

Orange Grove Power Plant Noise Barrier Wall System

Project: Orange Grove Power Plant Noise Barrier Wall System
Precaster: StructureCast

Project Description

Orange Grove Energy, L.P., and Industrial Construction Inc. constructed a \$85 million dollar simple-cycle power plant in northern San Diego County. The project has an electrical output of 96 megawatts. This facility will be used during times of maximum demand for electricity such as hot summer intervals. Under an agreement with San Diego Gas & Electric, OGE will be responsible for construction of the plant and an approximately 0.2-mile underground electric transmission line interconnection between the power plant and the existing SDG&E Pala substation boundary. OGE will operate the plant and under a land lease for a site on a larger parcel owned by SDG&E.

The generating facility includes two 50 MW GE LM6000 PC SPRINT combustion turbine generators, a gas metering station, water and natural gas pipelines. Transmission interconnection to the Pala substation occurs within the limits of SDGE's contiguous parcel and includes an underground transmission line interconnection. The project is fueled by natural gas delivered to the site via a 2-mile extension of an existing SDGE gas line. The project site, formally a citrus grove, occupies 8.5 acres within a 220-acre site, which is located off Pala Del Norte Road, approximately 3.5 miles northeast of I-5 on SR-76. StructureCast was contracted during the design phase of the project to design and build a noise barrier wall system to contain and reduce the sound generated by the plant's turbines within the power plant site. StructureCast chose to employ Whisper Wall technology to accomplish the State of California's sound level requirements for the project.

Noise Barrier walls reduce noise levels for people living next to highways, either by absorbing sound energy or by reflecting sound energy. Both methods work; however, sound absorption is more efficient and less likely to produce unexpected results. Sound absorbing noise barrier walls allow sound waves to enter the wall. As the sound waves travel through the sound absorbing mixture they are forced to change direction and follow a lon-

ger path. Every change in direction decreases the sound waves' energy. After the sound waves completes their journey through the wall, little, if any sound energy remains to reenter the environment.

In comparison, reflective noise walls abate noise by redirecting sound waves into the atmosphere. This is risky because reflected sound waves travel through the atmosphere and can bend upward or downward depending upon existing meteorological conditions. Consequently, as atmospheric conditions change, the accuracy to predict how reflected sound waves travel decreases. This explains why some residents living across from a reflective noise barrier may experience new sounds and / or increased noise levels.

StructureCast designed a wall system with a 50-foot height and Whisper Wall sound absorption material facing the turbines to contain and absorb the sound of the power plant. The structural backbone of the wall is the panel support column. The column was 50 feet in height and weighed over 65,000 lbs. each. The columns were pre-stressed and were supported by 48" caissons placed 25 feet deep. The site is in an area designated Seismic Zone 4. Placed in between each column was a pre-stressed wall with a smooth concrete finish on the outside and the whisper wall material on the inside of the wall. To further accent the plant's small footprint and the owners desire to fit into the surrounding foothills, the precast was colored to match the burnt red soil of the surrounding area. In all, over 265 panels were delivered and installed at the site – a contract valued at \$2.2 million dollars. One of the most interesting features of the wall and its design was the criterion that it be installed after the plant was built and operational. The two turbines and the power equipment were too large to install over such a high fence, so StructureCast was tasked with the challenge of erecting such massive columns and walls around existing operational equipment.

Only the versatility of precast could accomplish such a challenging set of project specifications.