



FIRE PROTECTION  
& BUILDING CODE  
CONSULTING ENGINEERS

# **2012 Ontario Building Code Changes Affecting Fire Alarm Systems**

**CFAA Annual Technical Seminar**

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# Developments in Life Safety

## Introduction

- Code Development Overview in Canada
- Who is responsible for Building Life Safety
- Building and Fire Code Application
- Implication of Fire and Life Safety changes included in the 2012 Ontario Building Code (OBC)
- Additional CSA B-44 requirements for elevators
- Verification and testing of life safety systems

# MAINTAINING BUILDING LIFE SAFETY

## WHO IS RESPONSIBLE?

- The building owner is responsible for life safety of the occupants in their building
  - Typically the owner engages others to assist in meeting this obligation
  - If the building owner fails to ensure the requirements are met this can result in fines, a jail term or both
  - Others who contract to provide services may also be held at fault, if they fail to carry out the services for which they contracted

# CODES

- **Building Codes** – Applicable to new construction
- **Fire Codes** – Applicable to operation and maintenance
- **National Building Code (NBC)** model code
  - A model set of technical requirements designed to provide an acceptable level of fire and life safety within a community. Forms the base of all Provincial Building Codes
  - Permits adoption by an appropriate authority
- **Constitution Act**
  - Regulation in Canada identifying provincial and territorial governments as responsible for building and fire safety

# BUILDING CODES

- **Building Code Application**
  - New buildings
  - Existing buildings
    - Reconstruction, renovation, alteration
    - Extension/addition
    - Changes in occupancy

# 2012 ONTARIO BUILDING CODE

- Legislation enabling the 2012 Ontario Building Code was passed in 2012
  - The 2012 Ontario Building Code will not come into force until January 1, 2014
  - The new OBC can be viewed on the Government of Ontario website, no published version is currently available
  - Based upon the 2010 National Building Code
  - Sections relating to fire alarm appear identical

# FIRE CODES

## Fire Code Application

- Existing Buildings
  - Fire prevention
  - Fire fighting and life safety in buildings
  - Uses, activities, hazards, limitations
  - Service and Maintenance
  - Emergency plans (reviewed annually and updated as needed)
- A revised Fire Code is complete
  - No date has been set for its release

# REFERENCED STANDARDS

- Codes and Standards
  - Regularly reviewed and revised by balanced committees based on geography, technical expertise and industry focus
  - Standards are referenced by date of issue in the body of the Codes and Standards and include
    - ULC , CSA
    - NFPA, ULI, FM, ANSI, ASME etc



# BUILDING CODES and STANDARDS

- Building Codes and Standards typically are reviewed, revised and reissued every 5 years to address
  - Changes in product technology
  - Increased hazards from newer construction and finishing materials
  - Changes identified by inquests
  - Changes in other Standards
  - Errors, omissions or missing detail

# CODE CYCLES AND TIMING

- Unfortunately, Codes are already “stale” by the time they become effective
  - By its effective date of Jan 1<sup>st</sup> 2014 the OBC requirements will be based on material developed 6 to 7 years prior
  - Industry Technology change far outpaces our ability to reflect it in current Codes
  - Its imperative that in addition to adhering to the published Codes, we create designs based upon good engineering practice

