Educational Session

"Fire Protection & Life Safety in Special Amusement Buildings"

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Escape to something entirely different…

Queue

- Bottom Line Up Front… Here are your "take-aways" from today's presentation (learning objectives):
  - Understand themed entertainment ride theory, storyline/show theory, and creative placemaking.
  - Understand the "human element" in design, operations, and emergency response.
  - Understand practical approaches for engineering applications in themed entertainment venues, especially for:
    - fire protection systems, automatic sprinklers, special hazards
    - egress systems and smoke control,
    - fire detection & alarm and integrated fire protection/life safety systems.
  - Understand how learning from the past can help inform the future.
  - Don't take safety for granted, even though fires in amusement buildings are very rare.
  - Have fun.
- We are all an important part of planning for the future – so let's dream BIG and be Creative!

Disclaimer: "Any photos presented without a citation are owned by Andy Grenier. Any references to a brand, park, venue, or location in this presentation are made solely for the purposes of commentary, research, and education ("fair use"). The views expressed in this presentation are my own, as the presenter, and do not reflect or represent any endorsement by or of any other party. Information sources are noted where necessary and are summarized on the last slide. The information presented in this presentation is for informational purposes only and should not be construed as professional advice. The viewer, reader, and listener of this presentation are encouraged to do your own research."

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Welcome to the illusion!

Pre-show

- What is your favorite amusement ride or attraction that you have ever experienced?
- Did you "forget about the real world" for awhile?
- Did you feel safe?

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Presentation Overview

Scene 1

"Together, let's look through the creative lens of imagination, illusion, magic, science, and engineering to discover how the codes and standards address the unique fire protection and life safety challenges for special amusement buildings, attractions, and themed entertainment venues."

- Review & Discuss Fire Incident History
- Evolution of Code development for Special Amusement Buildings
- Fire Protection & Life Safety Design Considerations and Application
- Q&A

Who am I?

Scene 2

- U.S. Coast Guard Academy,
  - B.S. Naval Architecture & Marine Engineering, 1990
- Worcester Polytechnic Institute,
  - M.S. Fire Protection Engineering, 1996
- Registered P.E. in Virginia, California, Florida, Hawaii
- Veteran, USCG/USCGR
- Retired Disney Imagineer
- Principal Advisor, Coffman Engineers since July 2024

Dreamland, "*Hellgate*", Coney Island, NYC, 26 May 1911

Scene 3

- **Fatalities:** none human (but several animals were killed in the blaze)
- **Injuries:** unknown
- **Financial Loss:** total loss of amusement park + surrounding structures
  - $5,200,000 (= $165M in 2024 dollars). 2,500 jobs lost due to loss of the park.
- **Cause:** maintenance repair with hot tar (light bulbs popping?)
- **Attraction type:** themed boat flume ride with whirlpool and rapids
- **Fire sprinklers:** NO
- **Smoke detectors:** NO
- **Emergency Lighting:** unknown
- **Exit Signs:** unknown
- **Notes:** Horse-drawn fire apparatus, Low water pressure for firefighting at the park

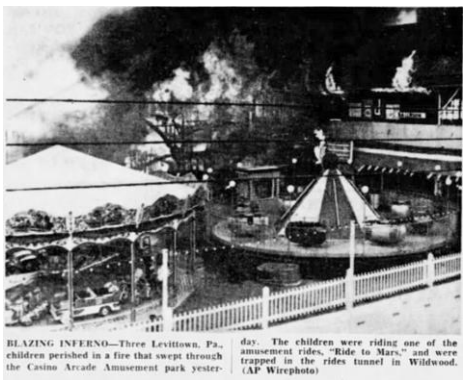
Sources (photos & info on this slide): https://www.westland.net/coneyisland/articles/dreamlandfire.htm
https://rivershorepress.com/blog/2020/11/24/coney-island-sends-guests-to-hell

