



## *Case Study*

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### **Specialized Fire Protection for Special Community**

The Sisters of St. Joseph of the Third Order of St. Francis built the Clare Woods Academy, a school for children with special needs, as an adjunct to their church in 1968. Thirty-five years later, a portion of their 41-acre grounds was dedicated to the construction of a non-denominational retirement community.

Today the Clare Oaks campus, located in Bartlett, Illinois, is home to both senior adults and special children. The campus consists of four independent buildings: the original church and school structure, and newly constructed healthcare, independent living and recreational facilities.

Planners of the Clare Oaks community sought an integrated fire alarm system for easier monitoring and maintenance. It would have to incorporate the existing devices in the church and school as part of a distributed network linking all of the buildings. In addition, special occupancies such as those in the healthcare building necessitated a unique approach to emergency notification. Such a large-scale project involving both new construction and renovation presented a unique challenge for Gamewell-FCI Engineered Systems Distributor ISS (Intelligent Systems Services) of Bensenville, Illinois.

### **Modern Technology and Architecture**

John Consiglio, sales engineer with ISS, presented a solution utilizing Gamewell-FCI's E3 Series<sup>®</sup> Expandable Emergency Evacuation System as the backbone of the community's fire protection network. The system communicates using a peer-to-peer networking architecture by means of an ARCnet LAN, allowing all components to interface with each other over a single UTP (unshielded, twisted-pair) of copper wires.

Peer-to-peer communications means the system's intelligence is distributed throughout the network. Today's more simplistic systems house all data in one head-end panel, and if damaged, could halt emergency operations. A peer-to-peer network is designed to be more "survivable". Therefore if a failure occurs, the remaining system components continue to function properly.

Integration of the complete fire protection network via a single pair of wires throughout Clare Oaks' four buildings produced a significant savings in installation time and material expense. The reduction in conduit size and integration of the church and school building's existing initiating devices also greatly limited the installation's physical impact on the building's facade.

There are five FACPs (fire alarm control panels) that serve as the community's fire protection command centers: one for the school and church, one for the Assisi Health Care Center, another for the Carillon Commons recreational building and two for the San Damiano independent living building—North and South.

Although communication exists between all command centers, they function independently of each other. The remote annunciators located throughout the complex are connected to the network and configured to display alarm, trouble and supervisory signals from all systems. The ISS team also setup separate radio systems for each system to directly connect to the municipal dispatch center at the local fire department.

"There's a major advantage to having four separate, but networked systems," says Consiglio. "While all information is shared between the systems, there are separate radio transmitters that transmit on a dedicated frequency to broadcast an alarm and the address of its source directly to the fire department. Now fire fighters will know exactly which building to respond to before they leave the station."

### **Customized Programming**

The team from ISS not only engineered the system, they provided the equipment and performed the original programming. While each FACP has the same basic array of inputs and outputs, each can be programmed independently to fit the needs of a particular building.

The programming dictates what happens per a given input. Programming for Clare Oaks incorporated a wide range of initiating devices for inputs such as smoke and heat detectors, manual pull stations, water flow switches and supervisory devices for the sprinkler system valves.

The network's outputs include NAC (Notification Appliance Circuit) control for horns, strobes and chimes. When an input such as smoke detector or pull station is activated, the system is set up to automatically output alpha/numeric messages to a printer located in the Carillon Commons building, creating a permanent record of every event.

At the developer's request, ISS programmed all input events to transmit messages to wireless handheld devices carried by facilities staff. Each alphanumeric message includes information about the node reporting the event, a pre-programmed description and the exact location of the device.

All smoke detectors, heat detectors, pull stations and waterflow switches are programmed to activate a general alarm throughout the corresponding building. However, smoke detectors in the multi-room independent living apartments are handled differently.

"NFPA 72 (national fire alarm code) requires smoke detectors to be placed inside and outside of each sleeping area. These detectors come with sounders, which we linked together. When one detector is activated, all the detectors within that residential unit sound and a supervisory signal is sent," says Consiglio "If multiple detectors go into alarm in the same unit, a general alarm is sounded in all units and common areas throughout the building."

According to Rich Roherty, vice president of the fire protection systems' installing contractor, Blue Star Technology Systems, Inc., the setup of the sounders was an important contributor to the life safety of Clare Oaks' residents.

