

Fire Safety During Construction of Mid-Rise Wood Frame Buildings in Ontario

Guideline

April, 2015

For ease of reference by stakeholders, each section references the sources from which the particular text or potential guideline item was drawn.

Glossary of Source Documents:

COC - National Course of Construction (COC) (Fire) Best Practice Guide

CWC-BC – Canada Wood Council (British Columbia and Ontario “Fire Safety and Security Guideline”

mNFC – model National Fire Code

mNBC – model National Building Code

NFPA – National Fire Protection Association

OFM – Office of the Ontario Fire Marshal – Discussion Paper on Fire Safety at Construction Sites for Five and Six Storey Combustible Buildings OHS –

Occupational Health and Safety Act Construction Regulations (O. Reg. 213/91)

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Introduction

The construction phase of any building represents a relatively short period of time in the lifespan of the structure during which a unique set of risks are present.

The risks and hazards found on a construction site differ in both nature and potential impact from those in a completed building; and this occurs during a time in which the prevention and protection elements that are designed to be part of the completed building are not yet in place or only partially installed.

For these reasons, construction site safety poses some unique challenges. However, an understanding of the hazards and their potential risks is the first step toward prevention and mitigation. While there are many types of hazards and risks that require consideration during construction of all buildings, this Guideline will focus on fire-related aspects, associated with the construction of mid-rise wood frame buildings.

Regulatory Context

This Guideline fills a gap in the current regulatory and legislative framework. It is intended to promote fire safety within and around mid-rise wood frame buildings while they are under construction.

The Ontario Fire Code (OFC) addresses fire safety of existing buildings but does not address buildings under construction. Articles 12(3) and 12(4) of the Fire Protection and Prevention Act (FPPA) specifically indicate that the OFC does not apply to buildings under construction. Generally speaking, the OFC becomes applicable once an occupancy permit is issued.

The Occupational Health and Safety Act (OHSA) regulates the health and safety of persons in or about a workplace. The OHSA authorizes regulations for construction projects which cover a wide range of health and safety issues related to construction sites, including topics such as: scaffolding; stairs and landings; electrical hazards; and fire safety. The fire safety provisions in the Ministry of Labour's (MOLs) construction project regulations are not as detailed as those in other regulations, for instance the model National Fire Code (mNFC).

The Ontario Building Code (OBC) regulates the construction, demolition and change of use of buildings. . Its inspection powers relate to the key physical components of the building, but do not address how the construction process produces a building which includes those required components.

Given the absence of a legislative and regulatory framework to authorize the necessary fire safety requirements for mid-rise wood frame building construction sites, it has been necessary to develop this Guideline in support of the construction sector in their efforts to formalize a fire safety management strategy that helps ensure the confidence of all authorities having jurisdiction.

This Guideline includes all of the fire safety related provisions currently found in MOLs construction project regulations. These extracts are specifically identified. It also draws upon requirements contained in regulations and provisions from various other sources such as the mNFC, the National Fire Protection Association (NFPA) in the US, and other similar guidelines and documents in jurisdictions, including British Columbia.

It is possible that in the future, existing legislation will be amended, or new legislation introduced, to authorize regulations to specifically address fire safety on mid-rise wood construction sites, and perhaps construction sites for other types of building projects. Until that time, this Guideline, will serve as a best practice document.

Purpose of This Guideline

While this Guideline is not a regulation and does not have the force of law, it provides guidance as a “best practice” document for builders to consider when planning and conducting the construction process. Although this Guideline has been written with specific reference to mid-rise wood frame buildings, most if not all the provisions will be relevant to other wood frame building projects and to building construction sites generally.

This Guideline has been developed and endorsed by the Ministry of Municipal Affairs and Housing (MMAH), the MOL, and the Office of the Fire Marshal (OFM) (under the Ministry of Community Safety and Correctional Services). As well, a cross-section of the over 200 private Property and Casualty insurance companies have provided input on this document. Since insurance premiums are based in large part on the degree of risk, compliance with this Guideline may help to satisfy insurance industry requirements and concerns over construction sites.

By following this Guideline, and incorporating the components into their staff training programs, construction processes and fire safety planning, builders will be demonstrating due diligence and will significantly reduce the likelihood of construction site fires attributable to accidents or criminal activity, such as arson.

1. FIRE SAFETY PLANNING

Summary:

A Risk Assessment should be conducted of the proposed construction project as the initial step. The purpose of this assessment is to determine the fire risks, the damage potential, and the potential interruption to the construction schedule. The Fire Safety Plan (FSP) that is developed for this construction site should focus on minimization of the chance of fire, and then subsequently, on the prompt extinguishment of a fire should it occur.

All mid-rise wood construction sites should have a site Fire Safety Plan (FSP). Builders should designate a trained individual to be a Fire Safety Co-ordinator (FSC).

Implementation of a FSP is the responsibility of the FSC who is also responsible for fire safety training of workers.

The FSC should be responsible to submit a fire safety plan to the municipal Chief Building Official (CBO) and Chief Fire Official (CFO) prior to the start of construction, and keep it updated as necessary.

The site's FSP is the written plan setting out everything that will be done on that particular project to minimize the risk of fire and to protect the safety of people working on the site. It should take into consideration all relevant MOL regulations (such as those discussed in this Guideline), as well as anything else that is considered relevant to reduce the risk and impact of fire on the site. In addition, the FSP should include as much information as possible regarding the expected stages of implementation of the various fire protection systems and procedures that are planned.¹

A 'one-size-fits-all' approach is not appropriate when it comes to FSPs – each project and site is unique and those unique aspects shall be considered and addressed in the site's FSP. This may seem obvious for larger projects, however, even smaller projects can present individual features (hazards) that may need special attention.²

The FSP should cover items such as: a site plan showing the location of fire access routes, hydrants and stairs; measures for controlling fire hazards in and around the building; emergency procedures to be followed in the event of a fire; and the designation of personnel to carry out fire safety duties, including a fire watch and guard duties where applicable.

In addition, the fire department should be invited to the building construction site prior to the start of construction to undertake a pre-fire plan review regarding matters such as water supply availability, and location of access routes.

¹ CWC-BC

² CWC-BC

Details are outlined below.

<p>a. Fire Safety Plan (FSP) ³</p>	<p>The site Fire Safety Plan (FSP) is a written document that:</p> <ul style="list-style-type: none">• describes the fire risks,• sets out what will be done on that particular project to minimize the fire risks,• highlights fire protection features designed to help protect the people working on the site, and• prescribes actions to be taken in the event a fire should occur. <p>1) The Fire Safety Co-ordinator (FSC) (see section 1.b, below) should prepare a FSP for the site that includes:</p> <ol style="list-style-type: none">a. the designation and organization of site personnel to carry out fire safety duties, including fire watch and guard service where applicable,b. measures for controlling fire hazards in and around the building, including:<ol style="list-style-type: none">i. good housekeeping,⁴ii. hot work procedures, andiii. inspections of electrical and heating equipmentc. emergency procedures to be followed in the event of a fire, including:<ol style="list-style-type: none">i. initiating a fire warning,ii. notifying the fire department,iii. instructing site personnel on the procedures to be followed once the warning has been initiated, andiv. where it is safe to do so, confining, controlling and extinguishing the fire.d. a maintenance procedure for on-site firefighting equipmente. installation of new fire protection equipment as construction progresses,⁵ andf. a site plan showing:<ol style="list-style-type: none">i. size and location of buildings under construction, andii. location of fire access routes, portable fire extinguishers, fire hydrants, fire department connections for standpipes and sprinkler systems, building access points, stairs accessing floor levels, hose standpipes, control valves for fire protection systems, hazardous materials storage areas and adjacent buildings.g. how to maintain safety during impairments to the fire safety systems or fire alarm, detection or communication systems during construction
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³ OFM
⁴ NFPA
⁵ NFPA

- h. a list of all emergency response numbers and a list of names, addresses, and telephone numbers of persons to be contacted during and after normal operating hours in the event of an emergency.
- 2) Emergency procedures should be posted in conspicuous places on the site. Ideally this should include areas that are protected from the weather elements, such as in the supervisor's on-site trailer and at worker's lunch or break areas.
- 3) Stairways providing access and egress should have a sign on each floor that identifies the floor level, stair location, and street address.
- 4) The fire safety plan should be submitted to the Chief Fire Official (CFO) prior to start of building construction, and should be updated on an agreed upon schedule.
- 5) The FSP should indicate actions to be taken in the event of a fire emergency, which should include, as a minimum, the following duties:
 - a. calling appropriate authorities,
 - b. checking sprinkler control valves to ensure they are open and operating,
 - c. checking the fire pump(s) to ensure it/they are operating satisfactorily,
 - d. checking fire hydrants to ensure they are accessible,
 - e. checking alarm panel indicators and, if safe to do so, coordinating an incident investigation,
 - f. providing direction to responding authorities as to location, source, extent and type of fire concern,
 - g. safely shutting down equipment,
 - h. safely shutting down electrical power where it is contributing to the emergency.
- 6) The FSP should include fire drill procedures for testing the awareness of workers about the requirements of the FSP, ability to effect prompt egress from the building, etc. The fire drill should include:
 - a. provisions for unannounced testing throughout the construction process,
 - b. prior notification to the municipal CFO to allow fire service staff to monitor the drill if they wish,
 - c. measurement and documentation of time to full egress from the structure and verification of whereabouts of all workers,
 - d. verification that all assigned duties were carried out as required, and if not, investigate what prevented success, and implement necessary corrections,
 - e. debrief with workers on drill experience to determine where aspects of the FSP, training program, or other matters may require improvement.