Wildwood Park, "*Ride to Mars*", Wildwood, NJ, 4 Aug 1964

Scene 4

- **Fatalities:** 3 children
- **Injuries:** several fire fighters "treated for cuts and smoke inhalation"*
- **Financial Loss:** $250,000 (~$2.5M in 2024 dollars); fire destroyed ride, miniature golf course, shooting gallery, and dance hall
- **Cause:** unknown
- **Attraction type:** "darkened funhouse ride on rails"*
- **Fire sprinklers:** unknown
- **Smoke detectors:** NO
- **Emergency Lighting:** unknown
- **Exit Signs:** unknown
- **Notes:** "Amusement park workers attempted to put out the blaze with hand extinguishers, but were driven back by the heavy smoke."*

*source: The New York Times, "*3 KILLED IN FIRE AT JERSEY RESORT; Children Trapped on Ride at Wildwood Park*", Aug 5, 1964, p. 67)



BLAZING INFERNO—Three Levittown, Pa., children perished in a fire that swept through the Casino Arcade Amusement park yesterday. The children were riding one of the amusement rides, "Ride to Mars," and were trapped in the rides tunnel in Wildwood. (AP Wirephoto)

Source: Plainfield NJ Courier News, "*3 Children Killed In Funhouse Fire*", Aug 5, 1964, p. 1

Disneyland, "*Matterhorn Bobsleds*", Anaheim, CA, 30 Oct 1971

Scene 5

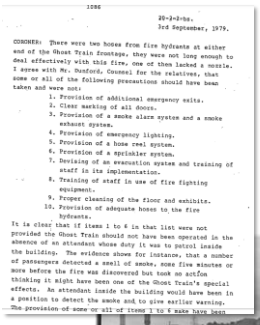
- **Fatalities:** none
- **Injuries:** 3 (slight injuries)
- **Financial Loss:** ride closed over the weekend
- **Cause:** unknown. Fire occurred on upper level of the "mountain"
- **Attraction type:** themed rollercoaster ride on a track
- **Fire sprinklers:** YES
- **Smoke detectors:** NO
- **Emergency Lighting:** unknown
- **Exit Signs:** unknown
- **Notes:** "…nearly extinguished by a sprinkler system within the structure. Five Anaheim fire units responded." *

*source: Fort Lauderdale News, "*Blaze at Disneyland Causes Injuries to 3*", Mon, Nov 1, 1971, p. 19A

Luna Park, "*Ghost Train*", Sydney, NSW, Australia, 9 June 1979

Scene 6

- **Fatalities:** 7 (six children, one adult)
- **Injuries:** unknown
- **Financial Loss:** loss of ride attraction at Luna Park
- **Cause:** initially considered "electrical fault", later speculated arson under suspicious circumstances. Exact cause could not be determined.
- **Attraction type:** themed dark ride on a track
- **Fire sprinklers:** NO
- **Smoke detectors:** NO
- **Emergency Lighting:** NO
- **Exit Signs:** unknown
- **Notes:** fire was reported to initiate in the "fake fireplace" scene, insufficient water pressure for firefighting at the park, understaffing contributed to the severity. Several documentaries have been made about this incident for television and YouTube.



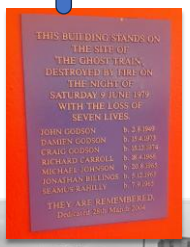
1086

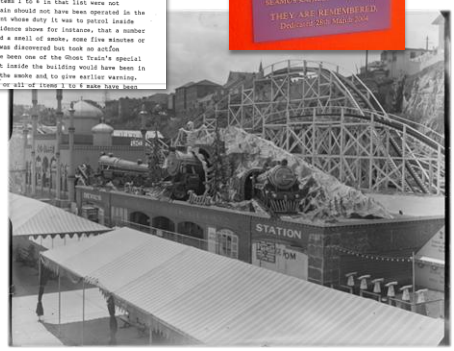
20-2-2-8a.
3rd September, 1979.

