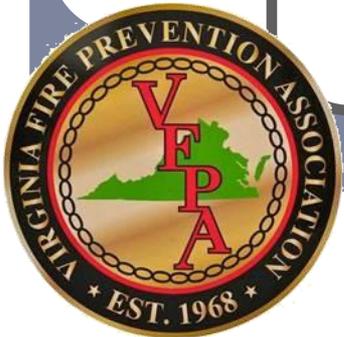


Crowd Management and the Virginia Statewide Fire Prevention Code

Gerry R. Maiatico

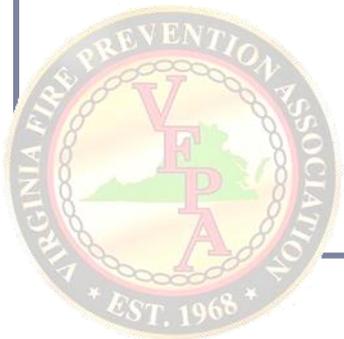
Warren County Department of Fire and Rescue
Services



Nightclub Dangers

What incidents can you think of?

What codes do you think of?





MONEY

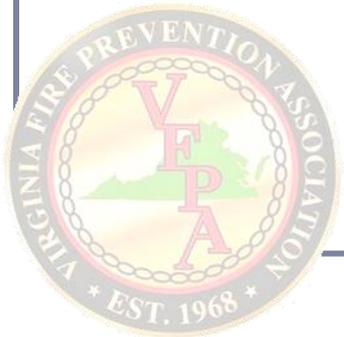
Yahoo earnings: Mayer still has much to prove

4:00 PM ET

Key words.....

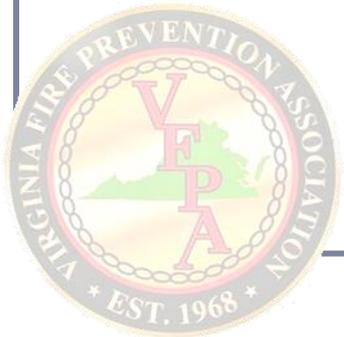
What key words did you hear?

- Overcrowded
- Blocked exits
- Suffocate
- Trampled
- Stampede



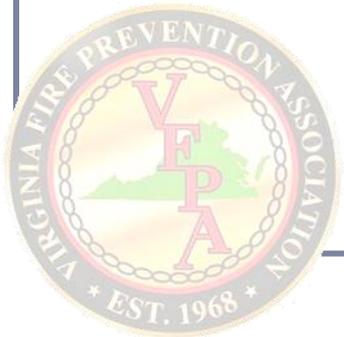
Objectives

- Review the characteristics of “crowds”
- Discuss Crowd Management vs. Crowd Control
- Review Historical Incidents leading to Code Development



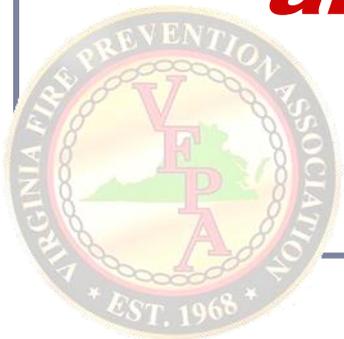
Objectives

- Identify SFPC Codes as it relates to crowd management
- Review changes in the 2018 Code
- Examine technological advancements to assist in Crowd Management



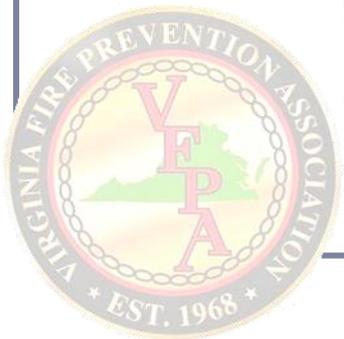


“The problem of crowds does not lie with the crowd itself, but rather in our incomplete understanding of its anticipated behavior and limitations in our ability to quickly adapt to that behavior.”



Understanding a Crowd

- Each crowd has its own vulnerabilities and challenges.
- Its own character, influenced by internal and external factors such as purpose, organization (or lack thereof), and emotional engagement.
- Crowd dynamics are influenced by time, space, the information available to people, and the group's collective energy.



Crowd Characteristics

Ambulatory Crowd



Escaping Crowd



Expressive Crowd



Aggressive/Hostile/Violent Crowd



Demonstration Crowd

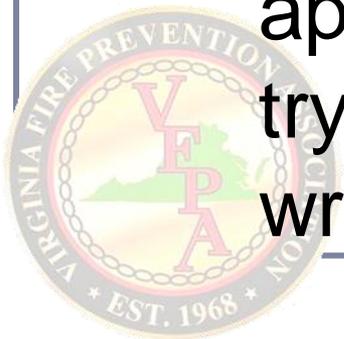


Dense/Suffocating Crowd



Crowd Control vs. Crowd Management

- “Crowd Control” prevailing term to define a major responsibility of facility management in stadiums and arenas.
- Managing and assisting crowds—a practice known as crowd management—is a more proactive approach and often more effective than trying to control a crowd after things go wrong.



Background

Historically, there have been many crowd disasters (from fire-related or non-fire related emergencies) around the world that have led to significant death and injury tolls.

