

# Executive Summary

## **Introduction**

On December 17, 2010 at 0243, Provo City Dispatch received a radio transmission from an off-duty Provo Police Officer working as a contracted security guard at the Provo Tabernacle reporting a fire at that location. The resulting fire would result in a fire loss of over 15 million dollars, and significantly damage a historical landmark. The ensuing investigation would last for 12 weeks with the final investigative report being issued on March 31, 2011. This is a summary of the investigative report.

## **Background**

The Provo Tabernacle is owned and operated by the Church of Jesus Christ of Latter-Day Saints. Construction began on the Tabernacle in 1883, completed in 1886, and was dedicated on December 8, 1898. The building is constructed of unreinforced brick, five wythes deep with a roof structure consisting of up to ten rough cut 2 x 12 inch planks held together with iron bolts. The roof deck was 1 x 8 planking and plywood with cedar shakes. The floor was 1 inch tongue in groove planks on top of 2 x 12 inch rough cut floor joists. A balcony lines the North, East, and South interior wall and was supported by 2 x 12 rough cut joists inserted into the masonry walls and 18 iron columns. Stairway access to the balconies was located in octagonal-shaped turrets located at each of the four corners of the structure. The ceiling deck consisted of lath and plaster on the interior ceiling supported by 2 x 8 ceiling joists topped with a plywood deck.

The building had a fire detection system that was installed in 1985. The system was local to the building only and was not monitored off-site. The system consisted of smoke detectors located in the attic space, turrets, east and west lobby, and the crawl space. The system was controlled by a fire alarm control panel located in the west lobby. According to the building coordinator and members of the Facilities Maintenance group the fire alarm system had a history of giving false alarms, up to a couple of times per month. The fire department only responded to one false alarm in the last five years prior to this incident. On December 2, 2010 the system was inspected by BEST Building Systems. The system was failed due to unacceptable detector sensitivity. Provo Fire & Rescue the Authority Having Jurisdiction (AHJ) was not advised of the systems failure as is required by state law. There were no other fire protection systems in the Tabernacle at the time of the fire.

The Tabernacle was scheduled to host a Gloria concert performed by Lex de Alzevedo and the Millennial Choir. The production was to be recoded by BYU Broadcasting. In support of this project, Trax Lighting and AV was contracted to provide production lighting, and APS Security was contracted to provide security for the production equipment.

## **The Gloria Production**

On Wednesday December 15, 2010 Trax Lighting and AV arrived at the Tabernacle to begin to set up for the production.

They were somewhat familiar with the structure because they attended the “tech shoot” in November and were shown around by the building coordinator, Robert Rasmussen... According to the producer Tyler Weston and the lighting technician, Jeremy Ostler the original plan did not include a suspended lighting truss. Jeremy Ostler stated that he added the suspended truss because he did not feel that he could adequately illuminate the performers without the suspended truss. At some point on the decision was made to suspend the lighting truss. Mr. Ostler made access into the attic to suspend the lighting truss. It is unclear how he accessed the attic. He first stated that Bob Rasmussen had let him in; however, he later stated that he used the keys on his key ring until one of them opened the door, and finally he stated that the door was not secured. Mr. Rasmussen disputes that he allowed access or that the door was unlocked.

Mr. Ostler brought two 6 foot sections of triangular aluminum truss, a yellow 10 gauge extension cord, and a nylon rope into the attic to suspend the truss. Mr. Ostler states that he set aside the two east incandescent light fixtures and placed the triangular trusses over the 2 x 8 wooden boxes and attached the chains to the trusses. When asked about the status of the lamps in those fixtures Ostler stated that the fixtures were not connected to any wiring. He later stated that they were attached with an electrical tether using wire nuts. Mr. Ostler never indicated that he removed the lamps from the fixtures he removed to suspend the lighting truss. Mr. Ostler stated that he placed the light fixtures onto the plywood deck. Mr. Ostler stated that there were no lamps in the fixtures although he does not say how he reached that conclusion. He also stated, in a subsequent interview that the fixtures were “light as a feather” so there would not have been lamps in them. Mr. Rasmussen, as well as Pete Crane and David Knecht all state that there were lamps in all of the eight incandescent lamps and all were functioning except for the northeast fixture that had a burned out bulb. It should be noted that the eight incandescent light fixtures were not energized on December 15.