CORONER: There were two hoses from fire hydrants at either end of the Ghost Train frontage, they were not long enough to deal effectively with this fire, one of them lacked a nozzle. I agree with Mr. Dunford, Counsel for the relatives, that some or all of the following precautions should have been taken and were not:

1. Provision of additional emergency exits.
2. Clear marking of all doors.
3. Provision of a smoke alarm system and a smoke exhaust system.
4. Provision of emergency lighting.
5. Provision of a hose reel system.
6. Provision of a sprinkler system.
7. Devising of an evacuation system and training of staff in its implementation.
8. Training of staff in use of fire fighting equipment.
9. Proper cleaning of the floor and exhibits.
10. Provision of adequate hoses to the fire hydrants.

It is clear that if items 1 to 4 in that list were not provided the Ghost Train should not have been operated in the absence of an attendant whose duty it was to patrol inside the building. The evidence shows for instance, that a number of passengers detected a smell of smoke, some five minutes or more before the fire was discovered but took no action thinking it might have been one of the Ghost Train's special effects. An attendant inside the building would have been in a position to detect the smoke and, to give earlier warning. The provision of some or all of items 1 to 4 may have been



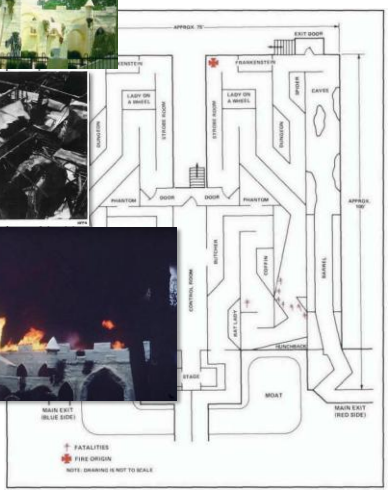


Sources (photos & info on this slide): https://en.wikipedia.org/wiki/1979_Sydney_Ghost_Train_fire
https://coroners.nsw.gov.au/documents/findings/1979/luna_park_fire_1977_-_findings.pdf
"The Infamous Ghost Train Amusement Park Fire", https://youtu.be/v5wnBuI-X4I?si=ZDnTqIAWXsHVAM_5
https://commons.wikimedia.org/w/index.php?curid=143907290

Six Flags Great Adventure, "*Haunted Castle*", Jackson Township, NJ, 11 May 1984

Scene 7

- **Fatalities:** 8 (ages 15-19)
- **Injuries:** unknown
- **Financial Loss:** loss of attraction
- **Cause:** guest-ignited combustible padding (accidental).
- **Attraction type:** walk-through maze type, consisting of 16 trailers for show areas, plus one control room trailer
- **Fire sprinklers:** NO
- **Smoke detectors:** NO
- **Emergency Lighting:** Not functioning as designed or as expected
- **Exit Signs:** Not functioning as designed or as expected
- **Notes:** Considered a "temporary structure", considered to meet code requirements. In operation for more than 5 years before the fire. Combustible decorative materials, combustible walls & interior finishes. Flashover in < 4 min.

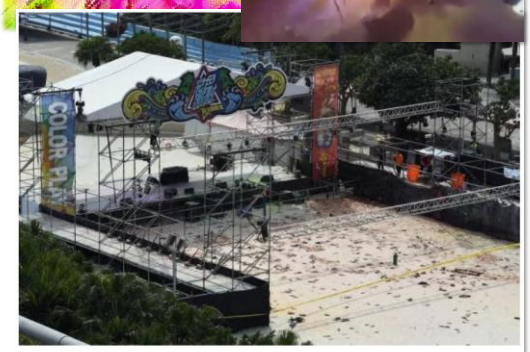


Sources (photos & info on this slide):
"The Haunted Castle Revisited", NFPA Journal, May 2014 (top image from this source)
"Fire in Haunted Castle Kills Eight", NFPA Fire Journal, September 1985 (other images are from this source)
https://youtu.be/-627tDQF-Vc?si=HmmQ3gdxR4G_l6rf (video snapshot of fire is from this source)

