2012 Ontario Building Code Changes Affecting Fire Alarm Systems

CFAA Annual Technical Seminar
May 31, 2013

Ken Baird VP Systems

www.LRiFire.com

©LRI 2010
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
• **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 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\textsuperscript{st} 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

45min Fire Separation
Bridge
Vertibules Limit Smoke Movement (e.g. Pressurization or Venting)

1 hr Fire Separation
ANNUNCIATOR ZONE INDICATION

Kitchen Fire extinguishing system

• Individual zone display for each extinguishment system
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)
• 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
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)
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
• 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
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
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”
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.
Life safety Systems include

- Fire alarm
- Sprinklers
- Standpipes
- Smoke control
- Ventilation
- Pressurization
- Door hold open
- Elevator recall
- Maglocks
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
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
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 fire3 alarm system
- Identified ways we can improve our ability to scrutinize the timely work of our service providers
Thank you for your attention

Questions?

Ken Baird
LRIFire
kbaird@lrifire.com

www.LRiFire.com

©LRI 2010