Common Causes:

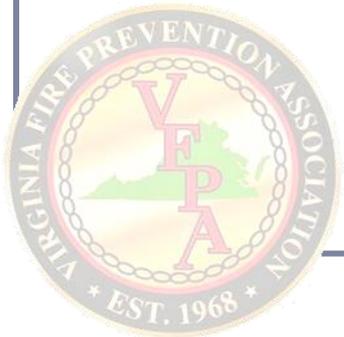
- Crowd crush
- Crowd craze
- Violence
- Inefficient means of egress
- Ineffective crowd management
- Unintended action
- Act of God

Locations:

- Assembly Venues:
 - Sporting Events
 - Concerts/Festivals
 - Clubs
 - Malls
 - Religious Events
 - Schools
 - Others

History – Lives Lost in “Crowd” Incidents

- 19th Century – 7,000+
- 20th Century – 6,100+
- 21th Century – 7,500+



Historical Crowd Incidents



1990

- Sheffield, England
- Hillsborough stadium disaster
- 96 dead, 400 injured
- Overcrowding



2005

- Beijing, China
- New Year Lantern festival disaster
- 37 people killed, 15 injured
- Crowd crush on bridge



2015

- Duisburg, Germany
- LOVE Parade
- 21 dead, 541 injured
- Overcrowding/ design issue

- Jamarat, Saudi Arabia
- Annual Hajj, Islamic Pilgrimage to Mecca
- ~2400 died, 900 injured
- Overcrowding

1989



- Mina Valley, Saudi Arabia
- Hajj; Islamic Pilgrimage to Mecca
- 1426 people crushed
- Overcrowding

2004



- Iraq's Tigris River
- Human crush in religious procession; railing collapsed, and crowds tumbled into river
- 640 died
- Overcrowding

2010



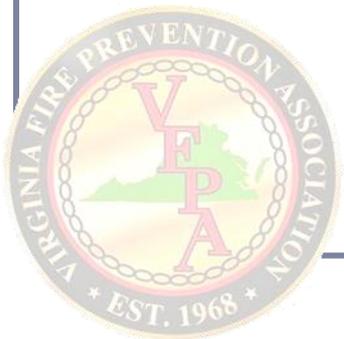
RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

www.NFPA.Org/Foundation | © Fire Protection Research Foundation. All rights reserved.

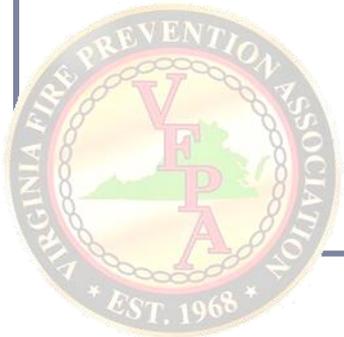
Stampede At Hajj Pilgrimage Near Mecca

- September 2015
- 2,700+ deaths – 1,000+ Injured (*conflicting reports*)



The Hillsborough Disaster

- April 15, 1989
- Crowd Crush Event
- Hillsborough Stadium in Sheffield, South Yorkshire, England
- 96 deaths and 766 injuries





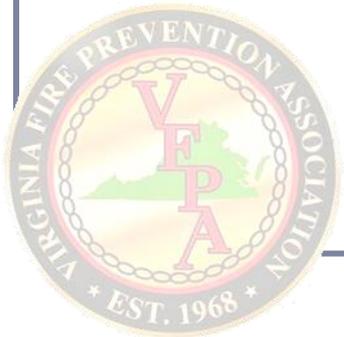


EINBAK DE WOOD

EBC NEWS

Indiana State Fair Stage Collapse

- August 13, 2011
- Sugarland Concert
- Approaching Thunderstorm / Strong Winds
- 7 deaths and 58 injuries





Crowd Dynamics

Four fundamental elements in every crowded situation:

Time

- Period of time that the crowding occurs

Space

- Size and configuration of area occupied

Information

- Perceptions of the crowd that lead them to take an action

Energy

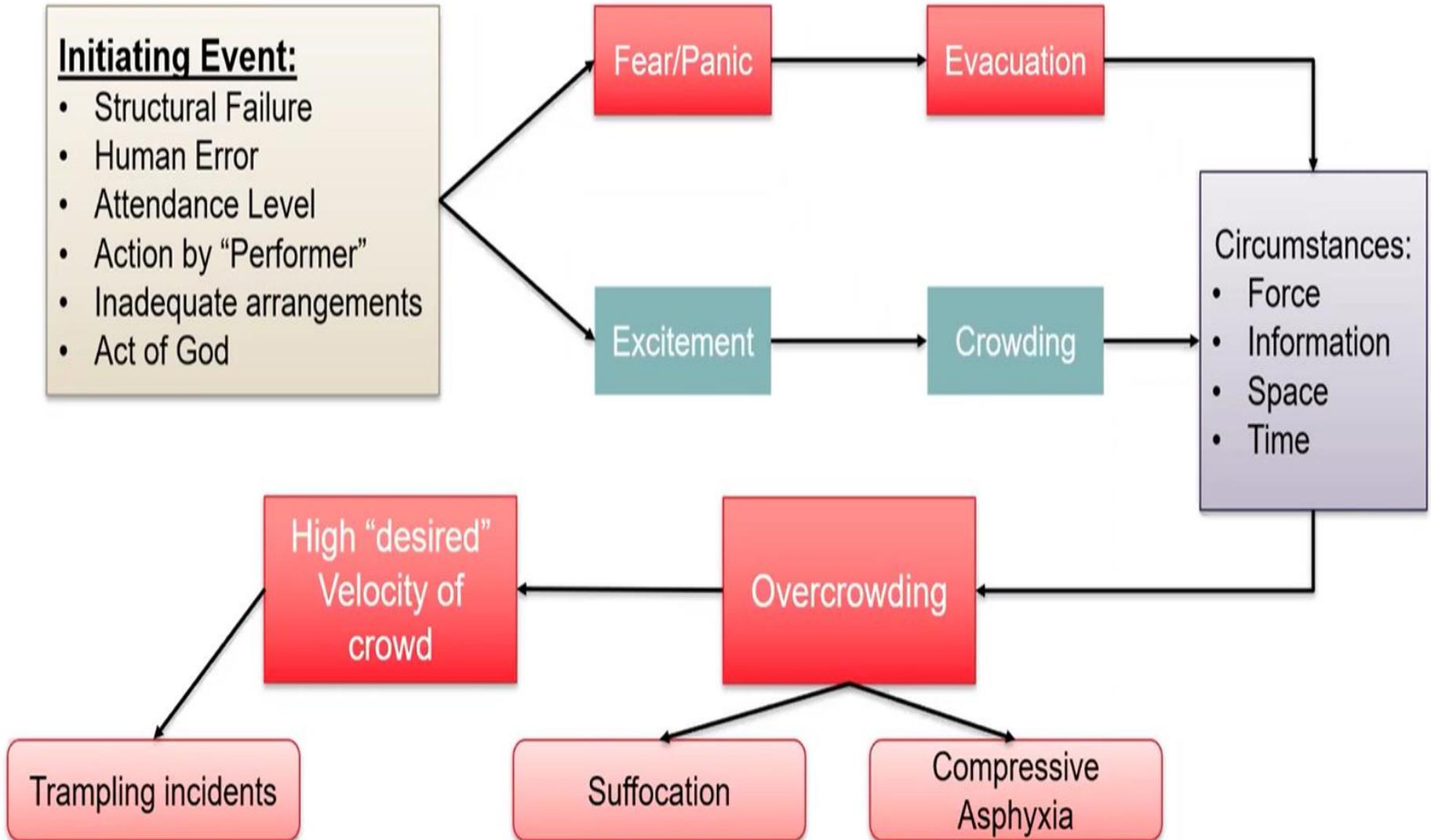
- The pressure created by a mass of crowded humans