Formosa Fun Coast water park, "*Color Play Asia*", New Taipei, TW, 27 June 2015

Scene 8

- **Fatalities:** 17 (incl. 2 later by suicide)
- **Injuries:** 497+ (199 critical)
- **Financial Loss:** full closure of the amusement park
- **Cause:** Dust fire/deflagration involving airborne corn starch & food coloring "color powder". Potential ignition sources: lit cigarettes, stage lighting, hot surfaces.
- **Attraction type:** outdoor festival w/ deployed color powder
- **Fire sprinklers:** N/A (outdoors)
- **Smoke detectors:** N/A (outdoors)
- **Emergency Lighting:** unknown (the incident happened at about 8:30pm local time)
- **Exit Signs:** unknown
- **Notes:** Fire lasted ~40 seconds. Several legal cases resulted from the incident.



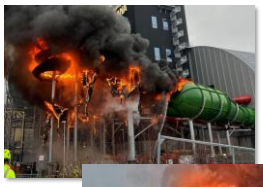
Local officials walk at the explosion site of the water park in Pali district, in New Taipei City, on June 28, 2015.
Photo by Sam Yeh/AFP/Getty Images

Sources (photos and info on this slide):
https://en.wikipedia.org/wiki/2015_New_Taipei_water_park_fire
https://slate.com/news-and-politics/2015/06/taiwan-color-party-disaster-500-injured-in-fire.html

Liseberg Oceana Water World, Gothenburg, Sweden, 12 Feb 2024

Scene 9

- **Fatalities:** 1
- **Injuries:** *"a number of people suffered minor smoke inhalation"*
- **Financial Loss:** unknown. the project was under construction at the time and nearing completion.
- **Cause:** electric socket welding of polyethylene pipe. Initial fire spread; "gas explosion" followed.
- **Attraction type:** water slide attractions
- **Fire sprinklers:** unknown
- **Smoke detectors:** yes; fire alarm was in test mode
- **Emergency Lighting:** unknown
- **Exit Signs:** unknown
- **Notes:** the SHK report indicates "deficiencies in knowledge about the risks of the work, the execution and planning."



Sources (photos & info on this slide):
https://shk.se/sok-utredningar/ovriga-handelser/2024-02-22-brand-pa-liseberg-oceana-vattenvarld-i-goteborg
"Fire at Liseberg Oceana Water World in Gothenburg", Swedish Accident Investigation Board Report, 20 March 2025 (47 pages)

A Note About "Escape Rooms"

Scene 10

- **On 5 Jan 2019, five teenagers were killed in a fire in an escape room in Koszalin, Poland. One man was also injured. Cause of the fire: "leaking gas cylinders" used for heating.**
- **As of 2019, it was estimated that there are over 10,000 escape rooms, worldwide (2,300+ in the United States)**
- **Q: Are "escape rooms" considered special amusement buildings?**
- **A: It depends… (more on this later)**

Sources:
https://youtu.be/27oGk7-L6QE?si=NOI5acyVVksmL5h6 (NBC News, 1/5/2019)
https://www.bbc.com/news/world-europe-46765692 (Escape Room Fire Kills Five Teenagers in Poland)
https://www.nfpa.org/news-blogs-and-articles/nfpa-journal/2019/07/01/escape-rooms

Code Development Timeline

Scene 11

(May 1984)
Haunted Castle fire

(November 1987)
NFPA Technical Committee Fall Meeting introduces special provisions for Amusement Buildings

(February 1988)
NFPA 101 Life Safety Code introduces requirements for Amusement Buildings

(May 1988)
CABO BCMC Public Hearing of Special Amusement Buildings

(1990)
ICBO Code Development Conference introduces provisions for Amusement Buildings

(1991)
1991 Uniform Building Code incorporates Amusement Building requirements

(1991-Present)
Building Codes and Standards organizations make few amendments to the original texts.