On Thursday, December 16, 2010 Mr. Ostler returned to the Tabernacle to complete the lighting set up. He suspended the lighting truss, set up his dimmer racks, and used one of his dimmer boxes to connect into the Tabernacles eight fixture incandescent dimmable lights. He stated that the lighting truss was suspended by mid-afternoon. It should be noted here that all of the production lighting was powered by a small trailer mounted generator located in the south side of the west parking lot. According to Mr. Ostler, the only house power used by Trax Lighting was the power drawn from an attic outlet used to power the chain crawlers.

At approximately 1300 the BYU Broadcasting production crew arrived and began to load in their equipment. All of the television production equipment was powered through the production trailer, which was powered by a large generator in the west parking lot.

At 1900 the dress rehearsal for the Gloria production began. It was at approximately this time that the house dimmable incandescent light circuits were energized. During the dress rehearsal the cast and crew reported several instances of breakers tripping as the set designer attempted to bring all of the Christmas lighting on line. There was no evidence that these breaker trips were related to the origin and cause of this fire. Several member of the cast also reported smelling “hot glue” or “hot lights”. None of these individuals reported their concerns to the fire department. At 2000 Ostler removed the chain crawler controllers and took them to the attic.

He reported that there was nothing unusual. The following photographs show the production lighting for the Gloria Production, Thursday afternoon and again at 2142 Thursday evening.

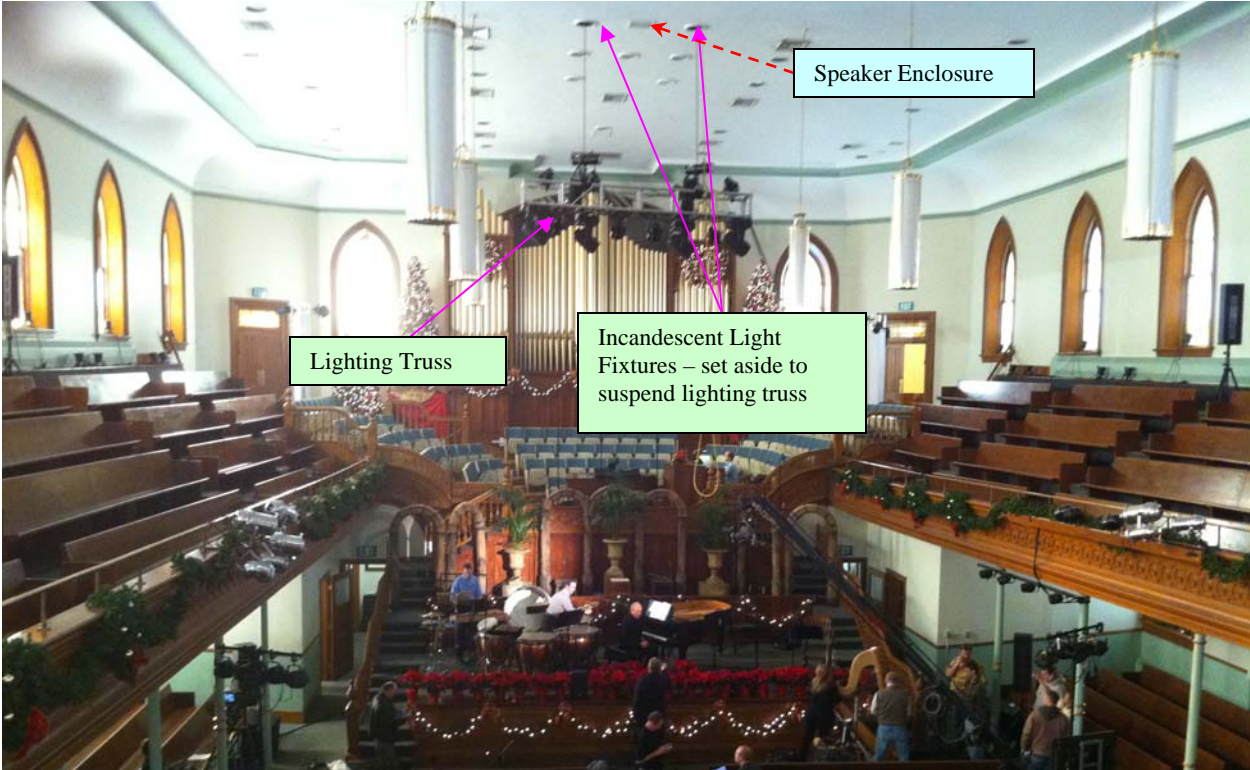


Photo courtesy of Tyler Weston



Photo Courtesy of Tyler Weston

At 2100 Austin Williams, an off duty Provo Police Officer working for APS security and Brian Bunton, a camera operator arrived at the Tabernacle. Austin Williams went into the audience and watched the remainder of the rehearsal. At 2130, the camera operator stated “I smell smoke” over the production headsets. He discusses the odor with another camera operator, Scott Morgan and they attribute the odor to hot lights. The unusual odor was not reported to the fire department.