# **2012 Ontario Building Code**

## **Changes Affecting Fire Alarm Systems included in the 2012 Ontario Building Code**

# CONTINUITY OF FIRE ALARM SYSTEMS

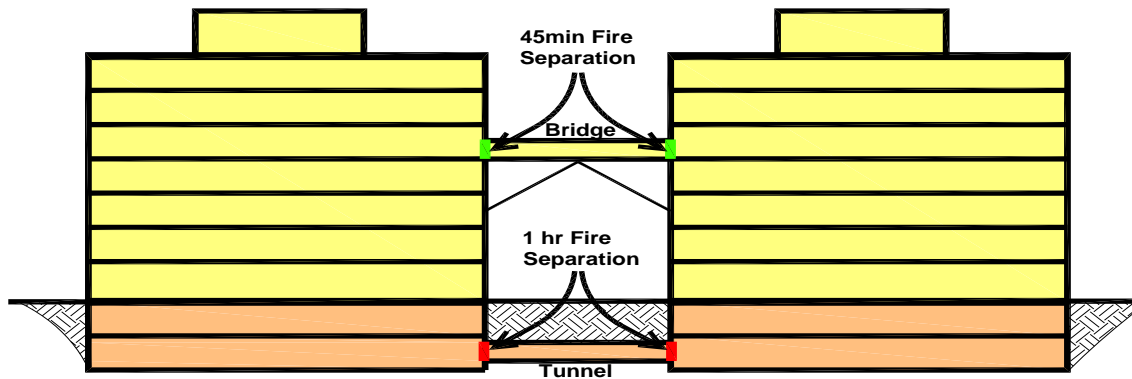
- Non high rise buildings interconnected by walkways or tunnels can have independent fire alarm providing
  - For walkways, each building must have a 45 min fire separation from walkway
  - For tunnels, each building must have 1 h fire separation from tunnel

# CONTINUITY OF FIRE ALARM SYSTEMS

## CONNECTED LOWRISE BUILDINGS

REQUIRED -MANUAL STATIONS AT EXIT FROM EACH BUILDING  
-SMOKE DETECTORS IN EACH BUILDING AT BRIDGE OR TUNNEL

RECOMMENDATION -WARNING "**DO NOT ENTER FIRE**" SIGN AT ENTRY TO BRIDGE OR TUNNEL. OPERATED BY ADJACENT BUILDING ON ALARM  
-BUILDINGS CONNECTED FOR 1st & 2nd STAGE ALARM



# CONTINUITY OF FIRE ALARM SYSTEMS

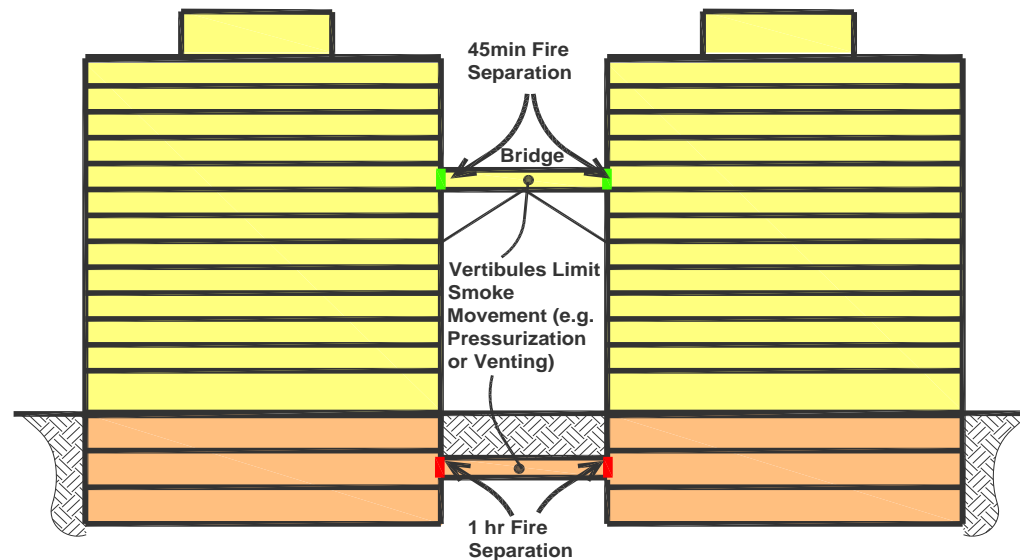
- Allows high rise buildings interconnected by walkways or tunnels to have independent fire alarm providing
  - For walkways, each building must have a 45 min fire separation from walkway
  - For tunnels, each building must have 1 h fire separation from tunnel
  - Vestibules must be designed to limit smoke movement (Section 3.2.6)