(2021)
Escape Rooms: New Annex material proposed for NFPA 101 Life Safety Code

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Code Development Timeline

Scene 12

Prior to 1988, fire codes and building codes covered assembly occupancies, decorative materials, egress, fire alarm, sprinklers, and emergency lighting… but not applied uniquely for "special amusement buildings"

(May 1984)
Haunted Castle fire

(November 1987)
NFPA Technical Committee Fall Meeting introduces special provisions for Amusement Buildings

(February 1988)
FPA 101 Life Safety Code introduces equirements for Amusement Buildings

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(1991-Present)
Building Codes and Standards organizations make very few amendments to the original texts.

(2021) Escape Rooms: New Annex material proposed for NFPA 101 Life Safety Code

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Code Development (1990)

Scene 13

- International Conference of Building Officials (ICBO)
  - "Amusement Building" code requirements first submitted in 1990 ICBO Annual Code Development Conference
  - Defined "Amusement Building"
  - Amusement Buildings shall conform with the requirements of their Occupancy Classification
  - Required smoke detection systems
  - Required automatic fire sprinkler systems
  - Amusement Building Alarm System Response:
  - activation of ONE smoke detector or sprinkler waterflow to sound alarm at "constantly supervised location" where manual operation of systems may be initiated
  - activation of TWO or more smoke detectors, a single smoke detector monitored by an alarm verification zone, the automatic sprinkler system shall immediately:
    - Stop confusing sounds and visual effects, and
    - Activate an approved directional exit marking, and
    - Cause illumination of the exit path with light of not less than 1 foot candle at the walking surface, and
    - A Public Address system which is audible throughout the Amusement Building shall be provided. The Public Address may also serve as an alarm system.

Source: *Building Standards*, Code Change Agenda, ICBO, July-August 1990, pp. 9-10

Code Development (1990)

Scene 14

Reason: The CABO Board for the Coordination of the Model Codes (BCMC) studied the subject of amusement buildings as a result of the May 11, 1984, fire in the "Haunted Castle" at the Six Flags Great Adventure Park in Jackson Township, New Jersey. Eight of the 28 to 34 visitors in the building, unable to immediately exit the structure, died in the fire. The BCMC *Report of Special Amusement Buildings* was completed in May, 1988.

The major factors contributing to the loss of life in this fire were:

1. Failure to detect and extinguish the fire in its incipient stage.
2. Ignition of synthetic foam material and subsequent fire and smoke spread involving combustible interior finishes and contents.
3. Difficulty of escape by the occupants due to fire conditions in the haunted-house-type of environment.

The proposal sets forth requirements in appropriate sections of the code to reflect the issues in the BCMC report. Section 402 defines "amusement buildings" which includes both temporary and permanent facilities since the hazards associated with these facilities are the same for either category. Section 601 requires all such buildings to conform with the requirements of the code in addition to specific sections which follow.

Section 610 provides for early warning of a fire by requiring an approved supervised smoke-detection system. Where theatrical distractions cause false alarms, an exception is included to provide for an approved alternate type of detection system.

When an alarm sounds in the building, it should be directed to a constantly attended location where emergency action can be taken such as contacting the fire service and halting further entrance into the building. A public address system, which may also serve as an alarm system, is required so that the occupants will be notified and given instructions in case of an emergency.

Since it is essential that the occupants have a clear exit path to the required exits upon detection of a fire, the system must cause the confusing sounds and visual effects to stop, activate the directional exit marking and illuminate the exit path.

Section 702 (b), Item 7, is added so that the provisions would apply to all such facilities, small or large.