<p>b. Fire Safety Co-ordinator (FSC) ⁶</p>	<ol style="list-style-type: none"> 1) The Fire Safety Coordinator (FSC) shall have minimum qualifications, including: <ol style="list-style-type: none"> a. minimum 5 years experience on similar job sites, preferably in similar roles of hazard assessment and loss prevention, b. and minimum 5 years experience in relevant emergency services disciplines, such as senior fire fighter, loss prevention consultant, or equivalent, c. knowledge of the work being undertaken at the job site, the equipment being used, the hazards involved, and the means to control the hazards, by reason of education, training, experience or a combination thereof, d. knowledge of current applicable fire protection standards, available fire protection systems, and fire prevention inspection procedures, e. the ability to identify, assess, and address job site hazards, f. the ability to communicate effectively with the employer and workers present at the site, g. the ability to lead and provide direction to others, and h. should be in good health, able to walk extended distances daily, and operate in various climates. 2) Prior to the start of building construction, the builder should designate a FSC who: <ol style="list-style-type: none"> a. reports directly to the project senior executive, b. is responsible for the development and implementation of the FSP, c. is responsible for retaining records of fire safety training, fire safety inspections, incident reporting, welding permits, fire watches, and fire protection systems testing and maintenance, d. has site authority to enforce the provisions of the FSP and other applicable fire protection standards, e. has site authority to report transgressions to the individual's supervisor and recommend training and/or sanctions, f. is knowledgeable of the applicable fire protection standards, fire protection systems and fire inspection procedures, and g. is responsible for the fire safety training of workers. 3) Where a guard service is provided, the FSC should be responsible for the guard service.⁷ 4) The FiSC should be responsible for ensuring the presence of adequate numbers of fire protection devices and appliances and for proper maintenance. 5) The FSC should be responsible for overseeing use and implementation of the hot work program. ⁸ 6) The FSC should liaise with the local fire service before work starts and keep fire services informed of any changes affecting access and firefighting as
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⁶ OFM (consistent with NFPA)

⁷ NFPA

⁸ NFPA

	<p>the work progresses.⁹</p> <p>7) The FSC should be responsible for inspection of:</p> <ol style="list-style-type: none"> a. all escape routes, b. fire assembly point locations, c. alarm systems, d. fire hydrants and water supplies, e. fire detection and fire protection systems, f. fire extinguishers, g. fire signage, h. fire brigade access,¹⁰ i. hazardous locations (including flammable liquids use and storage, fuel use and storage, hot work locations), j. designated smoking locations, k. housekeeping conditions, and l. all storage areas. <p>8) The FSC should be responsible for ensuring training in the use of fire protection equipment has been provided.¹¹</p> <p>9) The FSC is responsible for conducting the fire drills set out in FSP.</p> <p>10) The FSC should respond to the location command post whenever fire occurs.</p>
c. Fire Safety Training	<p>1) Prior to the start of work, every construction site worker should receive documented training on:</p> <ol style="list-style-type: none"> a. site fire safety, including smoking rules, elimination or control of common ignition sources, safe disposal of refuse, Workplace Hazardous Material Information System (WHIMIS) training,¹² and safe handling and storage of flammable and combustible liquids and flammable compressed gases,¹³ b. the demonstrated use of fire extinguishers that are provided on the site, and¹⁴ c. fire prevention and emergency evacuation procedures applicable to their workplaces.¹⁵

⁹ COC

¹⁰ COC

¹¹ NFPA

¹² COC

¹³ (OFM)

¹⁴ OFM

	<p>2) If there are workers assigned to firefighting duties in their workplace they should:</p> <ul style="list-style-type: none"> a. be given adequate training, by a qualified instructor, in fire prevention, fire suppression methods, emergency procedures, organization and chain of command, firefighting crew safety and communications applicable to their workplace, and ¹⁶ b. be physically capable of performing the assigned duties safely and effectively before being permitted to do them. ¹⁷ <p>3) The FSC should assess the need for additional fire safety training and implement that training as necessary,¹⁸ including regular retraining of workers on a pre-determined basis. ¹⁹</p> <p>4) In addition to fire prevention training, workers shall receive WHMIS training. Materials Safety Data Sheet (MSDS) shall be kept on site.</p> <p>5) Records, signed by each employee, should be kept of all training, with a copy put into the individual's personnel file. ²⁰</p>
d. Pre-Fire Planning	<p>1) The fire department should be invited to conduct a pre-fire plan of the building construction site prior to the start of building construction to review at least the following aspects:</p> <ul style="list-style-type: none"> a. protection of the site from unwanted intrusion, ²¹ b. availability of the fire protection water supply and location of hydrants, ²² c. location of fire access routes, building access points and stairs accessing floor levels, ²³ d. location of hazardous storage, such as storage of flammable and combustible liquids and storage of flammable compressed gas, and e. fire exposure from adjacent buildings.²⁴ <p>2) Systematic and frequent visits should be conducted for pre-fire planning purposes so that the fire department members are familiar with the site and stay abreast of the building construction phase, the types and nature of fire hazards to be present on the site during the course of the project, ²⁵ the</p>

¹⁵ Surrey guide

¹⁶ Surrey

¹⁷ Surrey

¹⁸ OFM

¹⁹ Surrey

²⁰ COC

²¹ OFM

²² OFM

²³ OFM

²⁴ OFM

	<p>installation of fire protection systems, and changes in fire exposure to adjacent buildings.²⁶</p> <p>3) Records of such site inspections including notes and sketches should be kept on file and used in company training.</p> <p>4) Facilities should be provided to enable the fire watch personnel to:</p> <ul style="list-style-type: none"> a. ensure a fire warning is sounded to notify occupants and b. communicate with the fire department. <p>5) NPFA 1620 – Standard for Pre-Incident Planning should be used as a reference guide.</p>
<p>e. Regular Site Self-Inspection</p>	<p>1) The FSC should conduct a fire safety inspection of the site to ensure that:</p> <ul style="list-style-type: none"> a. ignition sources are controlled or isolated,²⁷ b. all fire protection equipment (e.g. portable fire extinguishers, fire hydrants, sprinkler system control valves) and fire alarms and detection²⁸ equipment is operable and accessible,²⁹ c. closers in fire-rated separations are kept closed or are able to self-close upon heat or smoke detection,³⁰ d. emergency fire access routes are free of obstructions,³¹ e. evacuation routes are free of obstructions, f. external exposures are noted and accounted for, g. safe procedures are followed for all handling and storage of flammable and combustible liquids, h. housekeeping conditions are well maintained, and i. waste is removed on a frequent basis. <p>2) Records of fire safety inspections should be kept on file at the site until the building is occupied, and should be available for examination by the CFO.³²</p>

²⁵ COC

²⁶ OFM and NFPA

²⁷ OFM

²⁸ COC

²⁹ OFM COC

³⁰ OFM

³¹ OFM/COC

³² (OFM, NFPA)

	<p>3) Timeframe of the self-inspections may be weekly, daily or at the end of each shift. ³³</p>
<p>f. Shut Down of Fire Systems³⁴</p>	<p>1) Except as permitted in (3), where a fire protection system is provided, it should remain operational at all times during the construction period.</p> <p>2) Isolation valves for sprinkler and standpipe systems should be utilized to allow the shut-down of only the section required.</p> <p>3) Where any portion of the fire protection system is temporarily shut down during construction:</p> <ul style="list-style-type: none"> a. efforts shall be made to limit the impairment to the shortest possible time, b. all hazardous operations, such as hot work activities, in affected area shall be ceased, c. the CFO and all construction site workers should be notified of the impairment and of alternative measures implemented in (d), and d. alternative protection measures should be implemented, which could include: <ul style="list-style-type: none"> i. increased fire watch, ii. 24/7 site security until the impairment is corrected and the system is returned back to service, iii. an increase in availability of portable fire extinguishers, and charged fire hoses.