At approximately 2200, the dress rehearsal was completed. The BYU production crew disconnected all of their cables and coiled them in the doorway of the NW turret. Mr. Weston and Mr. Williams walked through the building to make sure all of the doors were locked. Mr. Weston did not show Williams the attic access. He, Weston, asks Williams to reset the heat every three hours to protect the instruments and some of the fragile plants used in the set. Mr. Ostler unplugged all of the power cords from the small generator and coiled them in the west door. Mr. Williams used duct tape to hold the west door in an unlocked position so that he could reenter the building to reset the heat or use the restroom. At 2315 all doors except for the west door were closed and locked and all power from the generators had been disconnected. Mr. Ostler left the building at 2315. He was the last person out of the building that night.

### **December 17, 2010**

At 0030 Williams drove around the block to check the perimeter of the building. He did not report anything out of the ordinary.

At approximately 0100 hours, a courier delivering blood products passed by the Tabernacle. He states that he saw “fog” in the lights on the east end of the building. He did not see fog anywhere else in Provo. He considered it unusual; however he did not smell smoke or see any other evidence of fire. He did not report his findings to the fire department.

### **The Fire Alarm**

At approximately 0110 Williams, the security guard exited his vehicle to reset the heat in the building as requested. As he approached the building he heard an audible alarm and contacted Provo City Dispatch to see if they were also receiving an alarm. Believing it to be an intruder alarm, he began to verify that no one entered the building. While checking the balcony he reported hearing “popping and crackling” sounds which he attributed to the building settling. When he found the alarm control panel the indicator light showed the problem to be in the attic. He provided Dispatch with Mr. Weston’s phone number. Mr. Williams reported finding a flashing amber light on the panel. As previously stated Williams did not know where the attic access was. Dispatch was able to get a hold of Mr. Weston who in turn contacted Bob Rasmussen. According to Mr. Weston, Rasmussen indicated that they had false alarms before and to have the security guard reset the alarm. Williams attempted to reset the alarm but it went off every 10 or 15 seconds. After reading the instructions found in the panel Williams pressed the button to acknowledge the alarm, thereby silencing it. Mr. Williams indicated that he did not see or smell smoke, nor did he see fire. Williams then returned to his vehicle.

At 0239 a security guard checking the NuSkin parking terrace observed what he believed to be steam or smoke coming from the roof of the Tabernacle. He made contact with Williams who re-entered the building.

### **Fire Discovery and Progression**

Williams reentered the Tabernacle at approximately 0243 and discovered fire on the stage, near the Fazioli piano. He stated that the flames were two to three feet in height. He also reported a large hole, approximately 10 x 20 feet in the center of the ceiling oriented east to west. He reported 2 levels of flames the first just a couple of inches in height at the bottom with flames approximately one foot in height on the top edge of the hole. Williams stated that he could see the ceiling clearly. Williams alerted dispatch of the fire and exited the building.

Provo Fire & Rescue received the first alarm assignment at 0243, Truck 25, who was returning to their station from another alarm and arrived at the Tabernacle at 0244. Truck 25 reported heavy smoke conditions from the gable vents. Engine 24, also returning from the previous call, reported smoke coming from the Tabernacle. A second alarm was requested. The following photograph depicts the smoke conditions presented shortly after the arrival of the first fire units.



Photo courtesy of A. Williams

A three person entry team made entrance into the Tabernacle at approximately 0300 and found light to moderate smoke inside of the west door. Continuing on into the main assembly area they found a large body of fire on the elevated stage that was beginning to move into the choir loft. They also found that the lighting truss had fallen onto the piano. They reported that they could hear debris falling from the ceiling in the east end of the building so they withdrew and reported their findings to the Incident Commander. At that time a defensive fire attack was ordered meaning that all suppression activities would occur from the exterior of the building.

Shortly after 0305 the upper windows on the south west side of the building began to fail. As the windows began to fail flames became visible near the ceiling, pushing down out of the attic space as shown in the following photograph.



