

# Sonoma Veterans War Memorial Building

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Fire 74: Fire Protection and Suppression Systems  
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## **Team Gold Star**

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The Sonoma Veterans Memorial Building is one of eight Sonoma County owned and operated buildings that are dedicated to a public purpose in the memory of the men and women who have defended our nation. The role of fire protection equipment and systems is to contain/control fires before they get large and cause loss of life and property. In this report we will be exploring the fire protection systems for this building because we recognize that the safety of human lives, property and long-term profitability of the Sonoma Veterans Memorial building all hinges on their quality.

This Veterans facility is located two blocks from the historic Sonoma plaza at 126 First Street West in the city of Sonoma, California. Designed by architect J. Clarence Felciano this 16,200 square feet building was built in 1952 and is now over forty-eight years old. The building site sits on 10.2 acres, the largest of the eight memorial locations in Sonoma County, and is adjacent to a Memorial Cemetery. *See diagram D-1 for building floor plan.*

### **General Building Description and Purpose**

The Sonoma Veterans Memorial Hall is a spacious single story commercial facility with concrete walls and wood frame construction. As defined by the California Building Code this building is an A2 classification. Structural highlights include bowstring trusses in the auditorium and a roof is comprised of diagonal sheathing over wood joists.

This building was structurally evaluated in February of 1991 and seismic retrofitting was done. In May of 1991 seismic retrofit was completed and columns hold downs, and sheer walls were all added into place. The building was also retrofitted with an automatic sprinkler system in January of 1996 and a new roof was installed in the summer of 1996. In September of 1997 steel

beams were added under the wood trusses and steel columns were added to support the overall structure of the building.

The building features a spacious carpeted lobby, large 80' x 55' auditorium with hardwood floors, a retractable theater style seating system and theatrical stage with full lighting capabilities. The building is equipped with a full commercial kitchen featuring a pass through counter to the 63' x 33' dining room. There is also a 45' x 19' lounge room, office area, shop room, restroom and shower facilities and ample storage space. *See diagram D-2 for specific building occupancy standards.*

This dedicated memorial is used for meetings, events and ceremonies by the veterans and public year round and has been identified as an emergency shelter, disaster response and post disaster recovery location if needed.

### **Operation and Maintenance Responsibilities**

Responsibility for operating this building transferred to the Regional Parks Department in 1978 and since then its use and operation have been managed by the Regional Parks Department, which handles all the marketing, booking and collection of rental fees. In the mid 1990's, building maintenance responsibility was transferred to the Facilities Operations Division of the General Services Department. The grounds are maintained by Regional Parks. Capital projects are managed by the General Services Architecture Division and funded through the Capital Project Budget, with most of the capital funding coming from the County's General Fund.

## **Fire and Life Safety Overview**

The faster the building occupant and fire service personnel can respond, enter, locate the incident, and safely operate in a building, the sooner they can mitigate an incident in a safe manner for themselves as well as occupants. Fire protection systems and equipment are installed in buildings to protect employees, the public, the property and the firefighters that will respond to an emergency. Like most other types of equipment, fire protection systems and life safety equipment need periodic inspection, testing and maintenance to ensure reliability.

The building is equipped with fire extinguishers with classifications that are appropriate for their location. The kitchen is equipped with a Wet Chemical Extinguishing System over the gas range. There is a fire alarm panel with detectors that are monitored by the local Sonoma Fire District. There are fire sprinklers throughout the Dining room, Lobby, Lounge, Auditorium and stage area. The buildings Auxiliary services also mitigate the dangers. *See diagram D-3 for Fire and Emergency equipment plan.*

## **Sprinkler System**

The NFPA standard 13 addresses the installation and design of commercial sprinklers. The wet pipe sprinkler system in this building consists of 2 ½ inch steel piping. A wet pipe sprinkler system consists of water already in the piping ready to suppress in the event of a fire. The sprinkler system runs throughout the entire building and can flow roughly 20-40 gallons of water per minute. The system is fed by one of the two 5 inch underground water lines. The underground lines are estimated to have 65-85 psi of residual pressure.