³³ COC

³⁴ OFM, NFC

2. FIRE SERVICE ACCESS

Summary:

Fire service access to the construction site and to the building under construction is a critical aspect of fire safety.

Fire access routes need to be strategically located and shall have the appropriate dimensions and features to ensure quick and unimpeded fire service access to the building under construction.

In addition, fire hydrants need to be charged, operational and accessible year round. The fire hydrant system should be available as soon as combustible materials are brought to the site, and preferably before they arrive.

Stairs providing fire service access shall not be obstructed, and shall have sufficient signage (floor level and street address) so that the fire service can reach the correct location as quickly as possible.

The construction site shall also have an office to serve as an “on-site command post” that has plans, emergency information, keys and communication equipment.

Details are outlined below.

a. Provision of Access Routes³⁵

- 1) The fire department should have access to:
 - a. the construction site as soon as combustible materials arrive on site, and
 - b. a key box provided for their use at locked gates to the construction site.
- 2) Provision should be made for the use of existing elevators, hoists or lifts to assist firefighting personnel in reaching all levels of the building.
- 3) Unobstructed access to fire hydrants and fire department connections for standpipes and sprinkler systems should be provided and maintained.
- 4) Construction site access routes for fire department vehicles should be provided and maintained. Where an access roadway cannot be provided an approved fire protection system or systems should be provided as required and approved by the authority having jurisdiction.

³⁵ OFM, NFPA, COC, mNFC

	<p>5) Except as provided in (6) and (9), access routes for fire department use at construction sites should:</p> <ol style="list-style-type: none"> a. be located to within 15.0 m of the face of one side of each building and extend to within 46.0 m of the remaining perimeter of the first floor of each building, b. be extended to within 30.0 m of the exposed face of any building located within 25.0 m of the building under construction c. have a clear width not less than 6.0 m, d. have a centreline radius not less than 12.0 m, e. have an overhead clearance not less than 5.0 m, f. have a change of gradient not more than 1 in 12.5 over a minimum distance of 15.0 m, g. be designed to support the expected loads imposed by fire department equipment and permit accessibility under all climatic conditions, h. have turnaround facilities for any dead-end portion of the access route more than 90 m long, i. be connected with a public thoroughfare, and j. have the portion of the access route in (5)(a) not more than 20 m below the uppermost floor level. <p>6) The recommendations in (5):</p> <ol style="list-style-type: none"> a. should be incorporated into the pre-fire plan and in place prior to the start of building construction, b. may not be modified unless, in the written opinion of the CFO, fire suppression or rescue operations would not be impaired by such modification. <p>7) The required minimum width of access routes should not be obstructed in any manner, including obstruction by parked vehicles.</p> <p>8) “No parking” signs or other appropriate notices prohibiting obstruction of access routes should be provided, maintained, and enforced.</p> <p>9) Where access routes or portions thereof are deemed impractical, a fire protection system or systems may instead be provided if acceptable to the CFO.</p>
b. Fire Hydrants	<p>1) Fire hydrants on a construction site should be:</p> <ol style="list-style-type: none"> a. charged and operational,³⁶ b. clearly marked with a sign, so that they can be located in all weather conditions,³⁷

³⁶ COC

³⁷ mNBC, OFM

	<p>c. accessible and have an unobstructed clearance of not less than 2.0 m at all times,³⁸</p> <p>d. available prior to combustibles being brought to the site, and³⁹</p> <p>e. serviced regularly.</p> <p>2) No material, equipment, or construction should be located in a way that would interfere with access to fire hydrants.</p>
c. Stairs	<p>1) During construction the stairway(s) should be enclosed where the building exterior walls are in place.⁴⁰</p> <p>2) Stairways providing access and egress should have a sign on each floor that identifies the floor level, stair location, street address,⁴¹ and passage at each floor level to an unobstructed stair discharging to grade level.⁴²</p>
d. Command Post ⁴³	<p>1) A specific location on site, such as the site office or security office, should be designated as a command post.</p> <p>2) The command post should provide access to important materials such as the fire plan, building, utility and site drawings, emergency information, emergency contact list, one or more means of communication, keys to locks, etc. for emergency responders and site fire safety officers.</p>

³⁸ (mNBC, OFM)

³⁹ COC

⁴⁰ NFPA

⁴¹ OFM

⁴² Surrey

⁴³ NFPA

3. SITE SECURITY

Summary:

The construction site needs to be properly secured to prevent arson, burglary and intrusion. A combination of security systems and guards should ensure complete perimeter control.

Since arson is one of the primary causes of fires on construction sites, site security is of particular importance.

Security requirements should be in direct proportion to the exposure present at the individual site. At the same time, the site shall allow for access to the site by firefighting personnel and apparatus.

Fencing around the site shall be strong, sufficiently high and without openings other than those required for access. The entire site shall be fenced for security prior to start of construction.

Trained site security personnel shall be on-site at all times that the site is not occupied by construction personnel.

Larger sites will require the use of additional lighting and security cameras.

Details are outlined below.

a. Fencing⁴⁴

- 1) A strongly constructed fence, hoarding, or barricade not less than 1.8 m high should be erected around the perimeter of the construction site.
- 2) Hoarding or barricades should have a reasonably smooth surface facing the outside and should be without openings, except those required for access.
- 3) Except as addressed by sentence (4), access openings through fencing/barricades should be equipped with gates that are:
 - a. kept closed and locked when the site is unattended, and
 - b. maintained in place until completion of the construction activity.
- 4) Fencing, hoarding, and barricades should be constructed and maintained in a manner that does not restrict access to the construction site for

⁴⁴ OFM, NFPA, NFC

	firefighting, or to fire protection equipment.
b. Site Office	<ol style="list-style-type: none"> 1) A single location or office for access to key site personnel and materials should be provided, and should be identified by appropriate signage. 2) Temporary offices should have sufficient separation from buildings under construction and use approved heating devices with sufficient clearances. 3) This office could serve as the “on-site command post” and if so, the location shall be chosen to ensure emergency access and overall safety during a potential fire event.
c. Security Guard(s)	<ol style="list-style-type: none"> 1) Security guards shall be on the site at all times that the site is not occupied by construction personnel. The security guards’ duties should include regular fire checks, which should be done throughout the night, as well as during holiday periods and weekends, times when construction sites are most vulnerable to arson.⁴⁵ 2) Where security guards are provided, they should be trained:⁴⁶ <ol style="list-style-type: none"> a. to recognize and report fire hazards, b. in the use of construction elevators, where provided, c. to routinely patrol hot work areas as necessary, d. to serve as a fire watch where necessary, e. in notification procedures that include calling the fire department and management personnel, and f. in the function and operation of fire protection equipment. 3) Security guards should be informed in writing of any special status of emergency equipment or hazards, especially of any impairments.
d. Cameras/ Lighting	<ol style="list-style-type: none"> 1) As necessary, after-hours lighting in support of security should be provided, but that lighting should not impact adversely on neighbouring residents and businesses. Motion activated lighting may be appropriate in residential areas. 2) Security cameras, equipped with motion sensors, tied in to lighting, should be provided.

⁴⁵ COC

⁴⁶ OFM – consistent with NFPA and National Fire Code

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| | <ol style="list-style-type: none">3) All cameras should be recorded with data kept on file for a minimum of 30 days.4) All cameras should be linked to a designated station where they can be monitored, either continuously or periodically as required. |
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4. CONSTRUCTION PROCESSES

Summary:

Various fire safety systems required by the Ontario Building Code are essential to the safety of completed buildings.

Key fire safety systems required by the Ontario Building Code for five and six storey wood frame buildings include: automatic sprinklers; firewalls; fire doors; exit stairways; fire separations; fire stopping; smoke detectors; fire alarms; and standpipes.

It is important that these key fire safety systems be installed and activated as soon as practical during the construction process.