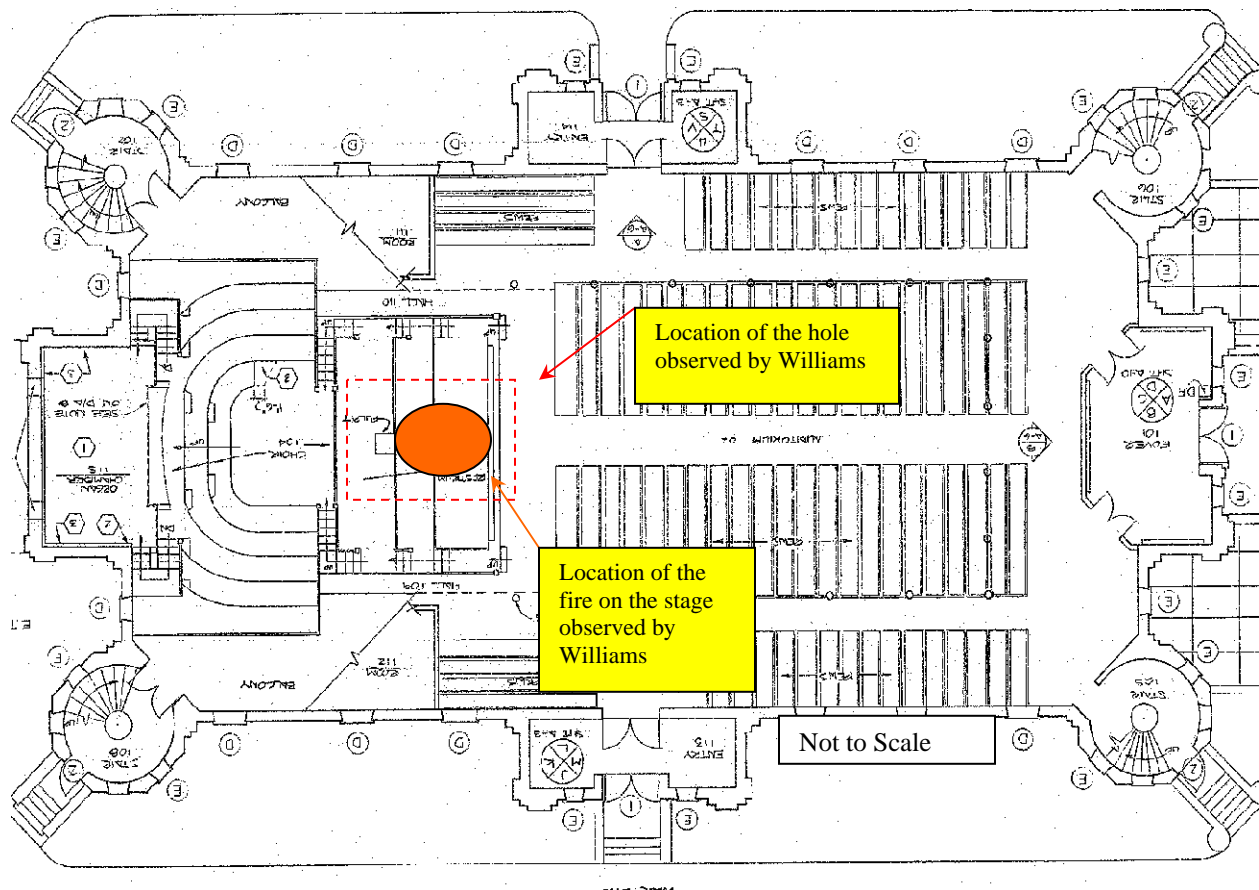
Photo courtesy of Tree Gore

As the fire continued to burn down out of the attic smoke conditions became heavier and more turbulent. At approximately 0328 the fire breached the roof deck. At approximately 0446 the west section of the roof collapsed. The fire then intensified in the remaining roof structure until at approximately 0600 the remaining roof along with the north, east, and south gables collapsed into the interior of the structure. The fire continued to burn the remaining contents of the structure until Saturday, December 18, 2010. Fire suppression operations continued until approximately 1530 Saturday afternoon.

