and project close-out documents. Structural services entailed drawing and Chevron Standards review, a site visit, analysis of the existing platform and support structure, a schematic repair concept, final design, and construction assistance.



USPS Moreno Valley Perris

Moreno Valley, California

In partnership with Ravatt Albrect & Associates, Cannon was retained to provide structural design services for the renovation of an existing postal facility building. The design included entry and dock canopies, a flag pole foundation, detailing for installation of a new dock load leveler, trash enclosure, fencing, a compressor pad, HVAC pad, new roof-mounted HVAC units and ducting support, and more. In addition, Cannon performed site visits to observe existing conditions and construction, provided as-built construction assistance, and responded to RFIs.



China Lake Building 5 Mezzanine Addition

China Lake, California

Cannon provided structural engineering design and construction services for a phased project to repair interior space in Building 00005, a portion of Wing 8 and design and construction services for a second floor interior mezzanine for a total of 11,844 square feet of renovation. Adjacent lab spaces were occupied continuously, requiring special attention to scheduling and conduct of work. The project was located within the existing Wing 8 of Michelson Laboratory, which was constructed in 1945 and recognized as a historic building. Attention to maintaining the exterior character was a critical requirement. Identification and abatement of hazardous materials was included.



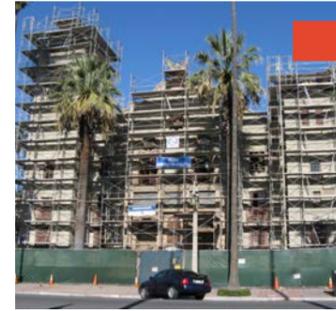
Apartment Structural Integrity Review

Taft, California

The apartment building at 355 Adams Street in Taft, California was constructed in the 1960s. It was part of a series of apartment buildings constructed as labor force housing. The soils in the neighborhood are sensitive to high moisture levels and experienced large settling as the result of a broken water main. Cannon was retained to review the structural integrity of the building and provide engineering for a leveling program, which included lifting the building up off of its foundations and infilling the variable gap between the raised building framing and the existing foundation.

Seismic Evaluation

Projects



Riverside Municipal Auditorium Renovation

Riverside, California

Cannon was selected as part of the team for design and construction services for renovation, seismic retrofit, and re-roofing of the Riverside Municipal Auditorium. The RMA is a 53,000 square foot, reinforced concrete, six-story plus basement structure on the National Register of Historic Places. Cannon designed the complete structural seismic exterior and interior retrofit. Criteria for this renovation were based on the goals of the Basic Safety Objective rehabilitation developed as ASCE 41-06. BSO is achieved by designing the renovated structure to meet the Life Safety and the Collapse Prevention Performance objectives. Cannon utilized a 3D analysis and design program to model the building.



NAS Lemoore Building 1 Renovation

Lemoore, California

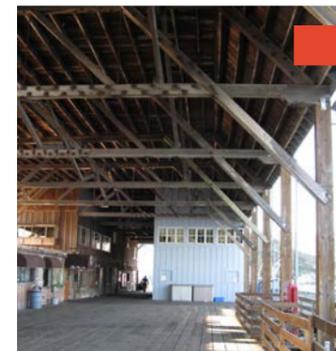
Naval Air Station (NAS) Lemoore is the Navy's newest and largest master jet base, and home to Strike Fighter Wing Pacific along with its associated squadrons. Cannon was retained to conduct site visits, prepare a structural system analysis with retrofit measures, and provide analyses and schematic designs for a foundation, structural elements, and non-structural components. In addition, Cannon delivered a construction quality assurance plan.



Lubrizol Small Tank Seismic Calculations

Paso Robles, California

The Lubrizol Corporation is a technology-driven global company that combines complex specialty chemicals to optimize the quality, performance, and value of products while reducing environmental impacts. In the past, Cannon provided miscellaneous designs for tank foundations, pipe and scaffold supports, and other small projects at Lubrizol's Paso Robles Plant. In light of this, Lubrizol enlisted Cannon's services for seismic calculations for a series of small tanks and equipment skids. Cannon visited the site to document existing components and verify geometry and dimensions in order to provide the seismic calculations and attachment details to ensure the stability of the tanks and skids subjected to code specified loads.