Details are outlined below.

a. Installation of Sprinklers and Standpipes	<ol style="list-style-type: none">1) Sprinklers should be installed on each floor as soon as physically feasible, not more than one floor below the top floor under construction.⁴⁷2) Taking climate and weather conditions into consideration, as well as the ability to provide heat in the building, sprinklers should be activated (charged) upon the installation of the ceiling on the respective floor.3) Where practical, the sprinkler system(s) should remain active at all times.4) As construction progresses in a building, a permanent or temporary standpipe system should be installed.5) The standpipe should be not more than one floor below the highest forms, staging, and similar combustible elements at all times, and temporary standpipe systems should remain in service until the permanent standpipe installation is complete.6) Additional detail on standpipe installation is found under “Private Fire Protection and Firefighting” under section 9.
b. Installation of Fire Separations, Fire Walls,	<p>An important means of reducing the potential for fires to spread is to ensure that the building, including concealed spaces, is properly segmented into a series of compartments. This helps contain a fire to a smaller area, thus enabling safer evacuation, and easing firefighting requirements.</p>

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<p>Fire Doors, Fire Blocking.</p>	<ol style="list-style-type: none"> 1) Fire walls, fire doors, and exit stairways shall be given construction priority.⁴⁸ 2) Where firewalls are provided to separate buildings, fire-rated closures should be: <ol style="list-style-type: none"> a. installed in openings as soon as the fire-rated components of the firewall are completed, b. operational and provided with self-closing and latching devices, and c. kept closed during idle construction times (i.e. night time, weekends or civic holidays). 3) Fire-rated closures in firewalls that are kept open during working hours should be provided with heat or smoke activated hold-open devices, such as fusible-links. 4) Fire doors and their closing devices should be installed as soon as possible. 5) All fire separations with a fire-resistance rating, to be located within the building, should be completed as soon as practical, including the installation of fire-rated closures with self-closing and latching devices. Any and all penetrations through the fire rated assembly (floor, wall, etc.) shall be sealed with approved fire stopping material, equal in fire rating to that of the assembly. 6) Where stair fire separations are provided on each floor of the building, the appropriately fire-rated doors should be kept closed during idle construction times (i.e. night time, weekends or civic holidays).
<p>c. Temporary Doors and Windows</p>	<ol style="list-style-type: none"> 1) Install, or otherwise secure, temporary windows and doors when the first storey is substantially completed, to inhibit entry into the building.
<p>d. Construction Materials</p>	<ol style="list-style-type: none"> 1) Consider alternate construction materials and methods to reduce fire risk, such as: <ol style="list-style-type: none"> a. using five-ply built-up roof coverings instead of single-ply membrane roofs, to avoid the need for hot work on the roof, b. less flammable adhesives c. non-combustible insulation materials or assemblies.

⁴⁸ COC

5. HOT WORK PROTOCOL

Summary:

A Hot Work Permit system should be implemented for all persons (employees and contractors) engaged in hot work activities of any kind.

No hot work activity should be undertaken prior to getting approval from the Fire Safety Coordinator.

A fire watch shall be provided whenever there is an open flame, torch or other ignition source on site.

A fire watch should be undertaken for a total period of not less than 4 hours (including both a 60 minute continuous attendance and periodic inspections every 30 minutes for 3 additional hours) after completion of hot work operations, and possibly longer depending on the type of hot work undertaken.

The use of a blow torch or welding and cutting equipment should be undertaken in accordance with Ministry of Labour Regulations and these guidelines.

Details are outlined below.

a. Hot Work ⁴⁹

Hot work is any activity involving any of the following: cutting, welding, torching, brazing, soldering, grinding, hot tar roofing, any operation involving an open flame, or any other hot process or heat producing activity.

- 1) Whenever possible, all hot work, such as hot tar roofing, should be avoided in favour of other less hazardous solutions.
- 2) When hot work cannot be avoided, it should be conducted in a designated area away from the main structure.
- 3) All hot work equipment must be maintained in good working condition in accordance with manufacturer's specifications.
- 4) The protection of persons and property from injury or damage by fire or explosion arising from hot work equipment or its installation, operation and maintenance shall conform to CSA-W117.2-12, "Safety in Welding, Cutting and Allied Processes".
- 5) Any and all hot work activity throughout the construction site shall be subject to use of the on-site Hot Work Permit System and shall conform to

⁴⁹ OFM consistent with OFC

	<p>NFPA 51B – Standard for Fire Prevention During Welding, Cutting, and Other Hot Work – 2014 Edition.</p> <ol style="list-style-type: none"> 6) Prior to any hot work commencing, the work area (including 11.0 m in all directions) should be cleared of all combustible materials. Where materials cannot be removed, they should be covered with listed or approved devices (such as welding pads, shields, or fire resistive tarpaulins). 7) An open flame torch should only be applied to materials intended for hot surface applications and should not directly expose: <ol style="list-style-type: none"> a. combustible materials, such as wood roof decks, cant strips, insulation and flashing, b. voids, holes and skylights in the roof or roof deck, or c. gas lines and electrical cables. 8) Inspection of every hot work activity shall be conducted at least every ½ hour for a total of 4 hours after completion of work. 9) Hot work activities should be discontinued at least 3 hours prior to the end of a work day. 10) Combustible materials that cannot be removed or protected against ignition shall be thoroughly wetted where hot work is carried out. 11) When there is a possibility of sparks, flames or heat igniting combustible materials as a result of hot work activity: <ol style="list-style-type: none"> a. combustibles within 11.0 m of the hot work activity should be protected against ignition, and b. openings in roofs, parapets or other building structures within 11.0 m of hot work activity should be covered or closed to prevent the passage of sparks or flames to adjacent areas. c. Where it is not possible to cover openings, combustibles in the area exposed by the opening should be protected against ignition.
<p>b. Fire Watch</p>	<p>Fire Watch consists of an individual or individuals assigned to stand by with fire extinguishing equipment while hot work operations are conducted. These individuals shall be trained in the use of the type of fire extinguishing equipment available and the procedures for sounding an alarm in the event of a fire.</p> <p>The Fire Watch cannot be the same person(s) performing the hot work activity itself.</p> <ol style="list-style-type: none"> 1) A fire-watch should be provided whenever an open flame torch or other ignition source is used for hot work activity in or on a building and should be especially conscious of: <ol style="list-style-type: none"> a. areas where combustible materials in building construction or contents are located within 11.0 m of persons using an open flame torch or

	<p>other ignition source,</p> <ul style="list-style-type: none"> b. other areas of the building exposed as a result of unprotected roof or wall openings located within 11.0 m of persons using an open flame torch or other ignition source, and c. areas where combustibles on the underside of roofs or the opposite side of walls might be ignited as a result of persons using an open flame torch or other ignition source. <p>2) Personnel employed for fire-watch duty should be:</p> <ul style="list-style-type: none"> a. trained in the use of fire extinguishing equipment, and b. provided with a means to immediately contact the fire department and building occupants if a fire is discovered. c. equipped with at least 2 portable fire extinguishers and even a charged hose line, that may be used to extinguish small fires that start from hot slag or sparks. <p>3) The fire watch person(s) should:</p> <ul style="list-style-type: none"> a. have no other duties at this time, b. remain at the area of hot work activity as the fire watch for at least 1 continuous hour after the hot work has been completed, c. return to inspect the area of hot work every ½ hour for an additional 3 hours after the continuous period. <p>4) A fire-watch should be in effect from the beginning of a hot work activity to at least 4 hours after the hot work operations cease.</p> <p>5) The fire-watch for each hot work activity should be documented, as part of, or in addition to, the hot work permit and should include details outlining the:</p> <ul style="list-style-type: none"> a. location of hot work activity, b. start and completion times of hot work activity work during each day, c. number of fire extinguishers ready for use, d. site preparation to protect or eliminate combustibles prior to hot work activity, e. time of continuous fire watch, intermittent checks, and final fire-watch inspection, and f. name of fire watch inspector, and responsible supervisor. <p>6) Records of the fire-watch should be kept on file until the building is occupied, and be available for examination by the Chief Fire Official.</p>
c. Hot Work Permit System	The FSC should be responsible for overseeing use and implementation of the hot work program and issuing Hot Work Permits.

Hot Work Permits are designed to provide authorization to conduct hot work activity, and to track the start and completion of that activity, while providing a checklist of precautions and fire prevention measures that should be undertaken with each such activity.

The permit must include at least the following elements:

1) Pre-Operation Inspection:

- To be performed by FSC or other designated hot work trained individual.
- Employee or contractor is aware of the method used to contact the fire department.
- Available sprinklers, hose streams, and portable fire extinguishers are in service and operable.

2) Special permission must be obtained to conduct hot work on metal vessels or piping lined with rubber or plastic.

3) Requirements within 11.0 m of hot work:

- Flammable liquids, dust, lint, and oily deposits are removed.
- Explosive atmosphere in area is eliminated.
- Floors are swept clean and trash is removed.
- Combustible floors are wet down or covered with damp sand or fire-resistive/noncombustible materials or equivalent.
- Personnel are protected from electrical shock when floors are wet.
- Other combustible storage material is removed or covered with listed or approved materials (welding pads, blankets, or curtains; fire-resistive tarpaulins), metal shields, or noncombustible materials.
- All wall and floor openings are covered.
- Ducts and conveyors that might carry sparks to distant combustible material are covered, and protected and/or shut down.

4) Requirements for hot work on walls, ceilings, or roofs:

- Construction is noncombustible and without combustible coverings or insulation.
- Combustible material on other side of walls, ceilings, or roofs is moved away.

5) Requirements for hot work on enclosed equipment:

- Enclosed equipment is cleaned of all combustibles.
- Containers are purged of flammable liquids and vapours.
- Pressurized vessels, piping, and equipment are removed from service, isolated, and vented.