## Fire Investigation

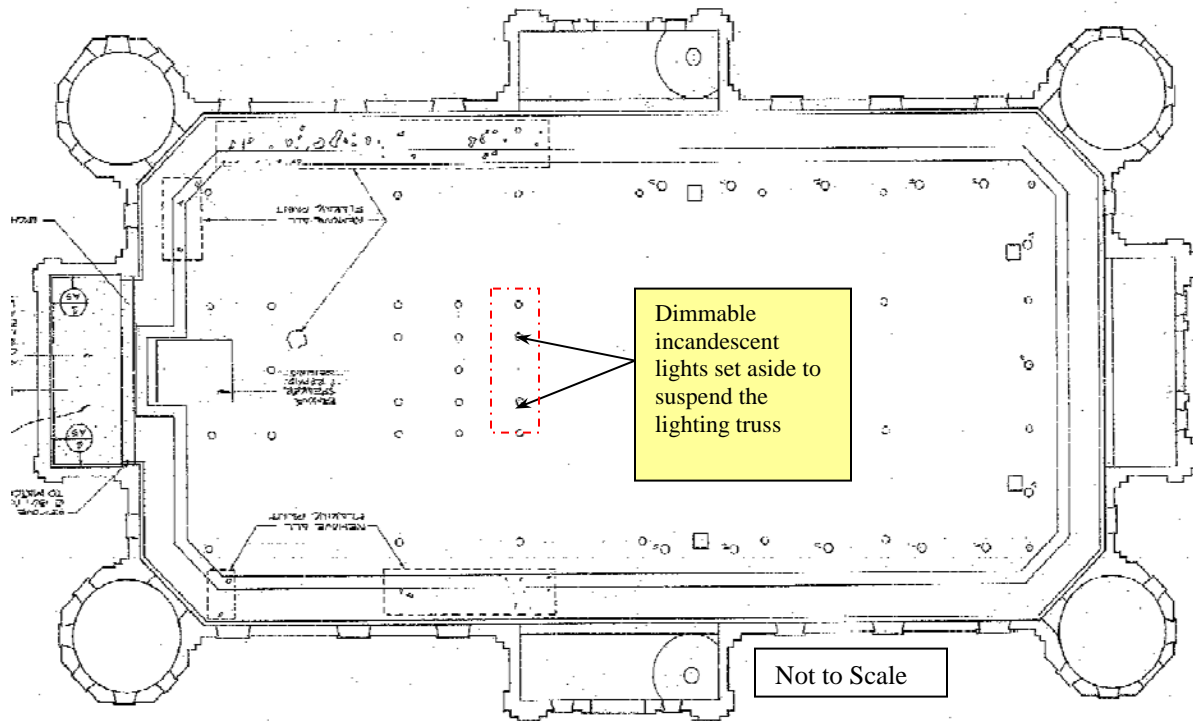
Fire Marshal (FM) Lynn Schofield arrived on scene at 0308. Initial observation of smoke conditions indicated that the fire was high in the building, and that the fire had been burning for sometime. Observations made when the south windows failed indicated that the fire was heavily involved in the attic space, and that the fire was pushing out of the attic in search of oxygen. Smoke conditions continued to deteriorate inside of the assembly area until the west section of the roof collapsed.

FM Schofield called the State Fire Marshals Office for assistance in determining the origin cause and circumstances of this fire. A Task Force was established for this purpose. On December 18, 2010 the Task Force met at Provo Fire Station 21 and was briefed. Following a short briefing the Task Force visited the site. The site was photographed. The Task Force then interviewed Mr. Williams, the security guard who discovered the fire, and Jeremy and Jeff Ostler, the owners of Trax Lighting and AV. Williams provided the following diagram showing where he found the fire on the stage as well as where he saw the hole in the ceiling.



Jeremy Ostler was interviewed with his father, Jeff. They provided a lighting scheme that was to be used for the Gloria production. He provided a diagram showing the location of the suspended lighting truss and the in-house incandescent light fixtures he used with his dimmer box.

The diagram is shown on the reflected ceiling plan for clarity. The following diagram is representative of the diagram provided.