"Consiglio's ingenious solution was to program the fire panel so that every sounder in the apartment will activate in response to any general alarm in the building. That easily meets the NFPA sound level requirement rather than having to add a horn in each unit," says Roherty.

Per NFPA 72, if a smoke detector is activated in a living area, the sounder must emit a warning at a minimum of 75 db to awaken a sleeping occupant even from the next room.

The healthcare building's living facilities are single rooms with a very different fire protection design. Here, nurses are on duty 24/7. The smoke detectors are programmed to ring chimes and flash strobes to alert the on-duty staff, allowing them to investigate and determine the response. If a smoke detector in a resident room goes into alarm, the system sends a signal to the nurse's station and activates a red strobe outside of the room. With a quick glance down the hall, staff can quickly determine which room is in alarm.

To limit the spread of smoke or fire, ISS included door holders on each room, which automatically release to close the door to any room in alarm. Corridors throughout the Assisi Health Care Center comprise heavy fire doors held open by electromagnets, programmed to release to close during general alarms.

For the entire Clare Oaks complex, smoke control was integral part of its fire protection plan. A general alarm will trigger that particular system to shut-down all ventilating fans and close fire dampers to minimize the spread of smoke and toxic fumes. If activated, detectors located in the elevator machine rooms and lobby areas will initiate a general alarm and elevator recall functions.

### **Economies of Scale**

The San Damiano independent living facility is four stories high with 12 to 15 apartments on each floor and approximately 1,200 smoke detectors installed throughout. In projects of this size, a parallel relationship typically exists between the level of system functionality and cost of installation. Taking advantage of the E3 Series' peer-to-peer communications architecture, ISS was able to minimize that trend.

“We installed two [fire alarm] panels in the independent living building, one on the first floor and one of the third,” says Consiglio. “Instead of running all the devices to one head-end, they were wired to the closest panel. The panels only had to be connected with a single pair of UTP cables. This saved considerable amounts of copper, conduit and labor time without in any way limiting the optimal functioning of the system.”

The independent living building's FACP's have two separate circuit boards for programming and control. Each board serves as a node, providing the logic for the control of a string of devices by means of a data loop. The entire Clare Oaks fire protection network uses only 10 of the 64 nodes that the system can handle.

While new construction offers flexibility in fire system design, the backwards compatibility built into today's more advanced technologies allow older system's existing devices to be repurposed as part of a modern, high-tech fire protection solution. Case-in-point, the E3 Series firmware enables it to connect to existing SLCs (Signaling Line Circuits), identify compatible devices and integrate them into a network.

The fire system design created by ISS had to account for the existing Clare Woods Academy and church building's established system. With the E3 Series as its network backbone, ISS was able to conserve this particular's building's installed initiating devices, eliminating a large majority of wire runs a complete system replacement would entail.

### **Recipe for Success**

The Clare Oaks fire protection network had to meet the requirements of NFPA 72 (Fire Alarm Code) and NFPA 101 (Life Safety Code), to the satisfaction of the local AHJ (Authority Having Jurisdiction). The healthcare facility's fire protection system was also mandated to meet requirements set forth by the Illinois Department of Public Health (IDPH). Due to the myriad of requirements coupled with each system's customized functions, the Clare Oaks project was handled in stages. The Assisi Health Care Center was completed first, followed by the Carillon Commons recreation building and San Damiano independent living facility's North and South sections. The final phase involved integration of the school and church building's system.

A key ingredient in the smooth delivery of a life safety project of this magnitude is utilizing organizations well versed in the local requirements and the local regulatory culture. The ISS team assisted Blue Star with commissioning the system and interfacing with local AHJs. As the project progressed, Roherty's group found acquiring final approvals was greatly simplified.

“Thanks to ISS, we knew exactly what they [AHJs] wanted,” said Roherty.  
“Given our experience running fire alarm circuit wiring through conduit in this area, we in-turn helped ISS lay out the system in a way that minimizes conduit runs.”

### **In Summary**

Not only are both companies expert at what they do, but they know how to work together. The fire protection solution provided Clare Oaks was sophisticated, but flexible enough to offer some economic benefits. In the end, proven technology mixed with experienced fire protection design and installation are “key” to the successful implementation of life safety systems in diverse applications such as the Clare Oaks Retirement community.

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