- | | |
|--|---|
| | <p>6) Requirements for hot work fire watch and monitoring:</p> <ul style="list-style-type: none">• Fire watch is trained in use of equipment and in sounding alarm.• Fire watch is provided with suitable fire extinguishers and, where practical, a charged small hose.• Fire watch can be required in adjoining areas, above and below.• Fire watch is provided during and for a minimum of 60 minutes after hot work activity, including any break activity.• Monitor the hot work area in 30 minute intervals for a minimum total of 4 hours after the job is completed. <p>7) Transfer of the permit or the fire watch to the next shift is not allowed without approval from the Fire Safety Coordinator and issuance of a new permit.</p> <p>8) Upon completion of the hot work activity, the employee or contractor must return the Hot Work Permit to the authorizing Fire Safety Coordinator for final review and sign-off.</p> |
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6. CONTROL OF OTHER IGNITION SOURCES

Summary:

It is crucial to control ignition sources to help prevent fires from starting.

Ideally, smoking should not be permitted on site.

Roofing operations and other operations that involve heat sources and hot processes should be undertaken in accordance with Ministry of Labour Regulations, and these guidelines, in order to avoid igniting combustible materials.

Other potential ignition sources, that need to be identified and carefully managed, include temporary electrical heaters, liquid or gas fired heaters, and internal combustion engine operated equipment. These types of equipment shall be used in strict accordance with these guidelines and Ministry of Labour Regulations.

Details are outlined below.

a. "No Smoking" Policy ⁵⁰	<ol style="list-style-type: none">1) Signs shall be posted throughout the site indicating "No Smoking".2) Where smoking is permitted on the construction site, it shall be permitted only in designated smoking areas that:<ol style="list-style-type: none">a. are located not less than 7.6 m away from the building under construction and not less than 7.6 m from any combustible storage or refuseb. are clearly identified with appropriate signage,<ol style="list-style-type: none">i. signage should use black lettering 50 mm high with a 12.5 mm stroke on a yellow background,ii. except that symbols 150 mm by 150 mm may be used in lieu of lettering, andc. are provided with safe, non-tip⁵¹ receptacles for the disposal of smoking materials that are emptied when ashes/butts are cold.
b. Bitumen Kettles	<ol style="list-style-type: none">1) Bitumen kettles shall:<ol style="list-style-type: none">a. not be located in the building, or on the roof,b. not be located in a fire access route,c. not be located within 3.0 m of building under construction, or means of egress from the building,d. be equipped with metal covers that are close-fitting and constructed of steel having a thickness of not less than No. 14 sheet metal gauge

⁵⁰ mNBC, OFM, COC, NFC proposal

⁵¹ COC

- thickness,
- e. be maintained free of excessive residue,
 - f. when in operation:
 - i. be level, with most of the weight off the tires on the legs,
 - ii. not be heated above 260°C or 14°C below the flash point of the material being used, whichever is the least,
 - iii. be kept clear of combustible debris or materials, and
 - g. be constantly attended during operation and for one hour after shut down of the kettle by at least one employee who:
 - i. is knowledgeable of the operations and hazards associated with the kettle,
 - ii. is located within 7.6 m of the kettle, and
 - iii. has the kettle within sight.
- 2) Mops and brooms that have been used for spreading bitumen, and bitumen covered rags, should be stored at least 3.0 m away from the building in a safe location when not in use.
- 3) Roofing operations involving heat sources to be conducted only by a qualified personnel. Single ply and torch applied roofing to be installed with caution.
- 4) Asphalt and tar kettles to be kept in a safe place (not on roof) to avoid ignition.
- 5) Used roof mops shall be cleaned and stored.
- 6) Roofing membranes shall not be over heated. Provisions shall include flame contact protection.⁵²

For reference: Ministry of Labour Regulations:

Section 123 ⁵³

- 1) Precautions to prevent a fire shall be taken when using a blow torch or welding or cutting equipment or similar piece of equipment.**
- 2) Only a competent worker shall operate a hot tar or bitumen road tanker or kettle. O. Reg. 213/91, s. 211 (1).**

⁵² NFPA

⁵³ MOL

	<p>3) If a hot tar or bitumen road tanker or kettle is fitted with a propane-fuelled heater, (a) the storage cylinder for propane shall not be placed closer than three metres to a source of fire or ignition; (b) the lines connecting the storage cylinder for propane to the heating device shall be located so that they do not come into contact with the hot tar or bitumen in the case of a spill or a failure of a component of the system; and (c) a fire extinguisher with an Underwriters' Laboratories of Canada rating of at least 4A40BC shall be provided with the road tanker or kettle.</p> <p>4) A propane burner used on a bitumen road tanker or kettle, (a) shall have a thermal rating no greater than that recommended by the manufacturer of the road tanker or kettle; and (b) shall consist of components that are adequate for their intended use. O. Reg. 213/91, s. 211 (3).</p> <p>5) Hot tar or bitumen shall be transferred from a road tanker to a kettle through enclosed piping. O. Reg. 213/91, s. 211 (4).</p> <p><u>For Reference: Ministry of Labour Regulations:</u></p> <p>1) A pipe that supplies hot tar or bitumen to a roof shall be securely fixed and supported to prevent its deflection. ⁵⁴</p>
c. Heating Equipment ⁵⁵	<p>1) All heating equipment, both temporary and permanent, should: a. be installed, used, and maintained in accordance with the manufacturer's instructions, and/or in accordance with recognized safe practices, b. be situated so that it is secured, c. be operated by personnel familiar with the operation of the equipment, d. be maintained by properly trained personnel, e. not be operated where damaged or deemed to be a potential safety hazard, and f. not use exposed radiant heating wires.</p> <p>2) The clearance between combustible materials and temporary heating equipment, including flues, shall be in conformance to Part 6 of Division B</p>

⁵⁴ MOL

⁵⁵ OFM, NFC, NFPA

	<p>of the Ontario Building Code, or in conformance with minimum clearances shown on certified heating equipment, whichever is greater.</p> <p>3) When heaters are used in confined spaces, special care should be taken to ensure sufficient ventilation in order to ensure proper combustion, to maintain the health and safety of workers, and to limit temperature rise in the area ⁵⁶</p>
<p>d. Fuel Based Heaters</p>	<p>Fuel-based heaters:</p> <ol style="list-style-type: none"> 1) Open flame heaters shall not be permitted. 2) Chimney or vent connectors, where required from direct-fired heaters, should be located at least 460 mm from combustibles. 3) Liquid or gas-fired heaters should comply with regulations under the Technical Standards and Safety Act, 2000. 4) Internal combustion engines and other devices capable of producing ignition should be kept at a safe distance from combustible material, but under no circumstances shall be less than 1.2 m unless other protection measures, such as thermal barriers, are provided. 5) Temporary enclosures and tarpaulins consisting of fabric or plastic film, that are used in or within 9.0 m of a building under construction shall <ol style="list-style-type: none"> a. meet the requirements of CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films", and b. be securely fastened to prevent them from being blown against heaters or other ignition sources. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><u>For Reference: Ministry of Labour Regulations:</u></p> <p>(1) A fuel-fired heating device shall be located, protected and used in such a way that there is no risk of igniting a tarpaulin or similar temporary enclosure or combustible materials adjacent to it.</p> <p>(2) No fuel fired heating device shall be used in a confined or enclosed space unless there is an adequate supply of air for combustion and adequate general ventilation.</p> <p>(3) Fuel-fired heating devices shall be protected from damage and overturning.</p> <p>(4) Shall not impact means of egress.</p> </div>

⁵⁶ COC

e. Electrical Equipment ⁵⁷	<ol style="list-style-type: none">1) Be alert around electrical equipment.2) When electrical equipment is not working properly, is hot to touch, or if it gives off an unusual odour - often the first signs of a problem that could cause a fire - disconnect the equipment and call an appropriate maintenance contractor.3) Promptly replace any electrical cord that is cracked or has a broken connection.4) When using extension cords:<ol style="list-style-type: none">a. protect them from damage,b. do not put them across doorways or any place where they will be stepped on or chafed,c. check the amperage load specified by the manufacturer or the "listing laboratory", and do not exceed it,d. do not plug one extension cord into another, ande. do not plug more than one extension cord into one outlet.5) Temporary electrical heating equipment should be equipped with tip-over protection and overheat cut-offs.6) Electrical installations, especially temporary ones, should be of sufficient capacity for the intended use and designed, installed, inspected and maintained by competent personnel, as prescribed by the Electrical Safety Authority (ESA).

⁵⁷ COC

7. STORAGE OF COMBUSTIBLE AND FLAMMABLE MATERIALS

Summary:

Storage of combustible materials on site, in particular flammable liquids and gases, can have a significant impact on construction site safety.