02/07/05 09:04:10 PM

M8 C36



Series of events that can lead to a crowd disaster



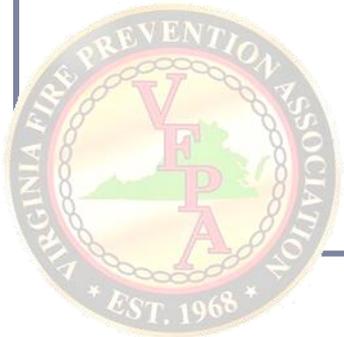
Dangerous Forces of Crowds

- In a dense crowd, the force of the crowd itself can exceed 1000 lbs
 - 3000 N (~670 lb) of force can break humans' ribs
 - 4500 N (~1000 lb) of force can bend metal railings
 - ~7000 N (~1,550 lb) of force can cause gross bone fractures
- This level of force can result in compressive asphyxia from people being stacked vertically or from horizontal or leaning forces

Key element of reducing crowd risks is to not allow dangerous densities to develop.

+1 Club Incident

- November 2015
- Paceville (pah-CHUH-veel) St Julian
- 2 Deaths, 74 Injuries
- Possible Gas Leak, Multiple complaints of skin irritation, watering eyes.







AFP 

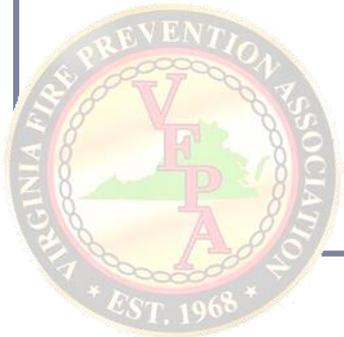
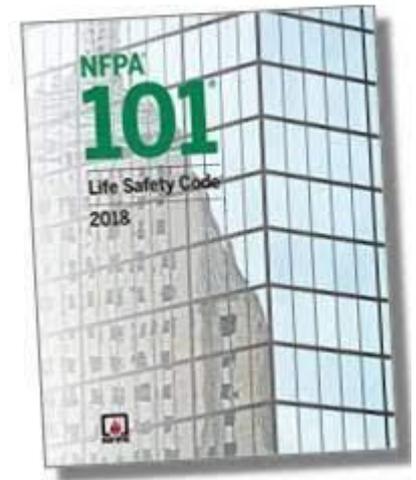
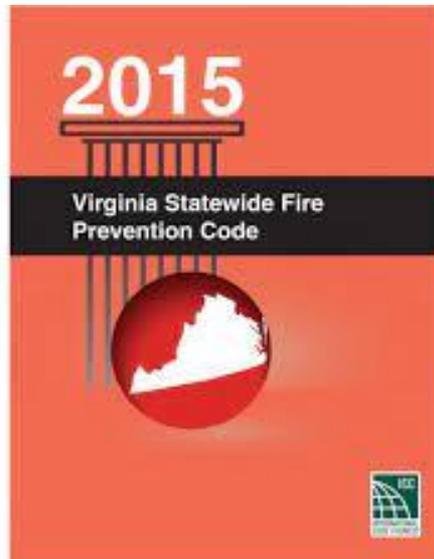
RTV

www.opinivoulgohespe.mplc



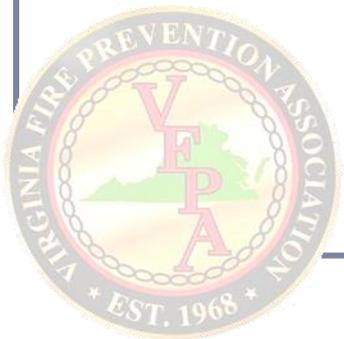


Review of the Code Requirements



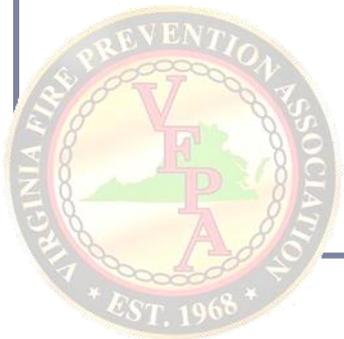
403.2 Group A Occupancies.