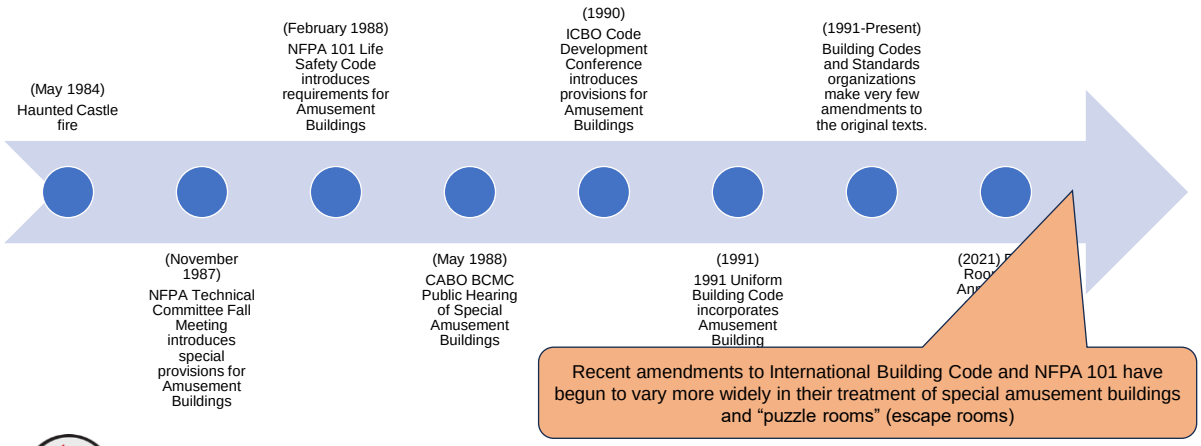
Section 3802 (c) requires an automatic sprinkler system in all amusement buildings, except temporary buildings may be an approved temporary type.

Analysis: None.

Source: *Building Standards*, Code Change Agenda, ICBO, July-August 1990, pp. 9-10

Code Development Timeline

Scene 15



Recent amendments to International Building Code and NFPA 101 have begun to vary more widely in their treatment of special amusement buildings and "puzzle rooms" (escape rooms)

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Special Amusement Building (2024 NFPA 101)

Scene 16

NFPA 101 — LIFE SAFETY CODE (2024)

3.3.37.9 * Special Amusement Building.

A building or portion thereof that is temporary, permanent, or mobile and contains a ride or device that conveys patrons where the patrons can be contained or restrained, or provides a walkway along, around, or over a course in any direction as a form of amusement or entertainment, and arranged so that the egress path is not readily apparent due to visual or audio distractions, contains an intentionally confounded egress path, or is not readily available due to the mode of conveyance through the building or structure. (SAF-AXM)

ENHANCED CONTENT — Collapse

The definition of the term *special amusement building* was revised, and the associated Annex A language was expanded, in the **2021** edition of the *Code* to correspond with revisions to the requirements for such attractions in **12.4.9** and **13.4.9**. The revisions recognize the varying degrees to which occupants might or might not be able to self-evacuate in an emergency depending on the arrangement of the attraction. For example, occupants might have the ability to readily self-evacuate from a walk-through haunted house attraction (a Class B special amusement building), or conversely, might have no ability to self-evacuate from an indoor roller coaster attraction in which they are restrained by the ride safety mechanisms (a Class A special amusement building). See the commentary following 12.4.9 and 13.4.9 for additional details on special amusement buildings.

From A.3.3.37.9 (excerpt, regarding escape rooms):

Other occupancies might also fall into the classification of special amusement building if the conditions described in the definition apply. Escape rooms are an example of where such conditions might exist. It is incumbent on the authority having jurisdiction to inquire if the conditions in the escape room meet the definition of a special amusement building. Where such conditions exist, escape rooms should be classified as special amusement buildings. Where such conditions do not exist, escape rooms might be classified as another occupancy type, such as business.

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California Building Code (2022)

Scene 17

- Special Amusement Area (Section 202 Definitions)
  - "…any temporary or permanent building or portion thereof that is occupied for amusement, entertainment or educational purposes and is arranged in a manner that:
    1. Makes the means of egress path not readily apparent due to visual or audio distractions, or
    2. Intentionally confounds identification of the means of egress path, or
    3. Otherwise makes the means of egress path not readily available because of the nature of the attraction or mode of conveyance through the special amusement area, building, structure or portion thereof."
- Puzzle Room (Section 202 Definitions)
  - "A type of special amusement area in which occupants are encouraged to solve a challenge to escape from a room or series of rooms."