There are also sprinklers that run both above the stage and underneath it for added suppression. Another unique location for the sprinklers is under the eaves and over hang on the

outside of the building. The sprinkler system is automatic and requires no human interaction. The system activates when the sprinkler heads are exposed to extreme heat, inside the glass bulb is a liquid that expands when exposed to heat, when the liquid expands the glass breaks. The sprinklers in the building are classified as ordinary with a temp range of 135-175 degrees F. There are different heads with different liquids that expand at different rates in the frangible glass bulbs according to heat temperature. These frangible bulbs are identified by different color liquids that represent the temperature ranges. The sprinkler heads/ nozzles are strategically placed to spray large amounts of water on a potential fire. Only the heads exposed to the heat will activate. There are different designs of heads in the building specifically engineered to work different. When activated, the system will run until turned off by the fire department. Replacement heads are required and they can be found in the building by the riser. It is very important that when a sprinkler head needs to be replaced that it is replaced with the same type of head so this facility has replacements on hand for that very reason.

The components of a sprinkler system consist of piping, sprinkler heads, valves, and Fire department connections (FDC). Each sprinkler system includes a water supply main which is the piping that connects the sprinkler system to the main water supply (the underground municipal main). System Risers extend vertically from the water supply to feed the cross or feed mains. Feed mains are piping that supplies water to the cross mains. Branch lines are pipes that contain the individual sprinkler heads. The fire department connection is located on the outside of the building. This Connection is used to augment the water supply and pressurize the system. The fire dept connects and pumps water into the system, this connection is above the water supply valve. The FDC connects to the riser above the check valve. The piping is set up in this manner

so that even if the OS&Y are shut the fire dept can still get water to the sprinkler system through the FDC. The buildings FDC are 4 inch piping with 2 ½ inch connections.

Many municipal, government and health department buildings require a back flow prevention device between the public water main and the automatic fire sprinkler system. The Sonoma Veterans building has two back flow devices that for extra protection. Any FDC must be situated between the backflow prevention device and the sprinkler riser. Tamper monitors are located on the OS&Y valve which will alert those monitoring off premises that there is a problem. A water flow indicator is located on the riser this indicator will sound an alarm when water is flowing. The flow indicator consists of a paddle that protrudes through the riser into the water way. Movement of the paddle sounds an alarm. The paddle is thin and pliable so as not to obstruct the water flow. The 1987 insurance services report that sprinkler system controlled 98% of fires. These sprinklers systems are not tested by the fire department but by certified licensed technicians every five years. The NFPA standard 25 addresses the inspection, testing, and maintenance on the sprinkler systems.

## **Suppression System**

The Wet Chemical Extinguishing system in the kitchen is a pre-engineered system. The following components makeup the system: storage tank for the expellant gas and agent, Piping to carry the gas and agent, Nozzles for dispersal of the agent, and actuating mechanism. This system is designed to activate when the fusible link in the hood and duct system melts in response to heat. The fusible link triggers a mechanical release that starts the flow of expellant gas and agent. This system can also be manually activated from a pull station. This system is inspected monthly by Sonoma County's FAC OPS division. If the Wet Chemical system were to

be activated and the agent discharged, the kitchen would not be allowed to be operational until the health department does there inspection.

### **Fire Control Panel**

The Fire Alarm control panel at this location is what contains the controls, relays, switches and necessary circuits to furnish power to a fire detection system, and receive signals from detection devices and then transmit them to signaling devices and auxiliary equipment. This control panel runs on normal AC power but also has a 24-volt standby battery, and an emergency generator. Because the fire detection system must be able to perform in an emergency without failure, the control panel is required to provide a trouble signal in the event of a power failure, an open circuit or a ground fault. It should give an audible or visual trouble signal on the panel.

Another function of the control panel is accepting a signal from the detection device and triggering the various audible devices *and* auxiliary devices such as fire doors, fan shut-offs, and multiple other things. The control panel will also provide test switches, as well as control switches for testing lamps, drills, etc. There will also be switches to silence the alarms, reset the system, or disconnect certain circuits.

The detection systems at this facility can be activated manually, and automatically. The manual activations consist of single-action and double-action pull stations. A double-action pull station means you have to push in, to expose the pull-down lever. These are near major exits and also spaced through corridors. This building also has thermal heat detectors, which are mostly rate of rise detectors in that they activate when it detects an abnormally high air temperature. Heat detectors are the cheapest form of detection device but are suited mainly for smaller, enclosed areas. In addition to the heat detectors, we also have both types of smoke detectors,

ionization as well as photoelectric. The ionization smoke detector uses a small amount of radiation to ionize the air which makes it conductive, and then when the combustion particles enter the chamber, they attach themselves to the ions and reduce the current flow which in turn activates the alarm. As for the photoelectric detectors, when the combustion particles enter the chamber, it obscures the photoelectric beam between the light source and the receiving element which activates the alarm. Smoke detectors are more costly than heat detectors but are faster to respond because smoke does not dissipate as fast as heat does.