# CONTINUITY OF FIRE ALARM SYSTEMS

## CONNECTED HIGHRISE BUILDINGS

REQUIRED -MANUAL STATIONS AT EXIT FROM EACH BUILDING  
-SMOKE DETECTORS IN EACH BUILDING AT BRIDGE OR TUNNEL  
-VESTIBULES TO LIMIT SMOKE MOVEMENT

RECOMMENDATION -WARNING "DO NOT ENTER FIRE " SIGN AT ENTRY TO BRIDGE OR TUNNEL. OPERATED BY ADJACENT BUILDING ON ALARM  
-BUILDINGS CONNECTED FOR 1st & 2nd STAGE ALARM



# ANNUNCIATOR ZONE INDICATION

Kitchen Fire extinguishing system

- Individual zone display for each extinguishment system
- Comply with NFPA 96, “Ventilation Control and Fire Protection of Commercial Cooking Operations,”





# FIRE PUMP SUPERVISION

- Supervise fire pumps as stipulated in NFPA 20 Installation of Stationary Pumps for Fire Protection
- Electrical Supervision includes;
  - Suction Valve
  - Discharge valve
  - Bypass valves
  - Loss of power
  - Pump Trouble



# ELEVATORS Based on OBC

## Elevator Hoistway:

- Individual zone display for Fire Detector required in elevator hoistway if separately zoned sprinkler not installed
  - Typically a heat detector is installed at the base and a smoke detector at the top



# ELEVATORS Based on OBC

## Elevator Machine Room

- Smoke Detectors required in Elevator machine rooms
- Must recall the Elevator(s) served by that machine room



# ELEVATORS Based on OBC

- If automatic recall provided and primary recall level not sprinklered, then smoke detector required in lobby and alternate recall required
  - Detector must be part of fire alarm system



# ELEVATORS Based on CSA B44

- Life safety requirements for elevators is also covered by CSA B44-07 which is enforced by TSAA
  - Required by TSSA over and above the OBC in order to get an elevator license for new elevators
  - Required by TSSA over and above the OBC in order to get re-licensed after a controller upgrade for existing elevators

# ELEVATORS Based on CSA B44

- CSA B44 Requirements
- Currently TSAA insist their requirements override those of the OBC if you want an elevator license
- Significant differences with many added requirements in the CSA B44-07 Code
  - Automatic recall required for elevator with rise over 2 m
  - Alternate recall required if recall level not sprinklered or there are landings below the recall level

# ELEVATORS Based on CSA B44

- Fire Alarm Input Devices
  - Smoke detectors required in elevator lobbies (or in vicinity if no lobby) on all floors (not required by OBC)
    - recalls all elevators in that bank
  - Other automatic fire detection allowed to recall elevators but not required (sprinklers and floor detectors)
  - Manual stations are not allowed to initiate recall
  - Smoke detector installed in elevator machine room (required by OBC)
  - Fire Detectors installed in Shaft (required by OBC)

# ELEVATORS Based on CSA B44

- Fire Alarm Control
  - If building not required to have a fire alarm system by OBC, dedicated panel required to serve for elevator detection and recall requirements
  - Although not covered by CSA B44, as a “fire alarm panel” in a building other requirements such as manual stations, sprinkler supervision, additional detection, alarm signalling, annunciation, verification and annual test is now required



# ELEVATORS Based on CSA B44

- Compliance Using Existing Fire Alarm Systems
  - Addressable system format
    - Smoke detectors in elevator lobby
    - Programming to initiate elevator recall from floor devices excluding manual stations
    - Addressable Relays for elevator recall