Generally, the quantity of flammable liquids and gases stored on site should be limited to what is required for one day's work, unless the material is suitably stored in accordance with this guideline.

Flammable substances should never be stored within the mid-rise wood building itself. Combustible storage within the yard should be separated from the building under construction.

Flammable gases and liquids should be stored carefully, in appropriate labeled containers and in suitable storage facilities as suggested by this guideline.

In addition, temporary site offices, trailers and sheds of combustible construction, need to be located at a safe distance from the building under construction.

Details are outlined below.

a. Flammable and Combustible Liquids	<ol style="list-style-type: none">1) Flammable or combustible liquids should be stored in their original containers or in listed or approved safety containers.2) No more than a one work day's normal supply of a flammable or combustible liquid should be stored in a building or structure on a project, unless stored in listed or approved storage cabinets.3) Bulk storage of fuels and other flammable and combustible liquids should be kept in a non-combustible structure, detached at least 3.0 m from the nearest blank masonry wall of the building or at least 9.0 m from the nearest building or other construction or building opening.4) Dispensing and filling of fuel containers from bulk storage containers shall be conducted not less than 3.0 m from the nearest blank masonry walled building or not less than 9.0 m from the nearest building or other construction or building opening.5) The storage structures referenced in points (2), (3) and (4) should be:<ol style="list-style-type: none">a. lockableb. ventedc. provided with secondary containment to hold 110% of the largest potential spill or leak
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	<p>d. provided with an early warning fire detection system.</p> <p>6) Materials susceptible to spontaneous ignition such as oily rags shall be stored in a listed or approved disposal container.</p> <p>7) Means shall be provided to clean up and dispose of leakage and spills promptly and safely.</p> <p>8) Good practices as contained in NFPA 30 – Flammable and Combustible Liquids Code should be followed where applicable.</p>
<p>b. Flammable Gases</p>	<p>1) Flammable or combustible compressed gas should be stored in suitable approved containers.</p> <p>2) Full or empty flammable gas storage cylinders should not be stored inside a building. Only the cylinders needed for the day's use should be brought into the building.</p> <p>3) Bulk storage of flammable and combustible compressed gases should be kept in a secure, outdoor enclosure, detached at least 3.0 m from the nearest blank masonry wall of the building or at least 9.0 m from the nearest building or other construction or building opening.</p> <p>4) Storage cylinders for flammable compressed gas should be secured in an upright position.</p> <p>5) Flammable gases should never be stored in common areas, stairways or exits.</p> <p>6) Flammable gases should not be stored near combustible materials.</p> <p>7) The control valve of storage cylinders for flammable compressed gas, other than cylinders connected to a regulator, supply line or hose, should be covered by a protective cap that is secured in a proper position.</p> <p>8) Spare propane bottles should:</p> <ul style="list-style-type: none"> a. be stored in conformance with the OFC, and must be stored outdoors, and b. have their valves left in the closed position. <p>9) Storage cylinders for flammable gas or compressed oxygen should not be placed within 3.0 m of a source of ignition or fire.</p> <p>10) Point (9) does not apply to storage cylinders that:</p>

	<ul style="list-style-type: none"> a. form part of hand-held propane equipment, b. form part of a lead pot used in plumbing or electrical work, c. form part of a propane-powered or propane-heated vehicle, or d. are protected from a source of ignition by a barrier, wall or other means of separation. <p>11) Good practices as contained in NFPA 58 – Liquefied Petroleum Gas Code should be followed where applicable.</p>
<p>c. Ordinary Combustibles</p>	<ul style="list-style-type: none"> 1) Deliveries should be scheduled in order to minimize overall quantities of combustible materials being stored on-site. 2) Combustible materials should never be stored in common areas, stairways or exists. 3) Ordinary combustible commodities can consist of predominantly wood, paper and natural fabrics, with or without metal components. The packaging (such as cartons, plastic wraps, wood pallets, etc.) must be considered as part of the overall commodity. Ordinary combustibles can have a limited amount of plastics, but in very small amounts by weight or volume. 4) Other materials present a higher fire hazard and a significantly greater challenge to control when involved in a fire. This would include: <ul style="list-style-type: none"> • storage of idle wood pallets • plastic bubble wrap • vinyl liners, tiles, or tarpaulins • rubber tires 5) All combustible materials should be: <ul style="list-style-type: none"> • stored in tidy, orderly piles or on shelves • kept to a maximum 2.0 m high • higher hazard commodities should be stored outside, or where that is not feasible, at least minimized in volume. 6) Storage areas should not exceed more than 40 m² in size, as defined by a minimum separation of 7.6 m to the next storage area. 7) Storage areas should be secured, and out of site of the general public. 8) Ordinary combustibles and higher hazard commodities, should not be mixed with, or kept in the same areas as, any flammable or combustible liquids or gases.

	<p>9) Combustible storage should be kept at a minimum distance of 1.0 m away from any electrical panels or other live electrical equipment.</p> <p>10) Combustible storage should be kept at a minimum distance of 1.0 m away from any heating equipment, such as electric heaters, or any equipment prone to heating during use.</p> <p>11) Storage, whether piled or on shelves, should be kept at a minimum of 18 inches below the sprinklers.</p>
d. Safe Storage	<p><u>For Reference: Ministry of Labour Regulations:</u></p> <ol style="list-style-type: none"> 1) Combustible material shall be stored in a suitable container. 2) A flammable liquid or gas shall be stored in a building or storage tank suitable for the purpose and, if practicable, not less than 100 metres from a magazine for explosives. 3) No more than one work days' normal supply of a flammable liquid shall be stored in a building or structure on a project unless it is stored: <ol style="list-style-type: none"> a. in a container that is suitable for the hazards of the liquid b. in a controlled access area/room that has sufficient window area to allow explosion relief to outside and that is remote from means of egress a. a portable container for storage or transportation shall meet relevant laboratory standards and have a label stating its use and the name of the laboratory which gave the approval b. material and equipment at a project shall be piled or stacked in a manner that prevents it from tipping, collapsing or rolling.
e. Labelling	<p>c.</p> <p>1) Containers for storing combustible liquids and gases shall be marked to clearly and accurately identify their content.</p> <p><u>For Reference: Ministry of Labour Regulations:</u></p> <ol style="list-style-type: none"> 1) Portable containers shall have a label stating the use for which the container is approved and the name of the testing lab that gave the approval.

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f. Separation Distances ⁵⁸	<p>1) Combustible yard storage should be stored no closer than 9.0 m from the building under construction.</p> <p>2) Separation distances between a building under construction and temporary site offices, trailers or sheds of combustible construction should be in accordance with Table 1.</p> <p>Table 1. Minimum Separation Distance to Building Under Construction (m)</p> <table border="1" data-bbox="362 560 921 901"> <thead> <tr> <th>Structure exposing wall length (m)</th> <th>Min. Separation distance (m)</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>9</td> </tr> <tr> <td>9</td> <td>11</td> </tr> <tr> <td>12</td> <td>12</td> </tr> <tr> <td>15</td> <td>14</td> </tr> <tr> <td>18</td> <td>15</td> </tr> <tr> <td>>18</td> <td>18</td> </tr> </tbody> </table> <p>Note: Where the separation distance between temporary structures is less than the minimum separation distance in Table 1, then the exposing wall length is considered to be the sum of the individual exposing wall lengths of the temporary structures.</p>	Structure exposing wall length (m)	Min. Separation distance (m)	6	9	9	11	12	12	15	14	18	15	>18	18
Structure exposing wall length (m)	Min. Separation distance (m)														
6	9														
9	11														
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⁵⁸ NFPA

8. HOUSEKEEPING AND WASTE MANAGEMENT

Summary:

The construction process produces considerable waste material much of which is combustible. Sawdust, cut-offs, plastic wrapping and other similar materials are all combustible and can catch fire very easily.

Good housekeeping is therefore one of the most important factors in site fire prevention. Proper storage and removal of combustible waste on the work site reduces the risk of fires.

Rubbish and construction debris should be lowered from the building by chute, container, crane or hoist. If disposal chutes are used, they should be installed as prescribed by regulations and as recommended in this guideline.

Even when combustible waste has been removed from the building itself, it can still constitute a fire hazard if stored too close to the structure, and shall be moved a safe distance from combustible buildings or building materials storage areas. It should also be stored in appropriate containers that reduce the potential for fire spread, and that can be locked to prevent unauthorized after-hours access. Waste storage containers should also be stored in illuminated areas of the work site. These areas should be monitored by site security personnel.

Arsonists or other opportunistic fire-setters may perceive the waste collection areas and receptacles as inviting places to start a fire. Ensuring containers are closed, locked, and do not allow easy access to combustible materials is an effective way to prevent these incidents. Careful location of these storage containers can also discourage unauthorized access by reducing accessibility from off-site, and by increasing the likelihood of detection.