Pier Evaluation and Renovation

Avila Beach, California

Constructed in the late 19th century, the Harford Pier comprises a core part of the Port of San Luis facilities and provides significant historical and economic value. The original buildings established atop the pier were destroyed by fire in 1915, and rebuilt into the pier's current structures in 1919. Since then the structures have undergone numerous emergency repairs over time with portions of the pier taken down in response to long-term wood decay and other wear and tear issues.

Cannon was selected to develop an action plan in response to the Port's need for the Harford Pier's preservation, repair, and maintenance. The action plan included a review of the existing studies, site visits to document current conditions, development of schematic repair scenarios, cost estimates for construction repairs, and prioritization of the recommended repairs.

Forensics



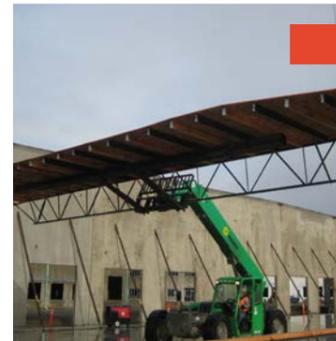
Projects



Lake Washington Heights COA v. FMG Siding Specialists

Seattle, Washington

The Lake Washington Heights condominium complex was constructed in 1995. Siding on the six-level residential structure was replaced with a cement panel siding system. One of the building's concrete panels fell from the parapet level in 2014, and the Homeowner's Association alleged deficiencies in the installation and support of the panels. Cannon was retained on behalf of the sider, Smith Freed, to evaluate the system and develop a concept for securing the panels without the need to take the panels off the building.



Panattoni v. Opus and Stellar Structures

Summer, Washington

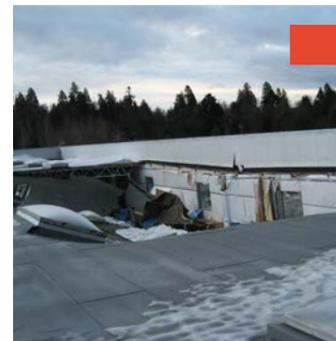
Panattoni Development Company is one of the largest privately owned industrial real estate developers in North America. Panattoni recently contracted Stellar Structures to construct 31 commercial warehouses featuring wood roof diaphragms and concrete or masonry exterior/perimeter walls. During the re-roofing of one of the warehouse structures, repetitive loading from a heavy cart hauling materials across the roof caused a 2x4 wood roof joist to fall from the ceiling. The Developer, Opus, retained Wiss Janney Elstner (WJE) engineers to investigate the cause of the failure. WJE noted, during their investigation, that a small percentage of the roof joists had conditions that could reduce their support capacity. Cannon worked with WJE to determine the expected incidence and protocols for repair.



Santiam Memorial Hospital

Stayton, Oregon

Santiam Hospital is a not-for-profit, 50-bed acute care hospital that serves more than 30,000 people annually. The hospital building dates back to 1953 and has undergone numerous expansions and remodels since its inception. A four-story wing was added to the campus, and after construction was completed, the hospital filed suit against the Contractor, Howard S. Wright, and their subcontractors for alleged defects, including excessive floor deflection. Cannon was retained on behalf of Marion Construction to perform surveys and structural analysis. Cannon developed a plan illustrating the as-constructed conditions, provided comparisons between actual and allowable deflections, and provided clarity regarding allowable construction tolerances. In addition, Cannon provided testimony before an Arbitrator who awarded no damages to the Hospital from Howard S. Wright and Marion Construction.



American Honda v. Opus and Stellar Structures

Gresham, Oregon

Stellar Structures constructed a large structure in Gresham, Oregon along the Columbia River gorge. The facility contained a large parts distribution warehouse with attached offices and a training facility. A segment of the roof collapsed due to a large snow storm followed by rain. Honda brought suit against the developer, Opus, Stellar Structures, the A/E firm that designed the structure, and the Special Inspection company alleging defective construction. Cannon was retained on behalf of Stellar Structures to review the allegations and reports by Honda's experts. Cannon performed independent investigations and evaluations, developed a repair scope based on construction deficiencies, and provided expert testimony in court. The demand by Honda exceeded \$21,000,000, and the jury awarded \$275,000.



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Toll Free: (866) 750-8165