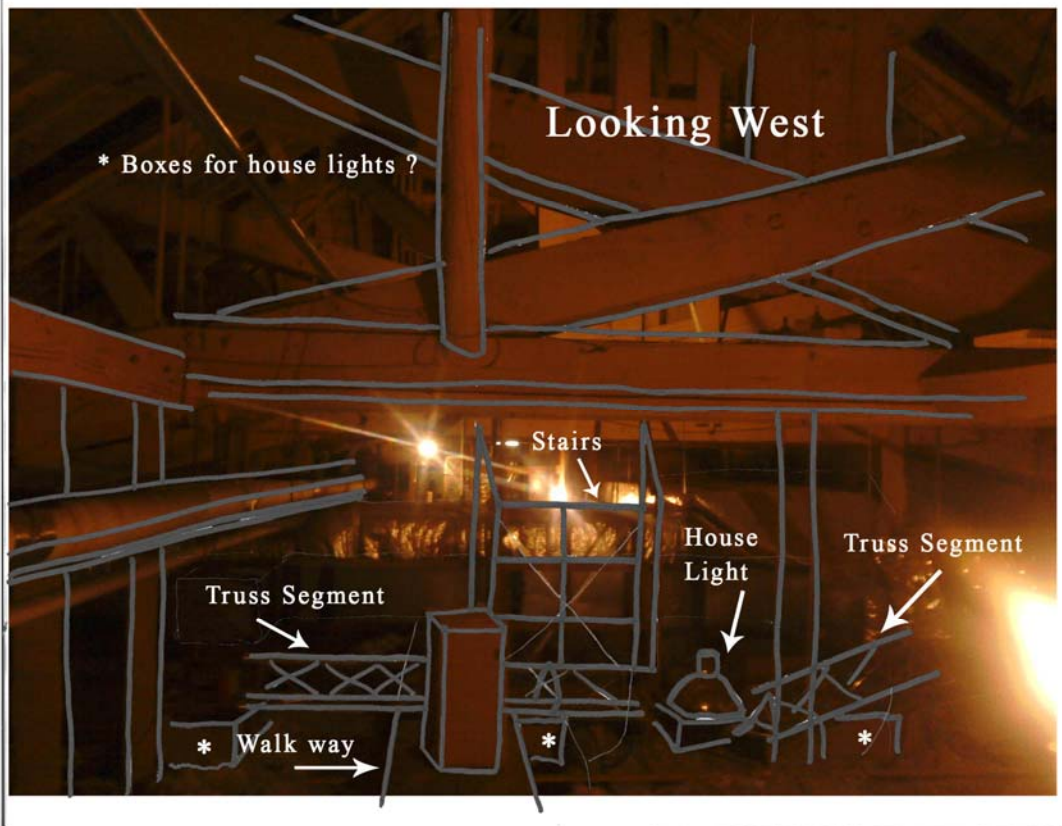


The Task Force continued to interview individuals with knowledge of the building, production crew members, cast members, maintenance and electrician while the south and west side of the building were stabilized.

On January 3, 2011 the Task Force was able to enter into the structure to gather data and evidence that would lead to the origin and cause of this fire. Based on the interviews conducted to that point, investigators were particularly interested in the two circuits that made up the dimmable incandescent light circuits. On January 4, 2011 a second camera operator, Scott Morgan, was interviewed by members of the Task Force. Mr. Morgan indicated that he and Mr. Bunton had gone into the attic space to look at the architecture of the building. Mr. Morgan stated that he had forgotten to take his camera with him; however he did take a picture with his cell phone. Mr. Morgan provided 2 copies of the photograph, one with labeling and one without labeling. The following photographs were provided by Scott Morgan.



Photograph courtesy of Scott Morgan



Investigators systematically excavated the west side of the building. The excavation took approximately four weeks. To minimize spoliation concerns an identical footprint of the Tabernacle was established in the park. As items were removed from the structure they were logged, photographed and marked prior to being placed in the corresponding grid. Items of particular interest, including light receptacles, wiring and light fixtures were secured in a container.

Investigators were able to identify the Fazioli piano, the tympani drums and pieces of the harp. They also identified pieces of the triangular truss from the attic space, the chain crawlers, and assorted pieces of the square lighting truss and lights. Investigators also recovered several reflective bells from the dimmable incandescent lights. Investigators also recovered a polished reflective bell, identified by the building maintenance group as one of the fixtures that was set aside to suspend the lighting truss. This piece is significant because the bell has thermal damage including melted metal and icicle formations on the interior of the bell that were created when the bell was in an upright or nearly upright position.

Using NFPA 921 as the reference standard for the investigation the Task Force developed the following two hypotheses.

### **Hypothesis 1**

The hypothesis is that a heat source, specifically an incandescent light fixture with an energized 300 watt lamp, placed too close to combustible materials, is a legitimate proximate cause of the fire at the Provo Tabernacle reported December 17, 2010.

### **Hypothesis 2**

A fuel source when heated to its ignition temperature, and in a state of glowing combustion, will continue to combust until it runs out of fuel, does not have sufficient oxygen to sustain combustion, or is suppressed.

Investigators tested Hypothesis 1 and Hypothesis 2 and collected data that supported both as being legitimate proximate causes of the fire at the Tabernacle on December 17, or as a legitimate continuation of the proximate cause of the fire.

## Conclusion

The Task Force has concluded the following:

### *Origin*

1. The origin of the fire at the Tabernacle on December 17, 2010 is in the attic. Specifically, the area around the dimmable incandescent light fixtures.
2. The point of origin of the fire at the Tabernacle December 17, 2010 is most probably the center wooden speaker enclosure located between the two east dimmable incandescent light fixtures.