An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group A occupancies, other than those occupancies used exclusively for purposes of religious worship with an occupant load less than 2,000, and for buildings containing both a Group A occupancy and an atrium. Group A occupancies shall comply with Sections 403.2.1 through 403.2.4.



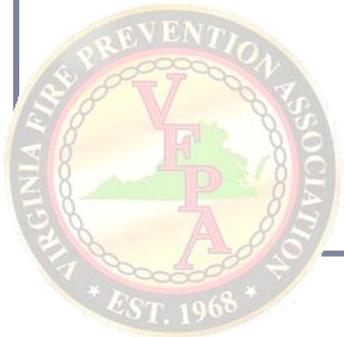
403.2.4 Crowd Managers.

Crowd managers shall be provided where required by Section 403.12.3.



403.12.3 Crowd Managers for Gatherings Exceeding 1,000 People.

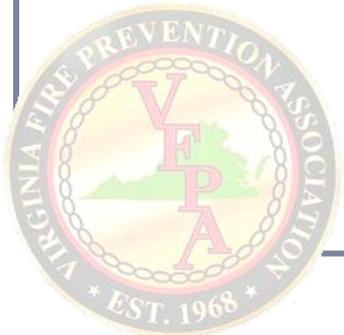
Where facilities or events involve a gathering of more than 1,000 people, crowd managers shall be provided in accordance with Sections 403.12.3.1 through 403.12.3.3.



403.12.3.1 Number of Crowd Managers

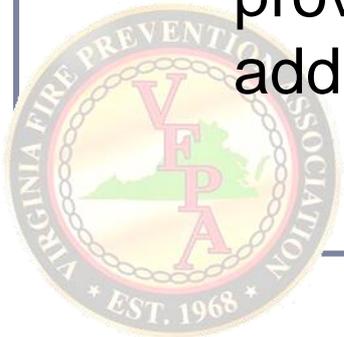
The minimum number of crowd managers shall be established at a ratio of one crowd manager for every 250 persons.

Exception: Where approved by the fire code official, the number of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.



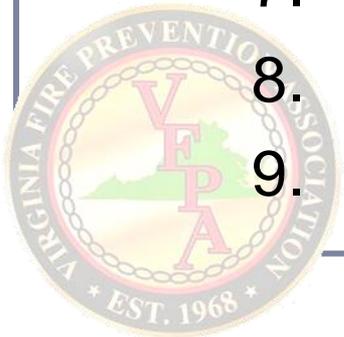
403.12.2 Public Safety Plan for Gatherings

Where the fire code official determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the fire code official shall have the authority to order the development of or prescribe a public safety plan that provides an approved level of public safety and addresses the following items:



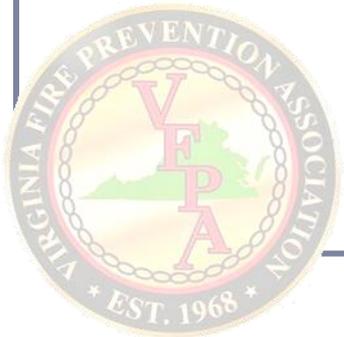
Continued

1. Emergency vehicle ingress and egress.
2. Fire protection.
3. Emergency egress or escape routes.
4. Emergency medical services.
5. Public assembly areas.
6. The directing of both attendees and vehicles, including the parking of vehicles.
7. Vendor and food concession distribution.
8. The need for the presence of law enforcement.
9. The need for fire and emergency medical services personnel.



403.12.3.2 Training

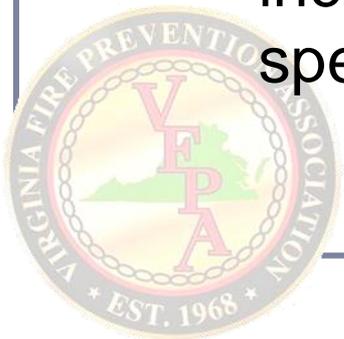
Training for crowd managers shall be approved.



403.12.3.3 Duties

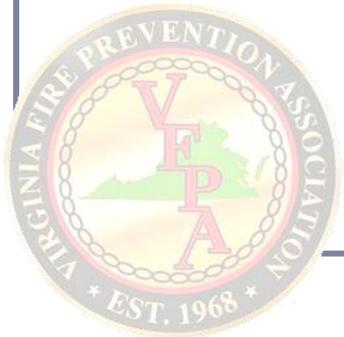
The duties of crowd managers shall include, but not be limited to:

1. Conduct an inspection of the area of responsibility and identify and address any egress barriers.
2. Conduct an inspection of the area of responsibility to identify and mitigate any fire hazards.
3. Verify compliance with all permit conditions, including those governing pyrotechnics and other special effects.



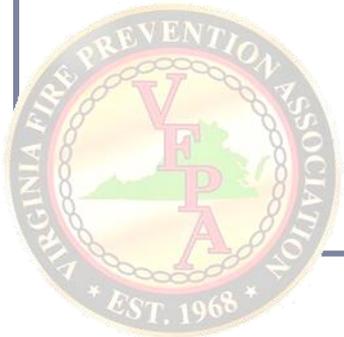
Continued

4. Direct and assist the event attendees in evacuation during an emergency.
5. Assist emergency response personnel where requested.
6. Other duties required by the fire code official.
7. Other duties as specified in the fire safety plan



2018 IFC Changes

403.12.3 Crowd managers. ~~for gatherings exceeding 1,000 people.~~ Where facilities or events involve a gathering of more than 1,000 ~~500~~ people, crowd managers shall be provided in accordance with Sections 403.12.3.1 through 403.12.3.3.