California Building Code (2022)

Scene 18

- Special Amusement Areas (Section 411)
  - Occupant load of 50 or more: Group A occupancy
  - Occupant load <50: Group B occupancy
  - Automatic sprinkler system:
    - "temporary" is defined as "less than 180 days", which allows sprinkler water supply of an "approved temporary means"
    - Automatic sprinklers not required in temporary special amusement areas <1,000 ft^2 and w/ exit access travel distance of less than 50 ft.
  - Automatic smoke detection systems (no provision for temporary)
  - Emergency Voice/Alarm Communications Systems are required
  - "Puzzle room exiting"
    - In accordance with Chapter 10 (egress), or
    - An alternative design approved by the Authority Having Jurisdiction
    - "Exits shall be open and readily available up activation by the automatic fire alarm system, automatic sprinkler system, and a manual control at a constantly attended location."
  - EXIT marking (+ for "Where mirrors, mazes or other designs are utilized that disguise the path of egress travel"… low-level exit signs and directional path markings listed in accordance with UL 1994)
  - Interior finish shall be Class A

California Building Code (2022)

Scene 19

- Special Amusement Areas, Fire Alarm and Detection Systems (Section 907.2.12)
  - Automatic smoke detection ("…in special amusement areas and throughout the exit access to the point of exit discharge")
  - Alarm: "Activation of any single smoke detector, the automatic sprinkler system or any other automatic fire detection device shall immediately activate an audible and visual at the building at a constantly attended location from which emergency action can be initiated…"
  - System response: Activation of TWO or more smoke detectors, a single smoke detector equipped with an alarm verification feature, the automatic sprinkler system or other approved detection device shall automatically:
    - Cause illumination of the means of egress with light of not less than 1 foot candle at the walking surface, and
    - Stop any conflicting or confusing sounds and visual distractions.
    - Activate an approved directional exit marking that will become apparent in an emergency.
    - Activate a prerecorded message, audible throughout the special amusement area and throughout the exit access to the point of exit discharge.
  - Emergency voice/alarm communication system

Fire Protection Systems Design Considerations

Scene 20

- Blending smoke detectors and fire alarm notification appliances in with themed elements:
  - Use of aspirating smoke detection? (e.g. VESDA)
  - Custom colors provided by manufacturers
  - Visible strobes, but "hidden" speakers?
- Fire sprinklers
  - Concealed sprinklers
  - Design criteria: what is the occupancy hazard classification?
- Smoke control (is it code-required?)
  - *IF* you design smoke control for a special amusement building, what type of system will it be?

Unique Challenges – Part 1 (LS)

Scene 21

- Amusement buildings need to be designed “in 3D”
- Ride restraint systems / Ride vehicle motion
- Lighting effects, “dark” rides, EXIT signs
- Evacuating ride attractions
  - (see NFPA 101 (2024) §A.12.4.9.2.2.2)
- After egress from the building, where is the “public way”?
- Human factors in operation and emergency response