# ELEVATORS Based on CSA B44

- Compliance Using Existing Fire Alarm Systems
  - Systems using “conventional” (non addressable) technology
    - If spare capacity available, modify floor zones so manual stations on separate zones
    - Add smoke detectors in elevator lobbies, machine rooms, elevator shaft
    - The use of detectors with relay bases is not an acceptable solution if connected to floor as the relay will not function if a contact device is operated on same circuit
    - If wired vertically, isolators required every level per S524

# ELEVATORS Based on CSA B44

- Compliance using a “dedicated” fire alarm system panel
  - To be acceptable to most Authorities
    - Must be integrated into building system to provide floor annunciation for alarms
    - Provide alarm signaling throughout the building
    - Release maglocks, fan control etc
    - Where required by the OBC, initiate fire service response
    - Follow good fire and life safety practices

# ELEVATORS Based on CSA B44

- Multiple points now required from fire alarm system to elevator controllers to:
  - Initiate primary recall
    - from elevator lobby smoke detectors, top of shaft and elevator machine room
  - If alternate recall provided
    - alarm from primary recall level or detector at base of shaft
  - If alarm from floor device
    - indicate “Available for emergency service” in elevator cab
  - If alarm from elevator shaft or machine room
    - indicate, “Not to be used for emergency service” in elevator cab

# ELEVATORS Based on CSA B44

- Impact of Elevator Changes

- In large complexes such as hospitals, will allow distributed elevator banks to continue operation
- Provides a safer means of egress for individuals with impaired mobility
- Interface/recall applies to all elevators (not just high rise)
- Smoke detectors now required in all elevator lobbies
- If primary recall level not sprinklered alternate recall required (no longer just for high rise)
- Manual stations not allowed to initiate recall, so floor zone cannot be used (problem primarily for existing FA systems)
- Verification and testing significantly more time consuming

# FIRE ALARM ALERT SIGNAL

- Alert signals (to be) clearly audible in continuously staffed locations, and if there are no continuously staffed locations, throughout the *floor area*.
  - Clarifies previous intent to ensure that supervisory staff are aware of fire alarm system operation
  - Alert Signals do not need to operate throughout the building or portions of the building (provided supervisory staff are alerted)
  - Alarm (EVAC) signals still generally required on floor of alarm initiation and floors above and below in high rise buildings

# VOICE COMMUNICATION

## Intelligible Emergency Voice Messages

- The OBC has required voice communication to be intelligible for many Code cycles
- No measurable, repeatable criteria for acceptance was available
- Bose spearheaded a means to test systems in the field for intelligibility using software which reflects speech pattern
- Baring any changes prior to the OBC becoming effective, broadcast of pre-recorded, synthesized, or live voice messages will need to meet an equivalent score of 0.70 on the Common Intelligibility Scale (CIS)

# VOICE COMMUNICATION

## Impact

- Meeting the .70 CIS results in a significantly greater number of speakers installed in closer proximity to one another
  - Use of digitized messages provides best results,
  - Added time needed for verification and testing
  - Added time required to design conventional office spaces
  - In large volume spaces, and areas with reverberant surfaces, an engineered sound solution approach will generally be needed



# VOICE COMMUNICATION

- Emergency voice communication capability now required for additional occupancies
  - Previously emergency voice communication capability was only required for “high” buildings
  - New requirement to provide emergency voice communication for all occupancies regardless of height where
    - a 2 stage fire alarm system is installed and
    - The occupant load will be greater than 1000 people

# VOICE COMMUNICATION

## Impact

- Will affect large assembly occupancies such as shopping malls, banquet facilities, arenas, auditoriums, retail, universities/colleges, etc.
- Where existing facilities are expanded the expansion will now require addition of voice communication capability
  - Display Control Centre/annunciator – add microphone and paging controls for expansion area, in some cases this may result in upgrade throughout
  - Control equipment – add voice control/amplifiers
  - Network architecture –requires a voice path from main control
  - Signal types – matching sound of bells, horns, tones
  - Partial voice – New section with voice, balance just tones?