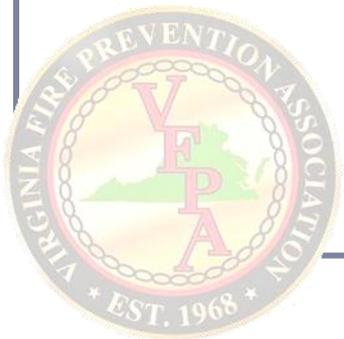
2018 IFC Changes

- **403.12.3.1 Number of crowd managers.** ~~The minimum number of~~ Not fewer than two trained crowd managers shall be established at a ratio of, and not fewer than one trained crowd manager for every each 250 persons or portion thereof, shall be provided for the gathering.

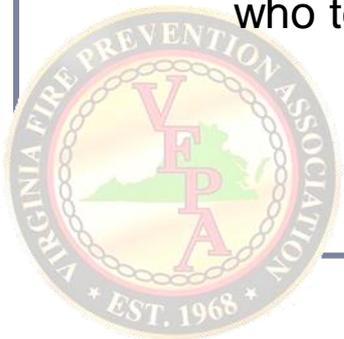
~~Exception: Where approved by the fire code official, the number of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.~~

Exceptions:

1. Outdoor events with less than 1,000 persons in attendance shall not require crowd managers.
2. Assembly occupancies used exclusively for religious worship with an occupant load not exceeding 1,000 shall not require crowd managers.
3. The number of crowd managers shall be reduced where, in the opinion of the fire code official, the fire protection provided by the facility and the nature of the event warrant a reduction.



CHANGE SIGNIFICANCE: This section is revised to accomplish two main changes. First, the threshold where crowd managers are required moves from 1,000 to 500 persons. However, two new exceptions allow for occupant load to stay at 1,000 for places of religious worship and outdoor events. Smaller venues sometimes place the public at greater risk than larger ones for many reasons, including the fact that larger facilities have greater requirements for other fire protection features. Many times, the event itself creates additional hazards that impact smaller audiences. The new Exception 1 for outdoor events with less than 1,000 is intended to recognize the fact that outdoor events are perceived to be less dangerous because egress isn't restricted as it is in a building. Exception 2 for places of worship with occupant loads up to 1,000 recognizes the fact that people who are in facilities normally have a greater awareness of their surroundings and are more familiar with egress routes because they attend the facility on a more regular basis than those at performances, who tend to be more transient.



Fundamental Elements of Crowd Safety

Space

Three types of spaces:

- Static spaces
- Dynamic spaces
- Unused spaces

Variance in crowd profile influences safe number of people

Codes and standards specify safe number of occupants per area

Time

Graph the number of people in the space against time to assess:

- Crowd build up
- Crowd density
- Crowd counts

Direction

Understand the direction of crowd movement.

- Where are people coming from (e.g. transportation hubs) and where are they going to.

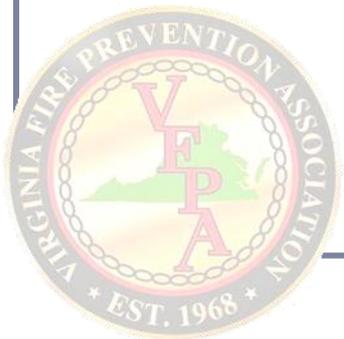
Flow

Calculate people/m(ft)/sec

- Measure width of pathway
- Count people passing through a line on pathway per minute
- Divide people per width per min by the width of pathway

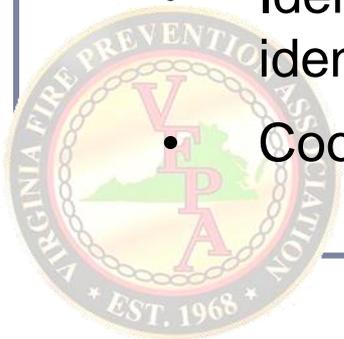
Crowd Manager

- Must understand:
 - crowd dynamics,
 - crowd management techniques,
 - the venue's emergency response plan,
 - various other characteristics



Crowd Manager

- Conduct pre-event inspections to identify problems with exits and egress paths and ensure required fire systems are operational
- Use a portable fire extinguisher
- Guide the crowd in an emergency
- Recognize when to use protection strategies, including defend-in-place, evacuation or partial evacuation
- React to deteriorating weather conditions
- Identify problem attendees and how to respond once they're identified
- Coordinate with emergency responders



When and Where?

Warren County becomes a gun sanctuary

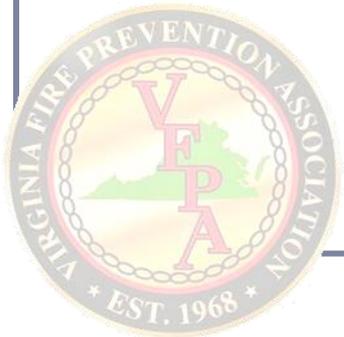
By Josh Gully The Northern Virginia Daily Dec 11, 2019 Updated Jan 7, 2020

5 of 7

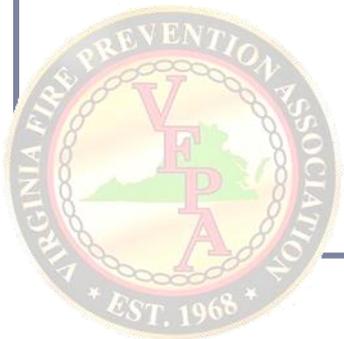


Warren County residents cheer as a speaker leaves the podium while waving flags.