### *Cause*

1. The cause of the fire at the Tabernacle on December 17, 2010 is unintentional.

### *Proximate Cause*

1. The most probable proximate cause of the fire at the Tabernacle December 17, 2010 is a heat source, specifically an energized 300 watt lamp, which was placed too close to combustible materials, specifically a wooden speaker enclosure.

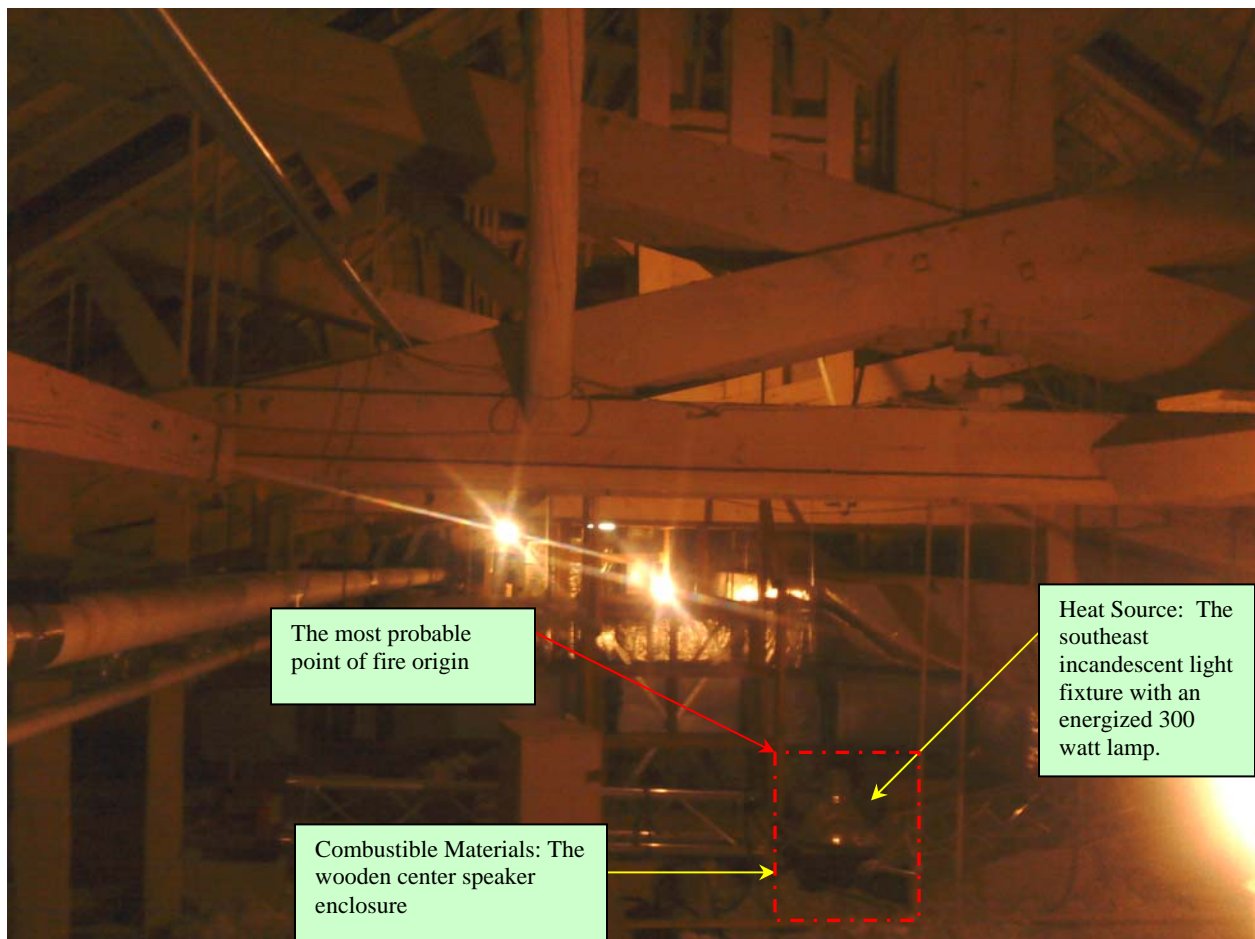


Photo courtesy of Scott Morgan

## **Circumstance**

The following circumstances are incidental to the origin and cause of the fire at the Tabernacle on December 17, 2010 but may have contributed to the ignition and spread of the fire and the subsequent fire loss.