Regular removal of construction waste from the work site to a proper disposal facility can also help deter fire setters by denying them accessible combustible materials.

Details are outlined below.

a. Handling Waste Material ⁵⁹	<ol style="list-style-type: none">1) Combustible refuse in sufficient quantities to constitute a fire hazard should be moved at least 7.6 m away from combustible buildings or building materials storage areas.2) A minimum clearance of 3.0 m should be maintained between metal containers for the disposal of combustible refuse and the building under construction.
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⁵⁹ OFM, NFPA, mNBC, BC.MOL

- 3) Waste material and reusable material shall be removed from the building at least daily to a suitable on-site disposal area to reduce the combustible fire load.
- 4) Accumulated waste and reusable materials shall be removed from the site at least monthly.
- 5) Higher hazard wastes, such as used flammable or combustible liquids, idle wood pallets, rubber tires, etc. should be removed from the site as soon as possible.
- 6) Rubbish, debris and other materials should not be permitted to fall from one level to another. All materials to be removed shall be lowered by a chute, in a container, or by a crane or hoist. ⁶⁰
- 7) Disposal chutes should:
 - a. be located on the exterior of the building,
 - b. be constructed of non-combustible material,
 - c. contain a lid or be lockable where applicable, ⁶¹
 - d. have a curb that is at least 100 mm high, and
 - e. not be more than 1.2 metres high.
- 8) Leaks or spills of flammable or combustible liquids or other materials should be cleaned up promptly and completely. ⁶²

For Reference: Ministry of Labour Regulations:

- 1) Disposal chutes shall be:
 - a. constructed to prevent spilling over when rubbish, debris and other materials are being deposited into the chute
 - b. kept closed when not in use.

⁶¹ COC

⁶² COC

9. PRIVATE FIRE PROTECTION AND FIREFIGHTING

Summary:

In the event of a construction site fire, an adequate water supply combined with prompt fire department response (firefighters and firefighting equipment) shall be available.

Water for firefighting purposes is required as soon as combustible material arrives on the site. This water can be from public or private sources, or a combination of both.

A pre-planned fire department response with sufficient apparatus and manpower is needed to contain fire emergencies.

Once the building under construction is over 3 storeys the required water supply should be increased as indicated in this guideline. The required water supply should also be increased if the building under construction is near other buildings, as indicated in this guideline.

Provisions in this section also include more detailed information on the installation of permanent and temporary standpipes during construction.

In addition, this section addresses the installation of automatic sprinklers during construction, portable fire extinguishers, exit stairs, evacuation routes, fire detection systems, permanent or temporary fire alarm systems, fire drills, and maintenance of fire protection equipment.

Details are outlined below.

a. Water Supply	<ol style="list-style-type: none">1) A water supply, for firefighting purposes, should be provided as soon as combustible construction material arrives on the construction site.2) Water supplies should be available at the construction site from:<ol style="list-style-type: none">a. pressurized hydrants drawing water from a municipal water supply or an on-site water source,b. fire department suction connections drawing water from an on-site water reservoir or storage tank, orc. a combination of (a) and (b).3) Water supplies in (2) may be provided from other sources if deemed acceptable to the CFO, taking into consideration fire department resources, reliability of, and access to, the water source, the quantity and arrangement of combustibles on site, and exposures to adjacent buildings.4) While the building construction stage does not yet exceed 3 storeys in height, the water supply should be:
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	<ul style="list-style-type: none"> a. sufficient to provide a minimum of 4550 L/min for the building under construction, b. sufficient to provide additional 1140 L/min for each side of the building where another building is located within 25.0 m, and c. available from one or more hydrants or suction connections located within an unobstructed 90 m of the building under construction. <p>5) When the building construction stage exceeds 3 storeys in height, the water supply should be:</p> <ul style="list-style-type: none"> a. sufficient to provide a minimum of 9100 L/min for the building under construction, b. sufficient to provide additional 1140 L/min for each side of the building where another building is located within 25.0 m, and c. available from one or more hydrants or suction connections located within 90.0 m of the building under construction. <p>6) Where two or more buildings under construction are to be separated by firewalls, the water supply requirements in (4) and (5) should be accumulative for each building.</p> <p>7) The water supply in (4), (5) and (6) should:</p> <ul style="list-style-type: none"> a. have a duration of a minimum 120 minutes, b. be available until the sprinkler system is fully operational throughout the building, and c. except for a water supply consisting solely of an on-site suction source, be available at a minimum pressure of 140 kPa. <p>8) Where the water supply in (4), (5) and (6) is provided by an on-site reservoir, it should be:</p> <ul style="list-style-type: none"> a. readily accessible by the fire department using a dry suction line or a fire department suction connection, and b. sized to provide the water flow duration in (7) despite drought conditions or the formation of an ice layer, unless protected against these conditions.
b. Fire Department	<p>An adequate initial response of apparatus and personnel, upon receipt of alarm of fire, is essential to provide prompt control of what is generally an escalating emergency.</p> <p>1) Response of fire companies should be pre-arranged and commensurate with the hazard. A minimum of 2 well-equipped pumpers with adequate manpower should respond on first alarms.</p>
c. Standpipes and Hoses ⁶³	<p>1) Where a standpipe is installed in a building under construction:</p> <ul style="list-style-type: none"> a. it may be a permanent or temporary standpipe system, b. it should extend up to the floor below the highest forms, staging, and similar combustible elements at all times,

⁶³ NFPA, MOL, BC, OFM

- c. it should be provided with a fire department connection that is:
 - i. located on the outside of the building at street level,
 - ii. conspicuously marked and readily accessible, and
 - iii. located within 45.0 m of an operational hydrant,
 - d. the pipe size, hose valve, attached hose and water supply should conform to Section 3.2.9. of Div. B of the Ontario Building Code,
 - e. it should be securely supported and restrained, as a minimum, on alternating floors,
 - f. at least one hose valve for attaching fire department hose should be provided at each intermediate landing or floor level of an egress stairway, and
 - g. hose valves should be kept closed at all times and guarded against mechanical damage.
- 2) A temporary standpipe should have at least one hose outlet per floor, with a valve and an attached 38 mm hose and nozzle.
- 3) Temporary standpipe systems should remain in service until permanent standpipe installations are complete.
- 4) A dry standpipe system complying with (1) may be used if deemed acceptable by the Chief Fire Official.

For Reference: Ministry of Labour Regulations:

- (1) Permanent or temporary standpipe shall be installed within two storeys of the uppermost work level.**
- (2) The standpipe:**
- a. shall have sufficient hose outlets to permit every part of the building to be protected by a hose no longer than 23 metres
 - b. shall have a connection for the use of the local fire department located on the street side of the building not more than 900 mm and not less than 300 mm above the ground level and to which there is clear access at all times
 - c. shall be maintained ready and operable if required.
- (3) Every hose outlet in a permanent standpipe shall have a valve.**
- (4) Every hose used with a standpipe shall:**
- a. be at least 38 mm in diameter
 - b. have a combination straight stream and fog nozzle and
 - c. stored on a rack in such as way to prevent it from damage and keep it available for immediate use.

	<p>(5) Temporary standpipes shall:</p> <ul style="list-style-type: none"> a. not be disconnected until the permanent standpipe is connected so there is always a standpipe in service b. be maintained so that it is readily operable c. shall have at least one hose outlet per floor with a valve and a hose attached to each hose outlet and a nozzle attached to each hose. <p>(6) Connection shall have clear access at all times, located between 30 and 90 cm above ground level on a side of the building that faces the street.</p> <p>(7) If a temporary standpipe is installed in a building under construction, the contractor shall post at the project, or have available for review, the floor plan indicating location of:</p> <ul style="list-style-type: none"> a. the hose and outlets on each floor b. the point on the perimeter of each floor that is furthest from the hose outlet on that floor c. each exit on each floor. <p>d.</p>
<p>d. Portable Fire Extinguishers⁶⁴</p>	<p>(1) Portable fire extinguishers should be provided in locations on the construction site where:</p> <ul style="list-style-type: none"> a. hot work operations are carried out, b. combustibles are stored, c. internal combustion engines are located, d. flammable and combustible liquids, and flammable gases are stored or handled, e. temporary or permanent fuel-fired equipment is used, and f. designated smoking areas are provided. <p>(2) A portable fire extinguisher should be located:</p> <ul style="list-style-type: none"> a. at each egress stair on each floor level of the building, b. within 25.0 m of any portion of the accessible floor area of the building, c. within 30.0 m of stored combustibles located outside the building under construction, and d. within 9.0 m of <ul style="list-style-type: none"> i. flammable and combustible liquids or flammable gases that are stored or handled,

⁶⁴ mNBC, NFPA, MOL, OFM

- ii. internal combustion engines,
- iii. temporary fuel-fired equipment, and
- iv. designated smoking areas.