Rich Cooley/Daily

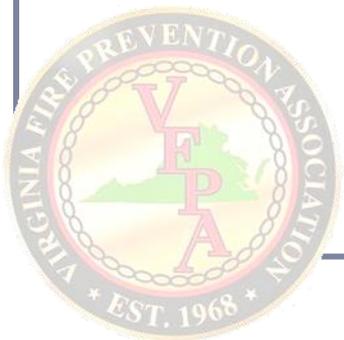


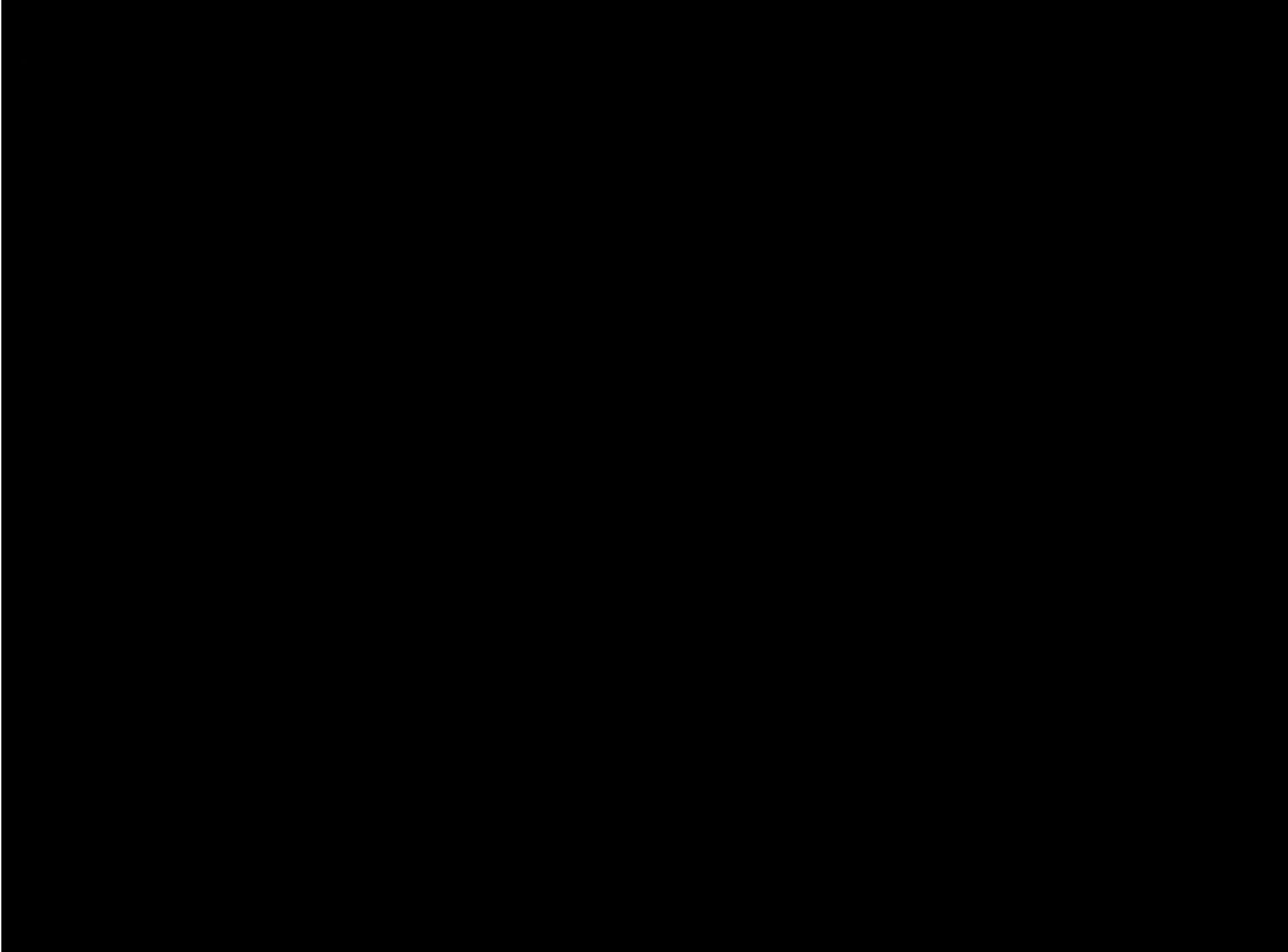
Front Royal Unites – Police Brutality March – June 2020



What about the training?

403.12.3.2 Training. Training for crowd managers shall be approved.





Crowd Management Training

This 2-hour online course was written by fire safety code experts in accordance with NFPA 101 Life Safety Code, NFPA 1 Fire Code as well as the International Fire Code (IFC), and includes:

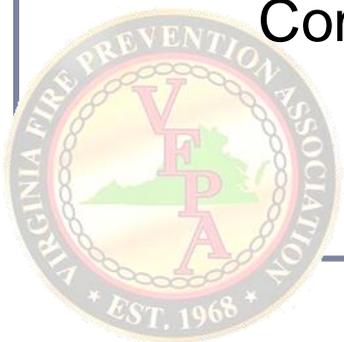
30 days of 24×7 access – fit to your schedule

Real-world scenarios that help you apply what you learn

Practice questions throughout the course

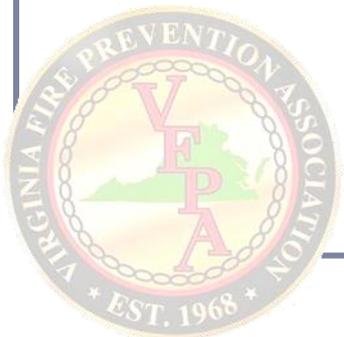
Electronic wallet and wall certificates

Compatible with modern mobile devices



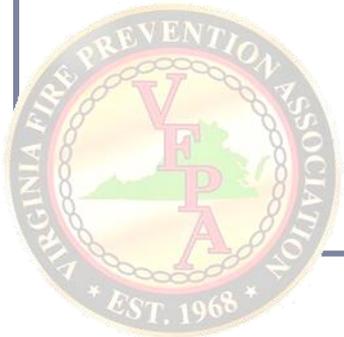
Crowd Manager Training

- National Association of State Fire Marshals
- International Association of Fire Chiefs