Flame detectors are also scattered throughout the premises, they are fast with response but have a high rate of false alarm. Also these have to be places where they can “see” the entire room since they work on line of sight. Being blocked by stacking material will render them useless.

### **Auxiliary Systems**

Auxiliary services are special fire detection and alarm systems that can be designed to perform special functions for buildings that have special requirements in the event of a possible emergency. The Sonoma Veterans Memorial Building has several examples of auxiliary functions in place to enhance the overall safety of the facility. There are magnetic doors with magnetic door stoppers (see P-4), when fire alarm is activated the magnets are released to close and seal off. This door release closes the auditorium so that smoke and/or fire door will not spread to other parts of the building.

The heating, ventilation and air conditioning (HVAC) system will also shut down the system’s blowers and ensure dampers are actuated when there is a fire to prevent the spread of fire or smoke throughout other parts of the building. The duct smoke detector is equipped with

an auxiliary relay that immediately cuts power to the fan motor before significant amounts of smoke can be distributed to hallways, the auditorium or dining areas.

When the emergency system is activated in the kitchen there is also an auxiliary function that will shut off all gas to the entire kitchen as well as an added precautionary measure to make sure that there are no additional hazards or explosions due to the presence of gas.

In addition to the above auxiliary systems this facility has also installed other safety devices and equipment to enhance the overall safety of the building. There are flame retardant curtains that line the windows and stage so that the bulk of the fabric material in the building is not highly flammable. There are also exit signs that are powered by electricity and back up battery in the event of a power outage and glow in the dark reflective strips that line key walk ways to illuminate exit routes. There are several portable fire extinguishers located throughout the building and the commercial kitchen is equipped with both a Class K and Class B,C fire extinguisher.

## **Summary**

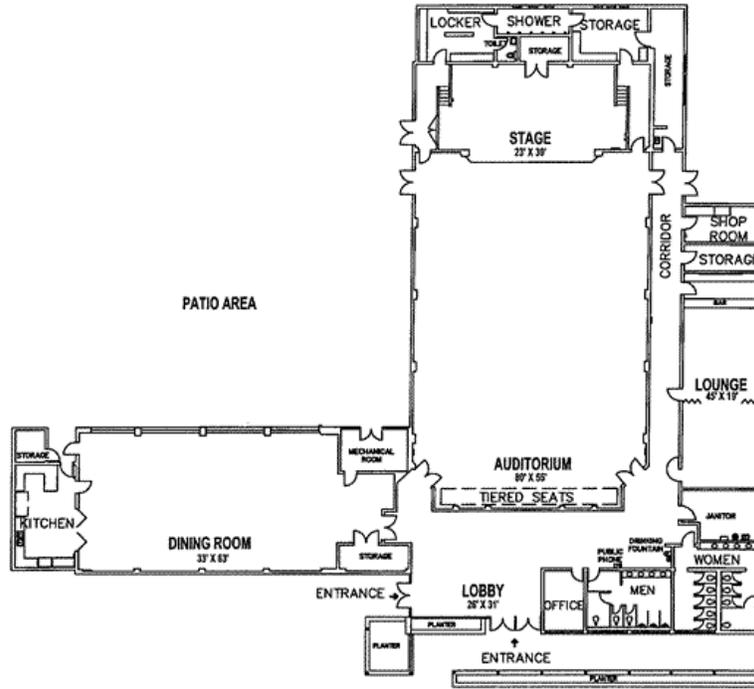
Fire is one of the most serious threats to a building, with consequences that can include harm to occupants and firefighters, damage to the structure and its contents, loss of building use, visual harm to the streetscape, and impact on the tax base. When a fire occurs it must be extinguished as soon as possible to prevent a major loss of property and/or life. If detection occurs early, then a portable fire extinguisher may be very effective. However, a flaming fire can rapidly exceed an extinguisher's capabilities. When this happens the fire department must apply large volumes of water to prevent complete loss. An alternative is to provide an automatic fire suppression system that can detect the fire and start to control or even extinguish it before

the fire department arrives. This will reduce the amount of damage and recovery effort needed to place the building back into use.

When it comes to safety and security, there is no margin for error. We covered several of the main features of this buildings fire detection and suppression systems and can see how they play a vital part in recognizing the early signs of a fire and in summoning aid. The Sonoma Veterans Building is an older facility that has continually upgraded their emergency systems to remain current with the laws and keep the occupants safe. Not only are lives saved by the presence of fixed detection systems, but damage to property can also be limited if trained help can be summoned as quickly as possible.

