



Fire & Life Safety Deficiencies Identified in Buildings that House Cultural Resources



Developed by the Branch of Structural Fire
For the Associate Director of Cultural Resources

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The following report is one in a series of reports being generated by the Branch of Structural Fire, which is under the Division of Fire and Aviation Management, Visitor and Resource Protection. Reports are being generated for program areas that have significant risk to life safety and the resources entrusted to the National Park Service from the effects of structural fire. These reports are being developed for other program areas in the NPS. The Structural Fire Program exists to help parks meet the technical complexities of structural fire protection Servicewide. The program emphasis is on fire prevention and education in the interest of protecting life, structures, and their contents from the effects of fire.

Sadly, the National Park Service has a history of losing irreplaceable collections to structural fires. The most recent example points to a significant loss of collections at the Flight 93 National Memorial, which included a flag that flew over the U.S. Capitol on September 11, 2001. In 2007, 5,000 vintage costumes valued at over \$1 million were lost at the Waterside Theatre complex in Ft. Raleigh National Historic Site, home of the *Lost Colony*

Gun belonging to John Wilkes Booth.

production. Many of the costumes dated back to the 1940s.

The majority of structural fire losses in the NPS are due to the:

- 1) Lack of properly designed, installed, and maintained fire sprinkler and fire alarm systems.
- 2) Remoteness of many parks and their reliance on getting volunteer emergency response forces on scene in a reasonable time to affect a positive outcome.
- 3) Lack of NPS personnel with the appropriate knowledge or authority to implement and enforce a fire prevention program.



The prevention of a fire is the most logical, economical, and effective means for parks to protect structures and their contents. The Waterside Theatre fire was likely caused by an electrical malfunction, a cause that is completely preventable with an aggressive fire prevention program. The building was not equipped with a fire alarm system that would have notified emergency responders of the fire and it lacked a fire sprinkler system that may have kept the fire in check until responders arrived on scene. Either system likely would have contributed to a more favorable outcome and certainly a much less significant loss.

The NPS has cataloged approximately 117,957,802 million artifacts, archives, and objects. Collections include items ranging from historic furnishings in the home of John Adams to flags that flew over Fort Sumter, Thomas Edison's handwritten invention notes, botanical specimens from Yosemite, and archeological items from Mesa Verde. Protecting these items for future generations is the core mission of the NPS and preventing their loss from structural fire is our programs soul mission.

Fire prevention starts with employees and managers being aware of their responsibilities and being empowered to take action. Effective fire prevention involves many things. Items must be

stored correctly; clutter must be eliminated; electrical wiring must comply with electrical codes; and fire protection systems must first be designed and installed correctly, and then properly maintained and tested annually by qualified vendors.

The content of this report comes from fire and life safety building inspections, called Fire Protection Condition Assessments (FPCA), performed since 2005. The Structural Fire Program contracted with fire protection engineering firms to conduct these inspections and gather information. These inspections assess each building's compliance with National Fire Protection Association (NFPA) codes and standards, specifically NFPA 1 *Fire Prevention Code* and NFPA 101 *Life Safety Code*. In order to provide information for NPS program areas, the inspections collect data pertaining to different categories, such as the historic nature of the building, whether the building houses collections, and whether the building is operated under a concessions contract. To date, we have inspected approximately 23% or 6,673 of the 29,116 buildings that require a fire and life safety building inspection in the NPS. As mentioned, one of the subsets of data collected during the inspection is whether or not the building houses any culturally significant resources. Building occupants were asked if items stored in the building met any of the following definitions:

- Irreplaceable
- Replaceable
- Reproducible
- Not of historic significance

Of the 6,673 buildings inspected, 377 were reported to house collections considered irreplaceable by the occupant. This report will focus on fire and life safety deficiencies found in these 377 buildings.

