



Kelso Depot / Mohave National Preserve Visitor Center Mohave Desert, California



Kelso Depot, Mohave National Preserve, California

Standing alone in the Mohave National Preserve, the Kelso Depot offers visitors and local residents a look into the desert area's history, as well as the technologically advanced future of Southern California with geexchange. The building was constructed in 1923 by the Union Pacific Railroad system to replace an earlier building. The grandiose architecture was chosen by the railroad to help it stay competitive with the Santa Fe railroad.

Kelso, then, was the fourth of six such style depots the Union Pacific built on its Los Angeles & Salt Lake (LA & SL) line in the 1920s. It served as a depot, a boarding/rooming house and a restaurant for the trains until 1985, when the historic depot closed its doors and was slated for demolition.

California Congressman Jerry Lewis requested that the Union Pacific not tear down the building. Local citizens immediately rallied to save the building, insisting it become officially

recognized as a historic structure and be preserved for its educational and aesthetic value.

The resulting press coverage, along with the sustained efforts of the newly formed Kelso Depot Fund, were ultimately successful and the Kelso Depot was rescued through their efforts. On October 31, 1994, the California Desert Protection Act was signed, and Public Law No. 103-433 shifted about 1,600,000 acres that had been the Bureau of Land Management's East Mojave National Scenic Area to establish the National Park Service's Mojave National Preserve, which included the landmark depot inside its territory.

Sometime in the middle of 2004, the Kelso Depot will open its doors again, only this time as a Visitor Center for the Mojave National

SYSTEM FEATURES

- Vertical closed-loop system
- 40 five-inch bore holes drilled 260-feet-deep each with 20 foot separations
- 400,000 BTUH of cooling peak
- 370,000 BTUH of heating peak (including domestic hot water)
- System mixes water-to-air heat pumps, water-to-water heat pumps and a single water-cooled DX air conditioning unit, all run on a BACNet system with Delta controls

*Geexchange field cost: \$140,000
Total HVAC system cost: \$600,000
Project completion date: 2002*

Preserve. The restoration project called for seismic strengthening of the building, as well as new building systems, including mechanical and electrical systems.

Since the owner of the center is the National Park Service (NPS), which makes it part of the Federal Government, the building must comply with strict energy-efficiency standards. Project designers and coordinators knew that whatever they chose to use to maintain the level of energy compliance necessary, it would have to be something that would work with the structure's historical preservation campaign and maintenance plan, as well as to ensure system longevity and the minimization of noise pollution.

The NPS performed a value analysis study before the redevelopment of the building, which, although not required, developed and evaluated all possible design schemes of the building. They also conducted an in-house cost analysis for the mechanical systems, which showed that a ground source heat pump (GSHP) was the best option for space conditioning the building. This study was duplicated by project design consultants at Guttman & Blaivoet, whose results found that the costs comparing the GSHP to an air-cooled chiller were not far from one another, but showed that other benefits supported the choice for geexchange.

The 20,000-square-foot facility required an energy analysis at the 50% design development stage. The designers incorporated a number of energy efficiency measures (EEMs)

into the 100% design development submission, and the DOE-2 model for the building had been updated based on this submission. The design includes awnings over all non-shaded windows facing east, west and south, as well as R-19 insulated walls and an R-30 insulated roof. As a result of this design, factoring in the GSHP, the building is 21% better than the 1998 Title 24 Standard Building.

Surveys conducted for the GSHP, the loop field design and installation, as well as thermal conductivity tests indicated a 40-ton geexchange system was needed to satisfy the building's needs.

Earth Energy Systems, Inc., installed the ground loop portion of the system into soil that was 95% sand, with very little rock, very little clay and no water. They worked with general contractor Pacific General to build a loop field of 40 vertical loops, 260 feet deep each. Every loop has a diameter of 4 ¾ inches, piped with 1 inch SDR-11 u-bend pipe, sealed with Bentonite grout with a thermal conductivity of 0.7. The loop field cost \$149,000 and was completed in 6 months.

The system was designed for 400,000 BTUH of peak cooling and 370,000 BTUH of peak heating, including domestic hot water.

Once the HVAC system was completed, the entire building's conditioning units consisted of a mix of water-to-air heat pumps, water-to-water heat pumps (for heating and cooling water), and a single water-cooled DX air conditioning unit. The entire system is run on a BACNet

system with Delta controls. The entire HVAC system cost approximately \$600,000, with only \$140,000 of that cost invested in the installation of the geexchange system.

No alterations of the building's structure were required and the NPS

can now enjoy the comfort, energy savings and peace of mind of the geexchange installation. The entire system stayed true to the integrity of the existing HVAC design, while improving the system's efficiency to levels above and beyond what is mandated by the NPS.

Project Participants

Building Information

The Kelso Depot
Kelbaker Rd., at the junction of
Kelbaker and Cima Roads, at
Union Pacific Railroad crossing,
Mojave Desert, CA

Building Contact

Mojave National Preserve
222 E. Main St., Suite 202
Barstow, CA 92311
(760)255-8800

Geexchange Loop Installer

Earth Energy Systems
Santa Rosa, CA
(707) 523-4363

Consulting Engineers

Guttman & Blaevoet
San Francisco, CA
(415) 625-0730

General Contractor

Pacific General
Mission Viejo, CA
(949) 770-2770

Drilling Contractor

Bertram Drilling
(406) 259-2532