Geocomp
Technologies to manage risk for infrastructure

Project Brief

University of Northern Iowa UNI-Dome

Client:
University of Northern Iowa

Location:
Cedar Falls, IA

Services Provided:

- Design and installation of structural health monitoring system during stadium roof retrofit and restoration
- Service and restoration of system components for long-term reliability

Value Provided:

- Reduce risk to general public during facility events
- Provide backup system to verify performance of snow melt system for roof protection
- Keep facility open to scheduled events and allow for pro-active roof maintenance
- Provide component maintenance to assure long-term performance of monitoring system for its intended use

Background & Project Challenges

The University of Northern Iowa's multi-purpose indoor facility is a 424-ft-diameter domed structure. The UNI-Dome has a seating of approximately 16,500 for sporting events and 25,500 for concerts. The original UNI-Dome was a cable-restrained low-profile air-supported roof with compression ring built in 1976 at a cost of $7.5 million. Three times in its history the dome encountered difficulties that caused the roof fabric to sag, accumulate water, and subsequently tear.

In 1998, a hybrid roof system was installed to replace the air-supported roof. Stainless steel standing seam roof panels supported by structural metal deck and bar joists formed the skin of the peripheral area of the roof (75% of the roof area). The 45,000-sq-ft center polygon is enclosed with an arch-supported, PTFE fabric tensile roof. The new roof system, further modified since the 1998 reconstruction, utilizes a snow-melting system to prevent snow from accumulating enough to damage the roof structure. As a backup measure, a structural monitoring system was installed as part of the roof system retrofit.

Geocomp Role & Accomplishments

In 2003, Geocomp personnel designed and installed a structural monitoring system for the roof members, to measure excessive or eccentric snow loads on the roof skeleton. The structural monitoring system includes wind speed and direction sensors and strain gages placed on key structural elements near the top of the roof on the central ring beam system.

Strain gages were placed on ring beam structural elements to identify stresses that may approach levels where maintenance staff may be required to visually inspect roof conditions for excessive snow loads. The strain gages connect to a data logger that issue an alarm if assigned response values for calculated stresses are exceeded for any sensor. The system is accessed remotely for software modification or data retrieval.

This system provides continuous, real-time evaluation of the roof structure's response to high winds, snow-melt or uneven snow accumulation. The system was integrated into the University's building control system.

In 2014, Geocomp performed on-site servicing and replacement of system components to assure a reliable and long-functioning system for its original intended use.