FPCAs LINK TO FMSS

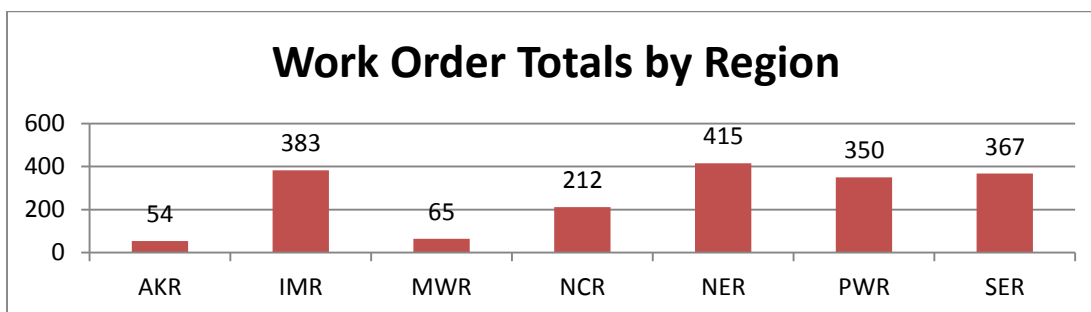
As mentioned, FPCAs involve a formal assessment of a building's compliance with nationally recognized fire codes, but simply assessing a building and putting its information in a database does little to get the deficiencies corrected. Once deficiencies are entered in the database, they are reviewed by the Regional Structural Fire Manager (RSFM) to determine if they warrant a work order in the Facilities Management Software System (FMSS). RSFMs determine what type of work orders should be placed in FMSS, then they assign the deficiency back to the engineers who provide a Class C cost estimate and a Risk Assessment Code (RAC). Deficiencies are transferred out of the FPCA database and into FMSS to generate the actual work order.

FPCA WORK ORDER NUMBERS BY REGION

Not all deficiencies found by FPCAs will warrant a work order. Some can be corrected by doing something as simple as moving boxes away from sprinkler heads or moving file cabinets from required exit routes. The RSFM, as the delegated Authority Having Jurisdiction (AHJ) for the region on structural fire matters determines whether a deficiency warrants a work order in FMSS.

To help explain this process, consider a defining feature of a historic building, such as a stairwell. The inspector might tell us the stairwell needs to be enclosed in order to meet the fire code, but the AHJ working with regional architects may determine that enclosing the stairwell is not an acceptable option. Together, they may agree that installing a fire sprinkler system in the building creates an acceptable solution that minimizes alteration of the historic fabric, is an acceptable alternative to the fire code, and provides adequate fire safety to the building's occupants.

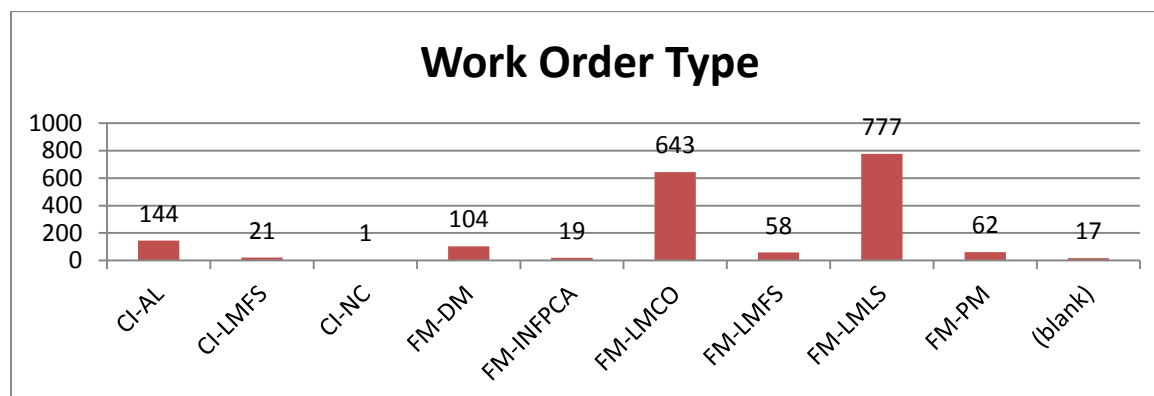
Currently, 3,921 fire code deficiencies have been identified in 377 buildings housing irreplaceable objects; 1,846 warranted a work order in FMSS. The graph below shows a breakdown of these deficiencies by region.