# SMOKE ALARMS

## Residential Occupancy smoke alarm

- Now requires smoke alarms be installed on every level as well as in every bedroom
- Alarm signal pattern now to be temporal pattern, proven to be more effective at waking individuals.
- Smoke alarm to have a local signal silence switch to reduce tampering
- Power from permanent connection (120 VAC) as well as battery suitable for 7 days followed by 4 min alarm

# EXIT SIGNS

## New Display Format for Exit Signs

- Green pictograms conforming to ISO Standards
- Language independent
- Internationally recognized and conforms to universal sign format
- Could result in mixed signage in existing buildings where additions need to conform to the pictorial symbols



# EXIT SIGNS

## Use of New Technology for Exit Signs

- Listed photoluminescent signs acceptable
  - Continues to function after emergency power fails
  - Provides easier cost effective installation
  - Lower maintenance
  - To be Acceptable must be “Listed”

# COMMISSIONING

## Life Safety and Fire Protection Systems

- Where life safety and fire protection systems are installed to comply with the provisions of the OBC or the OFC, the commissioning of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship between the systems

# COMMISSIONING

## Life safety Systems include

- Fire alarm
- Sprinklers
- Standpipes
- Smoke control
- Ventilation
- Pressurization
- Door hold open
- Elevator recall
- Maglocks

# FIRE ALARM DESIGN

## Design Process

- Establish the Design Parameters to be utilized for the project
  - New Construction, select the most appropriate infrastructure and technology
  - Retrofit must consider how full fire alarm protection will be maintained duration transfer to new
  - If replacing only the fire alarm panel, need to address outdated devices, wiring issues, audibility, etc



# FIRE ALARM DESIGN

## Select Fire Alarm System Architecture

- Consider Survivability & Redundancy
  - Careful use of network structure and wiring paths can achieve significant benefit with little or no cost
- Distributed architecture with processor based communication
  - Using addressable components can provide detailed alarm location, fire growth information and detailed fault information
  - Provides for future growth and flexibility

# FIRE ALARM DESIGN

## Select Appropriate Architecture Cont'd

- Computer control centre with colour graphics for large or complex systems
- Consider multiple DCC locations for multiple buildings, building operations and fire service response points
- Include digitized voice paging message broadcast for clearer intelligible messages
- Consider different operating sequences for two stage system based upon time of day and investigative personnel available

# VERIFICATION, TESTING & MAINTENANCE

- Ensure all system additions or changes verified and documents maintained with service records
- Contract to have testing performed at required intervals, monthly, semi-annually and annually
- Use reliable qualified service providers
  - Pre-qualify and identify expectation in detail in an RFP
  - On a regular basis monitor the work and progress
  - Require the test report on a timely basis on completion
  - Review the report for deficiencies and have corrected on a timely basis
  - Maintain reports for authorities for a minimum of 2 years

# TESTING & MAINTENANCE

- The accuracy, reliability and timeliness of reports for the annual testing of life safety systems can be improved by:
  - Utilizing a service provider who utilizes bar coding of devices (such as Building Reports Canada) and records in electronic format on site
  - Uploading test results on a daily basis to a website where progress can be accessed and reviewed immediately
  - Allows deficiencies to be reviewed while work in progress and corrected rather than waiting till end of testing work
  - Ensures that technician actually gets to all devices
  - Added protection for owner that work completed as agreed

# Summary

Today we have covered some of the changes in life safety which affect building construction, operation and maintenance

- Reviewed the 2012 revisions to the Ontario Building Code which affect Life Safety Systems
- Identified some of the challenges we will face as a result of the changes
- Identified requirements for verification and testing of integrated life safety systems
- System design suggestions to provide a more reliable, robust fire alarm system
- Identified ways we can improve our ability to scrutinize the timely work of our service providers



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Thank you for your attention  
Questions?

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