Source: *open source, as seen on X.*

NFPA 101 (2024) §A.12.4.9.2.2.2

Scene 22

A.12.4.9.2.2.2

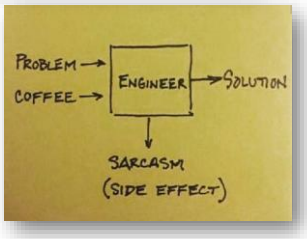
Amusement rides and devices that contain or restrain their patrons such that they are unable to evacuate without the assistance of a ride operator present a unique challenge during an emergency. ASTM F2291, *Standard Practice for Design of Amusement Rides and Devices*, provides for the design of evacuation paths in case the ride stops before completing its full cycle. The safest and fastest way to exit patrons during an emergency might be to “cycle out” by continuing ride operation until all patrons have exited the ride at the normal exit point (at the unload platform). If a patron were to attempt to exit the ride vehicle while the ride continues operation during an emergency, the patron may potentially be struck by the ride vehicle, or the ride’s safety systems might stop all ride motion, potentially extending the evacuation period. Because increasing the illumination of the means of egress along the ride and terminating any conflicting or confusing sounds or visuals while the ride is cycling out might entice the patrons to attempt to self-evacuate while the ride is in motion, the authority having jurisdiction and the owner are encouraged to work closely to develop a plan that implements the safest and most efficient method to exit the patrons from the ride, which might include continuing normal show operation during cycle out. In addition, the plan should assure that all ride operators and emergency responders understand their roles during cycle out, or during an evacuation if the ride cycle out is interrupted.

The ride owner should work with the authority having jurisdiction from an early stage to develop a pre-incident plan in accordance with NFPA 1620 and any required or applicable provisions of **12.4.2.5.2**.

Unique Challenges – Part 2 (FA)

Scene 23

- Fire Alarm System integration with other safety/control systems? (lighting, ride, show)
- Special Effects: fire, flame, smoke, fog
- NFPA 4 Integrated Fire Protection and Life Safety System Testing
- Systems testing: “NFPA 4 on steroids”
- Balancing Prescriptive Code Provisions vs. Design Flexibility for new ideas
- Performance Based Design
- Alternative Means & Methods / Requests for Modification



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Circling back, while looking forward

Scene 24

- Escape rooms… Are they special amusement areas?
  - It depends. Look at the definition of “Puzzle Room” in the IBC, CBC, and NFPA 101 (2024) A.3.3.37.9
  - However, check if they meet the definition of a “special amusement area” or “special amusement building”.
  - What about lighting?... What if the escape room goes dark as a part of the “show? Are EXIT signs ever turned off as a part of the escape room storyline?
  - Are escape room audio soundtracks designed to be muted automatically in the case of a fire alarm?
  - What provisions are available for means of egress always being available for use?
  - Staffing and operational considerations? These may include written incident response plans and training for staff.
  - Shall conform with the requirements of their Occupancy Classification
    - smoke detection systems?
    - fire sprinkler systems?
  - Any other considerations, questions, or discussion from the group?
  - Bottom line: Engineers and Architects need to take the responsibility to design for safety, depending on the use of the escape room, regardless of the basic code requirements.

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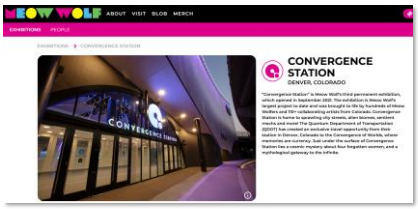
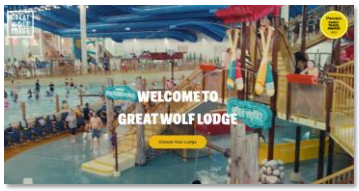
Other unique occupancies

Scene 25

- Casinos
- Zoos
- Museums
- Theater shows
- “Immersive art experiences”
- Interactive exhibits
- Indoor play structures
- Water slides
- Cruise ships



Source: *https://meowwolf.com/*



Source: *https://www.greatwolf.com/*

Source: *https://www.visitlasvegas.com/experience/post/downtown-las-vegas-hotel-guide/*

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So, what now?

Unload Station

- Dream BIG
- Think “Outside the Box”
- Be creative!!!
- Stick to first principles of engineering and science, but don’t be afraid to challenge the status quo and the “way we always do it”

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Post-show

DISCUSSION

QUESTIONS & ANSWERS

Thank you!

Questions

For further questions, please feel free to contact Andy Grenier at:

andrew.grenier@coffman.com

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COFFMAN ENGINEERS

For AIA CE Credit and to request a Certificate of Completion:

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Course Number: 401104252C53
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Attendees will receive one (1) Learning Unit (LU) in the "Health, Safety, Welfare" category