DEFICIENCIES BY WORK ORDER TYPE

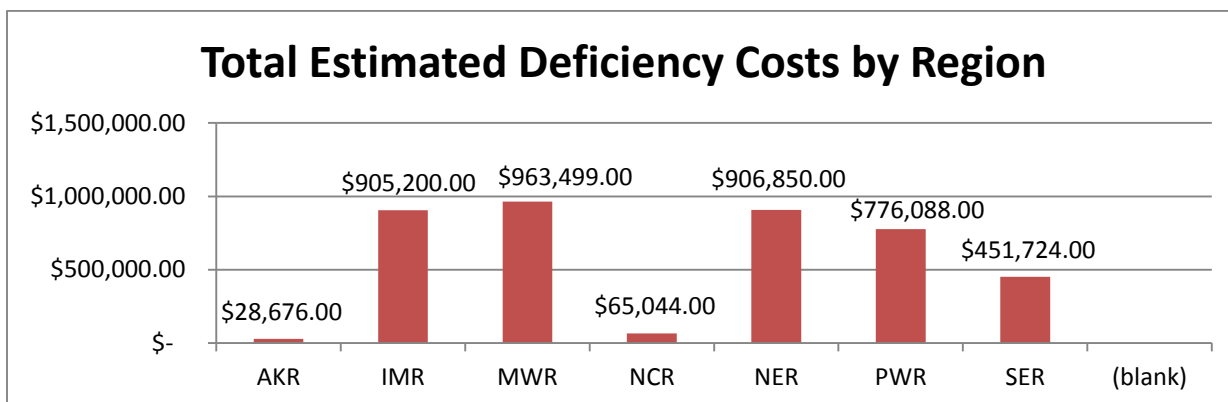
Fire and life safety deficiencies identified in the FPCA inspection process are assigned a Work Order (WO) type by the RSFM. The WO type and the RAC will greatly affect the funding priority to correct the deficiency. Legislated Mandated Fire Safety (LMFS) deficiencies will always improve the work order's priority. The chart below shows work orders currently in FMSS for buildings housing irreplaceable artifacts by work order type.

[Link to Work Order definitions](#)



FPCA WORK ORDER COSTS BY REGION

A total of more than \$4 million in Class C cost estimates have been entered into FMSS for buildings housing irreplaceable objects. A Class C cost estimate means the work order has been provided with a FMSS cost estimate by the inspector. The chart below shows the total cost estimates of all deficiencies in FMSS by region:

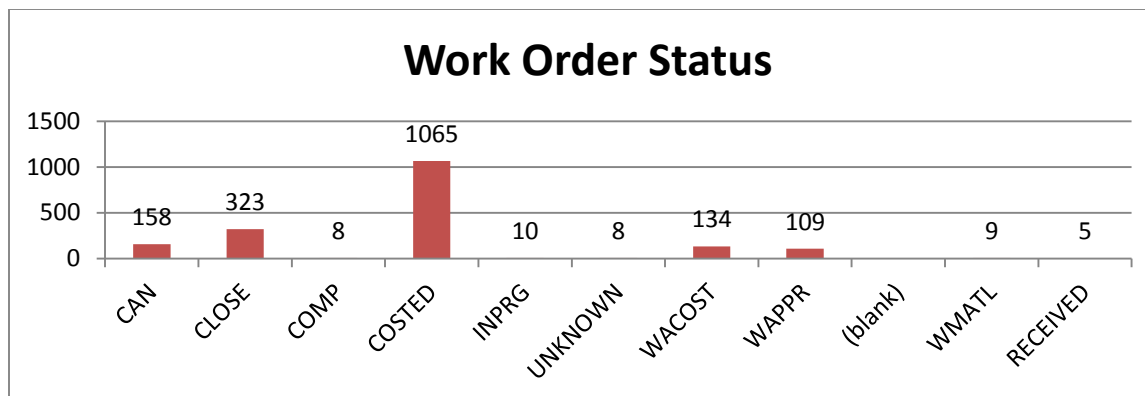


RISK ASSESSMENTS OF WORK ORDERS

The RAC is one factor that is considered to fund a work order. All work orders are required to have their risks evaluated. A RAC of 1, 2, or 3 require an immediate or interim control measure to take place. This might involve closing the building until the problem can be fixed or it may be as simple as installing battery operated smoke detectors in bedrooms, until a code compliant hard-wired system can be funded. A total of 354 deficiencies out of 3,921 were considered serious enough to warrant a RAC of 1, 2 or 3.

TRACKING A WORK ORDER IN FMSS

The FPCA database automatically receives information back from FMSS, so we can easily track the status of all work orders. Ultimately, we want to see all work orders completed or closed. Completed work orders means a project has been finished, but not all of the paperwork has been accomplished. Closed WOs means a project has been through the entire work order cycle and all the paperwork has been completed. It does not always represent a WO that was closed for other reasons. The following chart depicts the work order status of all the deficiencies related to buildings housing irreplaceable objects. A total of 8 WOs have been completed, 323 are closed, and 1,065 have been costed with no further action taken. The chart below shows all the work orders by their status as it exist in FMSS currently.



FIRE SPRINKLER SYSTEMS

Fire sprinkler systems at a minimum require annual testing and maintenance by a qualified contractor. A total of 156 of the 377 buildings housing collections had a fire sprinkler system in them. A total of 85 or 54% of these systems did not have the required annual inspection and testing completed.