Research Continues

<https://www.nfpa.org/-/media/Files/News-and-Research/Resources/Research-Foundation/Current-projects/ProjectSummaryDataInformedCrowdManagement.ashx>





Fairfax County – Permit Requirements

Carnivals, Fairs and Festivals | Fire | X +
https://www.fairfaxcounty.gov/fire-ems/fire-marshal/festival
COVID-19 Updates: Vaccine Is Readily Available and Free

RESIDENTS BUSINESS GOVERNMENT **FAIRFAX COUNTY** SERVICES CONNECT SEARCH 
VIRGINIA  Translate

 To report concerns/violations about Phase III Reopening Guidelines, call 703-691-2131 (Fairfax County Public Safety Non-Emergency Number).

DEPARTMENT RESOURCES

- [Fire & Rescue Homepage](#)
- [Office of the Fire Marshal Homepage](#)
- [About the Fire Marshal](#)
- [OFM Contacts / Directions](#)
- [Email Subscriptions](#)
- [Plans Review & eReview](#)
- [Acceptance Testing \(Fire Protection Systems\)](#)
- [Installation Permits](#)
- [Emergency Planning & Preparedness](#)
- [Operational Permits \(FPCPs\)](#)
- [Code Compliance Information](#)
- [Applications & Forms](#)
- [Billable Services & Fees](#)
- [Community Risk Reduction](#)
- [Hot Tips](#)

Carnivals, Fairs and Festivals

CODE COMPLIANCE GUIDELINE AND OUTDOOR PUBLIC ASSEMBLAGES 500+ PERSONS

**** PERMIT REQUIRED **** 

This page outlines the Virginia Statewide Fire Prevention Code (i.e., Fire Prevention Code or SFPC) permit and public safety plan requirements related to carnivals, fairs, festivals, and outdoor public assemblages of 500 people or more within Fairfax County and the towns of Clifton, Herndon, and Vienna. This information does not address circuses and temporary tents, nor does it address special amusement buildings defined by the Fire Prevention Code.

***** Please Review This Entire Publication BEFORE TAKING ACTION *****

Questions regarding the content of this publication should be directed to the Fire Inspections Branch at 703-246-4849 during regular office hours, Monday thru Friday, 8:00 a.m. to 4:00 p.m.





James City County Fire Department
5077 John Tyler Highway, Williamsburg, Virginia 23185
Phone: (757) 220-0626 Fax: (757) 220-9125

Special Event Information & Request for Fire/EMS Services

Event Name: _____ Date(s) of Event: _____

Event Location: _____ Times of Event: _____

Type of Event:(check all that apply): Outdoor Indoor Concert Festival Stadium
 Sport Extreme Sport Combat Sport Equestrian Rodeo Event involving Water
 Political Run Event (5K, 8K, etc) Other: _____

Estimated Attendance Including Staff: <500 500 – 1,000 1,000 – 2,500 2,500 – 5,000 >5,000

Is the event weather dependent? Yes No Alternate Location/Date? _____

Promoter/Sponsoring Organization: _____

Event Coordinator (EC) _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

Telephone #: (____) _____ Fax: (____) _____ Other: (____) _____

E-mail: _____

Principal Crowd Manager (PCM) _____

PCM Telephone Day of Event _____

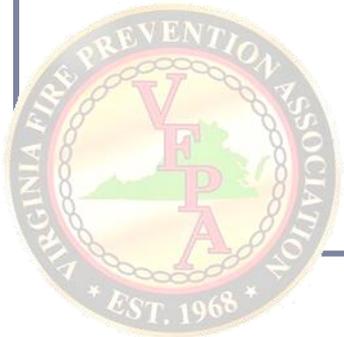
PCM E-mail: _____

Definitions

Event Coordinator (EC): The *Event Coordinator* is the person responsible for coordinating or sponsoring the venue or event. The *Event Coordinator* is responsible for appointing the *Principal Crowd Manager*. The *Principal Crowd Manager* will report directly to the *Event Coordinator*. The *Principal Crowd Manager* and *Event Coordinator* may be the same person so long as their duties do not conflict.

Principal Crowd Manager (PCM): The *Principal Crowd Manager* is responsible for on-site event safety. Before the event, the *Principal Crowd Manager* must perform and document that a safety inspection was performed of the facilities and venue. They must wear identifiable clothing that distinguishes him or her from the general audience. They are responsible for notifying the *Event Coordinator* of safety issues that are identified prior to the event and assuring these are corrected before the event begins. They are also responsible for establishing contact with emergency response personnel when they arrive to relay pertinent information about the emergency, such as cause, status, injuries and facility and venue information.

James City County Special Event



Virginia Statewide Fire Prevention Code

The VSFPC § 403.3 states:

“Trained crowd managers shall be provided for facilities or events where more than 1,000 persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons.” For the purpose of this Guide, a congregation includes spectators, general public, performers, and event staff. Events that require Crowd Managers shall have a minimum of four Crowd Managers on-duty, and one additional Crowd Manager for every 250 persons. For example, an event with 1,000 persons would require four crowd managers; an event with 1,500 would require six crowd managers. One Crowd Manager must be designated as the Principal Crowd Manager.