### **Fire Protection Systems**

1. *Lack of adequate fire detection systems.* The Tabernacle was equipped with a fire alarm system that was originally installed in 1985. The detector placement in the attic space was well below the crest of the roof allowing the fire, once ignited, to become well seated prior to the activation of any alarm. In addition the alarm system failed its inspection and testing on December 2, 2010. Finally, the system had generated sufficient false alarms that building personnel may have become apathetic to the system as a whole.
2. *Lack of a fire alarm notification system.* The alarm system was a local system. When the system activated no one was aware of it. The system could have activated as early as 2320 and it would have gone unreported. Under normal circumstances no one would have been in the building at 0110. If the security guard had not been asked to reset the heat the alarm would have gone undetected until fire or smoke showed to the outside of the building.
3. *Lack of an automatic sprinkler system.* An automatic sprinkler system would have likely controlled the fire and contained it to the attic.

## **Fire Load**

The fire located on the stage area, as a result of drop-down fire, was aided in its growth by some pieces of the set prepared for the Gloria production. The Styrofoam arches provided an adequate ladder fuel to carry the fire from the elevated platform into the choir loft.

## **Human Error**

Human error contributed to the Tabernacle fire in the following manner.

1. *Failure to recognize an unsafe condition.* It is the conclusion of the investigators, that when the eastern incandescent light fixtures were set aside to suspend the lighting truss the lights were not “disarmed”, that is, the 300-watt lamps were left in place. The lighting technicians did not recognize, or chose to ignore the hazard associated with an energized 300-watt lamp being placed onto a wood surface. The packaging for the lamp used in the fixture of origin, a Sylvania model 300BR40/FL clearly states: “Do not allow paper or other flammable or heat sensitive materials within 12 inches of the glass bulb during operation.”
2. *Failure to correct an unsafe condition.* Several individuals have stated that they were in the Tabernacle on December 16, 2010 and had concerns about whether or not the lamps had been removed from the incandescent light fixtures set aside to suspend the lighting truss. None of these individuals spoke with, or questioned, the lighting technician, nor did they go to the attic and ensure that the lamps had been removed.

3. *Failure to recognize and report unusual smoke.* When W-13 Hopkins drove by the Tabernacle at 0100 on December 17, 2010, he saw what he described as fog in the lights on the east side of the building. He states that he did not see fog anywhere else in Provo. Although he considered it unusual, he did not report it to dispatch or the fire department.
4. *Failure to recognize the fire alarm.*
  - a. At 0110 in the morning, W-1 Williams heard an audible alarm (horn) when he was going to reset the heat in the building. Mr. Williams considered the alarm to be an intruder alarm and completed a search of the building, according to the training that he had received. When he reached the alarm panel, Williams did not recognize it as a *fire* alarm control panel. Finally, when Williams used the instructions contained in the fire alarm panel to acknowledge (rather than reset) the alarm, thereby silencing the horn, he did not see or follow the first instruction “**What to Do:** Evacuate the building and notify the fire department.” It is the conclusion of the investigators that W-1 Williams did not recognize the audible alarm as a fire alarm.
  - b. When W-1 Williams contacted Provo City Dispatch, the protocol for a business or burglar alarm was followed. In the recorded conversations, no one identifies or recognizes that the alarm sounding in the background is a fire alarm horn. It is the conclusion of the investigators, that during the interaction with the Williams, and W-6 Weston from approximately 0110 to 0134, neither one recognized or stated that the alarm sounding was, in fact, the fire alarm.
5. *Failure to respond to the fire alarm.*
  - a. When advised of the alarm sounding at the Tabernacle, W-6 Weston contacted W-7 Rasmussen the Building Coordinator. According to Weston, Rasmussen indicated that the alarm system would go off occasionally for no reason. Mr. Rasmussen then instructed Weston to have Williams reset the alarm. There was no conversation, at least in the statements and recordings received by investigators, that Williams was ever advised that this was a fire alarm or that he should go up to the attic and check things out or call the fire department.
  - b. In discussions with the facilities maintenance group that cared for the Tabernacle, investigators learned that the fire alarm system had issues. As previously stated in this document, the alarm system failed inspection and testing on December 2, 2010. The most frequent location of false alarms reported were in the northwest turret and the attic. It should be noted here, that there has only been one fire department response to the Tabernacle for a false alarm prior to this incident. The last reported false alarm was two weeks prior to the fire and it was in the attic zone. It is the conclusion of the investigators, that building coordinators developed apathy to the fire alarm system, due to the frequent false alarms that contributed to an inappropriate response on the morning of the fire