Additionally, 80 buildings housing irreplaceable objects with fire sprinkler systems were not installed properly or have not been maintained properly in accordance with fire code requirements. Based on the observations by the inspector at the time of the inspection, in their professional opinion, the fire sprinkler system in many of these cases would not work effectively to protect the structure or its contents from the effects of a fire.

Fire codes require sprinkler systems in some occupancy types to protect its occupants and contents from fire. Fire sprinklers buy precious time. They allow occupants to safely exit the building and often extinguish or hold the fire in check to increase the chances for firefighters to save or reduce the destruction of its contents.

While the installation of fire sprinklers should be considered to protect all buildings housing irreplaceable objects, the fire code requires them only in certain occupancy types. In the fire codes, occupancy refers to how the building is used. At the time of the inspection, the following buildings that housed irreplaceable objects were required by fire code to have a fire sprinkler system, but did not.

Year	Region	Park	Location #	Asset Description
2005	MWR	JEFF	19270	Old Courthouse

FIRE ALARM SYSTEMS

A total of 247 of the 377 buildings housing irreplaceable objects had fire alarm systems installed. Almost 55% (137) of the installed systems did not have the required annual inspection and testing completed by a qualified person. Additionally, 45 buildings housing irreplaceable objects with fire alarm systems were not installed properly or have not been maintained properly in accordance with fire code requirements. Based on the observations by the fire protection

engineer at the time of the inspection, in their professional opinion, the fire alarm system would not work properly to provide early notification to emergency responders or occupants that a fire had started in the structure.

While the installation of fire alarm systems should be considered for each NPS building housing irreplaceable objects, the fire code requires of them only in certain occupancy types to protect its occupants and contents from fire. Fire alarms quickly alert the occupants to a fire, allowing them to safely exit the building. It also sends early notification directly to responding fire departments that there is a fire in the building. At the time of the inspection, the following four buildings housing irreplaceable objects were required by fire code to have a fire alarm system, but did not.

Year	Region	Park	Location #	Asset Description
2005	IMR	GRTE	16142	B - B0218 Colter Bay Visitor Center/Office Building/Museum
2005	IMR	GRTE	52848	B - (HS)0133 BRINKERHOFF
2007	PWR	NOCA	16678	Marblemount Curatorial Building #1040
2009	MWR	HOSP	61295	HOSP Buckstaff Bathhouse Building 102

ELECTRICAL FIRE HAZARDS

Electrical hazards are one of the leading causes of fires in America. Older buildings wired before the advent of modern building codes are particularly susceptible to electrical fires. A total of 44 buildings housing irreplaceable objects that were inspected had electrical problems, such as worn exposed wiring or excessive use of extension cords.

FIRE EXTINGUISHERS

Fire extinguishers are the first line of defense when fires occur. Staff that is trained to safely use a properly maintained fire extinguisher can make the difference between a small fire and one that leads to the loss of a building and its contents. Of the 377 buildings housing irreplaceable objects, 235 had portable fire extinguishers that were not minimally maintained in accordance with national standards.

CONCLUSION

This report highlights some of the more important data that is available in the Fire Protection Condition Assessment (FPCA) database and a reminder that it is inspection data for only 23% of our buildings in the NPS. The attached spreadsheet is a complete list of all deficiencies identified in all buildings housing irreplaceable objects inspected to date. The data is broken out by region, by RAC assignment, and work order status. You will also find a work order number useful for referencing work progress.

I would like to suggest that Cultural Resources assign a liaison to discuss this report in more detail and to develop short term and long term strategies to prioritize and resolve these

deficiencies. Brian Johnson, my Fire Prevention Program Manager is available to work with you on these issues and can be reached at (208) 387-5497 or brian_johnson@nps.gov.

We look forward to partnering with you to develop priorities and strategies to protect our artifacts, archives and objects from the effects of fire.

Regards,

Hal Spencer
Chief, Branch of Structural Fire

Photos on the front cover:



Fort Sumter National Historic Site - Photograph of the original Fort Sumter Flag now on display at Fort Sumter. The fort is best known as the site upon which the first shots of the American Civil War were fired.



Hubbell Trading Post National Historic Site – Is the oldest continually active trading post on the Navajo Nation. The collection contains over 350,000 individual items, including the family archive of 264,000 business records.



Guilford Courthouse National Military Park - The museum located in the Visitor Center is full of Revolutionary War artifacts, such as weaponry, cannon, musket, and rifle balls, surgical instruments, and much more.