Event Planning

1. Please describe your event:

2. Please describe what medical services you have had at previous events, and injuries and accidents that have occurred:

3. Have you developed a safety plan for your event? If so, please describe your plan and attach a copy with this form.

4. Inclement Weather: Please describe how you will monitor the weather.

5. Please describe your plan for educating and notifying event attendees regarding EMS System Access, Evacuation, Specific Hazards or Severe Weather:

6. Venue/Race Route/Facility Considerations

Type of Surface: Grass Loose Gravel Dirt Asphalt Concrete

Temporary flooring Other: _____

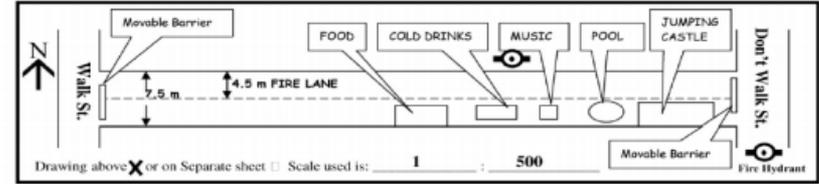
Condition of Surface: Smooth Rough Slippery Other: _____

Levelness: Even Uneven

Generators, Portable Lighting, Flammable Fuel Powered Equipment: Describe all such equipment:

Please attach a site map and indicate any areas where you propose to erect any tents or other structures and the locations that you will require vehicle access. Also indicate where you will have parking, bands, vendors, race routes, etc. Maps of most County sites can be found on the County Web site at JCCFD Special Event Information & Request Form

www.jamescitycountyva.gov.



7. Estimated age composition of audience:

- 0 – 12 years: Percentage of Total _____ %
- 13 – 18 years: Percentage of Total _____ %
- 19 – 25 years: Percentage of Total _____ %
- 26 - 40 years: Percentage of Total _____ %
- 41 – 55 years: Percentage of Total _____ %
- Over 56 years: Percentage of Total _____ %

8. Is alcohol being served and/or allowed at your event? Yes No

9. Are you requesting EMS at your event? Yes No If Yes, please describe the types of EMS you are requesting (examples: First Aid stations, Bicycle delivered EMS, Off the Road (Gator) EMS services, ambulance based services).

10. Do you have a medical plan for your event? Yes No If yes, please provide us a copy of what you propose for your medical plan.

If you have not run a similar event in the past, consultation with the Special Events EMS Planner at the Fire Department can be very helpful. As soon as you begin planning your event, begin working with EMS regarding the medical response and safety plan your event may need. This will vary from having a simple first aid kit and AED available for a small event, while larger events may require on-site ambulances, field medical aid stations, mobile EMS Bike Teams, and mobile EMS Gator teams. Every event is different. You can reach the EMS Planner at 757-220-0626 or by email at: al.catlett@jamescitycountyva.gov.

Revised January 2015

**Crowd Management Checklist
During the Event or While Open to the
Public**

| | |
|--|--|
| | Do not exceed your occupancy capacity! It is designed to protect your occupants and you! You must count the number of people who enter and the number of people who leave and be able to produce that number upon request. |
| | Walk the rooms and confirm that the exit paths are staying clear. Do not allow people to congregate around or block any exits. |
| | Assure all marked exits remain unlocked and unobstructed at all times. |
| | Look for situations that could lead to challenges in the event of an emergency. |
| | Maintain all fire lanes, fire hydrants, and fire department connections free from vehicles and obstructions. |
| | Make sure that you have the adequate number of trained staff on-duty for the number of occupants. |

The Office of the Fire Marshal performs routine and unplanned spot checks of assembly occupancies and venues to assure compliance with authorized occupant loads and fire and life safety code compliance.

**In the interest of you and your occupants
safety, please review your ESCAPE plan
daily!**

| | |
|----------|---|
| E | Exits—Are unblocked, unlocked, and properly marked. |
| S | Storage—The occupancy is clean, orderly and there is no excessive storage. |
| C | Capacity—The number of persons occupying the building or space does not exceed the posted capacity. Capacity certificates are properly posted. |
| A | Aisles—All aisles are free and clear at all times and of the proper width. |
| P | Protection—Smoke, fire alarm, sprinkler systems, and fire extinguishers are in proper working order and have up-to-date inspection and testing performed. |
| E | Emergency Lighting—All exits signs and emergency lighting are working properly. |



*Frederick County
Office of the Fire Marshal*

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**Frederick County, Maryland
Division of Fire and Rescue Services
Office of the Fire Marshal**
www.co.frederick.md.us/fm



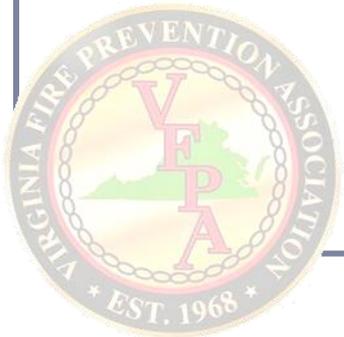
***Crowd Management
Information
And
Checklists***

Contact the Frederick County Office of the Fire Marshal to answer any questions regarding fire and life safety code requirements or to obtain training in Crowd Management for your business or organization.

**You have the responsibility for
providing a safe environment for
your occupants/patrons!**

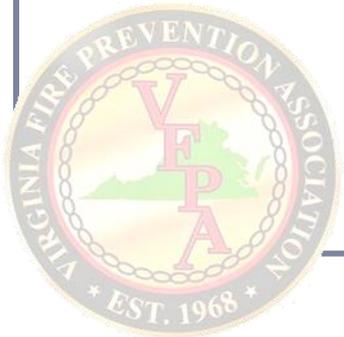
Reference Materials

- NFPA Journal – July 2020 “Crowd Source by Victoria Hutchison”
- NFPA Today “Using Data to Inform Crowd Management” Webinar – November 2021



In Closing

- Code Enforcement must consider the impacts of “crowds” and enforce the provisions of crowd management.
- Crowd Mangers are essential for the safety and wellbeing of those we serve.



Questions