**SUPPORTING DIAGRAMS**

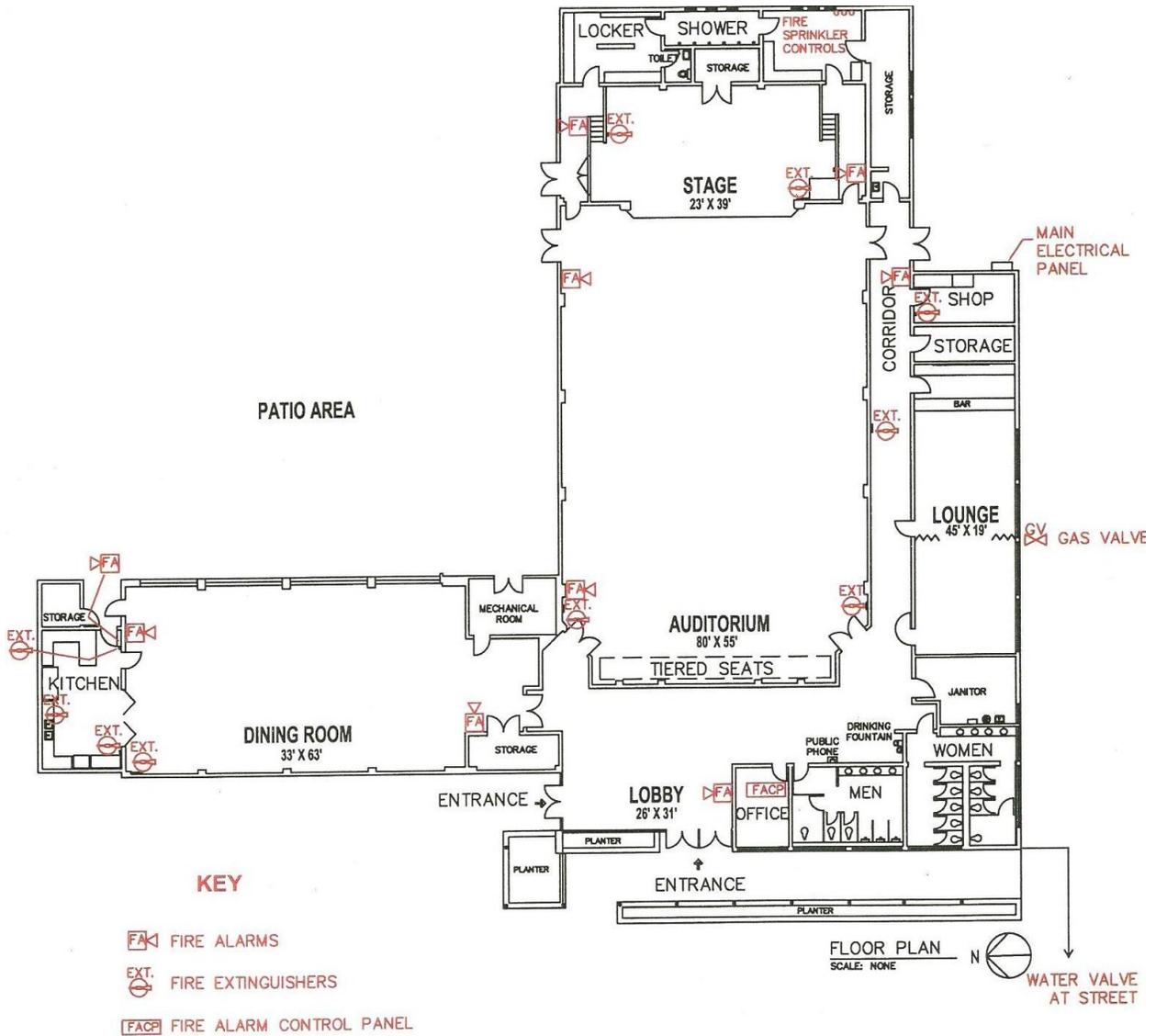
**D-1: Sonoma Veterans Memorial Hall Floor Plan**



**D-2 Occupancy Guidelines**

ROOM	CAPACITY			
	Assembly	Seated	Dining	Dine/Dance
<b>Auditorium</b> 80' x 55'	700	500	300	225
<b>Dining Room</b> 63' x 33'	309	240	144	90
<b>Lounge Room</b> 45' x 19'	141	85	66	n/a

**D-3 Fire and Emergency Equipment Plan**



## **SUPPORTING PICTURES**

Please see the attached power point file for all of our supporting pictures that accompany this report. These images will also be used in our in class presentation to give a better understanding of the fire systems present in the Sonoma Veterans Memorial Building.