ELARA ENGINEERING

Big Picture Thinking. Practical Approach. Sustainable Design.

Dundee Middle School MEPFP Infrastructure Replacement

Project Highlights and Results





- Completed MEPFP infrastructure replacement to address aged and inefficient equipment and systems for an all-electric building that had been served by 50-year-old, direct expansion cooling and electric heating, variable air volume air handlers, and package roof top units.
- Building infrastructure upgrades included a new geothermal heating and cooling system, packaged DOAS equipment, new lighting, a new fire alarm system, a new emergency generator, and a new domestic water system.
- Comprehensive energy modeling including geothermal modeling was used to design a 90 bore vertical geothermal well field.
- Geothermal water serves indoor water cooled variable refrigerant condensers and horizontal concealed variable refrigerant flow (VRF) evaporators with the ability to simultaneously heat or cool individual spaces.
- Ventilation is provided by roof or grade mounted, packaged, direct expansion cooling, natural gas heating "Dedicated Outside Air Systems" (DOAS) ducted to each space and served by a variable air volume (VAV) box to regulate ventilation air based on CO2 readings so as to not over ventilate the space and to reduce ventilation when spaces are unoccupied.
- To accommodate the district's academic calendar, project construction was completed in three phases (started and completed each Summer).[JF2.1] Each construction phase had to ensure that the new portion was served by the geothermal system while the original portion was maintained to remain in service until scheduled for renovation.

Project Background

Owner:	**Community Unit School District (CUSD) 300**
Location:	**4200 W. Main Street, West Dundee, IL**
Team/Team Lead:	**Chris Frauens, Mark Rockwood, Bob St Mary**
Elara Role:	**MEPFP Engineer**
Type:	**Infrastructure Replacement**

Project Overview

Building Type:	**K-12 Middle School**
Building Attributes:	**1-Story, 139,622 SF**
Initial Construction:	**1976**
MEPFPIT Systems:	**Geothermal Water Sourced Variable Refrigerant Flow (VFR) with Packaged Dedicated 100% Outside Air System, Demand Controlled Ventilation (DCV)**

Additional Project Details

- Designed and installed a hybrid geothermal system where the design intent was to have the ventilation air delivered by packaged rooftop DOAS to considerably reduce the overall number of geothermal wells needed by removing the latent load from the geothermal system.
- Each of the 90 geothermal wells was 450 feet deep and capable of approximately 3 tons per well to achieve the 270 tons required for the system. Piping from the field was routed to an existing, standalone pump house that was converted to accept the geothermal piping wells and manifold including the associated primary pumps serving the air-cooled VRF condensers in the building.