(3) At least two portable fire extinguishers should be located within 9.0 m of hot work operations, including hot surface roofing operations.

(4) Portable fire extinguishers should be provided in or on vehicles working on construction sites, including industrial trucks.

(5) The portable fire extinguishers required by (1) to (4) should have a minimum rating of:

- a. 2-A:10-B:C on moveable equipment, and
- b. 4-A:40-B:C in all other locations.

(6) Portable fire extinguishers in (1) to (4) should be visible or designated by signage, and be accessible.

For Reference: Ministry of Labour Regulations:

- 1) Fire extinguishing equipment shall be provided at readily accessible and adequately marked locations.**
- 2) Everyone who may be required to use an extinguisher shall be trained in its use.**
- 3) One extinguisher shall be provided:**
 - a. where flammable liquids or combustible materials are stored, handled or used**
 - b. where oil fired or gas fired equipment, other than permanent furnace equipment in a building is used**
 - c. where welding or open-flame operations are carried on**
 - d. on each storey of an enclosed building being constructed.**
- 4) Every extinguisher shall:**
 - a. be a type whose contents are discharged under pressure**
 - b. have Underwriters' Laboratories of Canada 4A40BC rating.**
- 5) Fire extinguishing equipment shall be protected from damage and freezing.**
- 6) After use, an extinguisher shall be refilled or replaced immediately.**

	<p>7) Shall be inspected for defects, deterioration at least once a month by a competent worker who shall record the date of the inspection and attach a tag to it.</p>
e. Fire Alarm Systems	<p>8)</p> <ol style="list-style-type: none"> 1) Alarm systems should be established as a form of alert during an emergency. Whenever fire alarm systems are deactivated for certain works the protection should be reinstated as soon as possible. 2) A means to alert site personnel of a fire should be provided The alert signal should be audible throughout the construction site and the building, including enclosed floor areas. 3) Where fire alerts are activated from a central location on the construction site, every worker should have ready access to appropriate emergency phone numbers and a telephone, two-way radio or other system of two-way communication, so as to be able to notify the fire department and site personnel that are able to activate the site alarm. 4) Where a permanent or temporary fire alarm system is used to provide the fire alert in (1), it should be installed and activated on each floor level located below the top floor under construction or the roof and should, as a minimum, include: <ol style="list-style-type: none"> a. alarm bells within 60.0 m of all floor areas, and b. manual pull stations at each egress stairway and person hoist. 5) Testing of the fire alarm system should be conducted by activating different manual pull stations each week, such that every pull station is tested over a 2 month period. 6) Records of the fire alarm testing should be kept on-site until the building is occupied, and be available for examination by the CFO.
f. Automatic Sprinkler Systems	<ol style="list-style-type: none"> 1) Every effort should be made to get full or partial sprinkler protection in service as soon as possible. 2) Sprinkler systems should be checked, inspected and tested in accordance with Section 6.5 of Div. B of the OFC as appropriate for the installation.
g. Adequacy of Access/Egress	<ol style="list-style-type: none"> 1) All designated evacuation routes should: <ol style="list-style-type: none"> a. have a minimum width of not less than 900 mm and be maintained clear of obstructions,

Routes ⁶⁵	<ul style="list-style-type: none"> b. be provided with adequate lighting, c. be provided with signs to designate egress path direction, and d. be located no closer than 3.0 m from a fuel-fired heating device. <p>2) Except as provided in (3) and (4), during building construction, each floor area should have at least two stairways to provide a means of egress, and each stairway should be:</p> <ul style="list-style-type: none"> a. extended upward as each floor is installed, and b. separated from each other by at least 30.0 m on each floor. <p>3) A single stairway may be deemed acceptable in buildings that are less than 300 m² in building area if:</p> <ul style="list-style-type: none"> a. the stair is accessible from within 20.0 m of all parts of the floor area, and b. another means of egressing the floor during an emergency is provided that is acceptable to the CFO, such as a temporary stair structure attached to the side of the building, hoists or ladders. <p>4) Where a fire barrier constructed as a fire separation is provided between the two stairways in (2) then the separation between them can be less than 30.0 m, if the fire barrier:</p> <ul style="list-style-type: none"> a. subdivides the entire floor area, b. is constructed of a minimum layer of 12.7 mm type X gypsum wallboard on both sides of studs spaced no more than 400 mm apart, c. is provided with at least two door openings spaced no closer than 15.0 m from the stairwells, and d. has openings protected with closures: <ul style="list-style-type: none"> i. having a minimum 20 minute fire-rating, or consisting of hollow metal or kalamein doors, and ii. provided with self-closing devices and latches. <p>5) Except as provided in (7), each stair in (2) and (3) should be provided with:</p> <ul style="list-style-type: none"> a. a temporary enclosure constructed as a fire separation using a minimum layer of 15.9 mm type X gypsum wallboard on both sides of studs b. spaced no more than 400 mm apart, c. hollow metal or kalamein doors with latches on each floor, and d. an overhead temporary structure on the uppermost floor to protect the stair enclosure from the elements as needed. <p>6) Stairways in (2) and (3) should:</p>
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⁶⁵ (OFM with portions similar to NFC Proposal and NFPA 241)

	<ul style="list-style-type: none"> a. comply with the dimensional requirements of Article 3.4.6.8. of Division B of the OBC for treads and risers, and b. be provided with one handrail in conformance with Sentences 3.4.6.5.(3), (4), (5), (9), (11) and (12) of Division B of the OBC, c. have a minimum width of not less than 900 mm, be provided with guards that have a height of not less than 920 mm measured vertically to the top of the guard from a line drawn through the outside edges of the stair nosings and 1070 mm around landings, and d. be provided with stair identification signs to include the floor level, stair designation, and exit path direction as required to provide for safe egress. <p>7) Temporary stair structures attached to the side of the building should be provided with a fire barrier extending at least 1.0 m beyond the stair to separate this stair structure from the adjacent floor area, consisting of:</p> <ul style="list-style-type: none"> a. a minimum layer of 15.9 mm type X gypsum wallboard on the interior side of studs spaced no more than 600 mm apart, and b. hollow metal or kalamein doors, or minimum 45 mm solid-core wood doors with latches.
h. Inspection, Servicing and Maintenance	<p>1) As a minimum, the inspection, testing and maintenance of fire protection equipment must follow the OFC requirements.</p> <p>2) Guidelines provided by NFPA documents should also be followed, such as:</p> <ul style="list-style-type: none"> • NFPA 10 - Standard for Portable Fire Extinguishers • NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (which includes automatic sprinkler systems, standpipes and hoses, fire department connections, fire pumps, fire hydrants, and water storage tanks) • NFPA 72 - National Fire Alarm and Signaling Code

10. PROTECTION OF EXPOSURES FROM/TO ADJACENT PROPERTIES

Summary:

Before starting construction of a mid-rise wood frame building, it is important to consider the potential consequences of a fire from nearby properties. This is especially significant where buildings are being constructed in existing built-up areas.

Similarly, construction site fires can produce considerable heat creating the risk of fire damage to an adjacent building.

Details are outlined below.

a. General Provisions	<ol style="list-style-type: none">1) The additional water supply and firefighting requirements to protect adjacent exposures need to be established in concert with the fire department during the pre-fire planning process.2) Consideration should be given to fire department access to the exposed faces of nearby buildings, or even to means of temporarily sealing windows and doors, or other means to prevent fire from the site to gain access to an adjacent building.
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11. OTHER

Summary:

It is important for management to be committed to construction site safety, and to establish a “culture of safety” on the construction site. A commitment statement should be prominently displayed and disseminated to all staff.

This includes regular self-inspections by the Fire Safety Coordinator and the use of checklists to track review of key elements.

Insurance companies who provide insurance coverage for the construction site should be engaged to review the building design before the start of construction.

Details are outlined below.

a. Management Commitment	<ol style="list-style-type: none">1) The construction firm should have a corporate commitment statement that addresses health and safety, environmental stewardship, fire protection and general loss prevention.2) The commitment statement should be readily accessible, prominently displayed and disseminated to all staff and trades at the on-set and throughout the term of the project.3) Conduct regular self-inspections of the entire construction site, both inside and out, using a site specific checklist for reference and maintaining a copy of the inspection results on file at the site.4) Training programs should be created that include not only fire prevention, but also security, site safety, and general loss prevention.5) Develop and review prior to each project, a formalized maintenance program for all equipment and machinery on the job site.
b. Insurer Engagement	<ol style="list-style-type: none">1) Engage risk control representatives from the insurance company in the review of the building design before the start of construction.
c. Culture of Safety	<ol style="list-style-type: none">1) It is important to establish a “culture of safety” on the construction site.2) This can be accomplished through measures such as, training, explaining the reasons for construction site safety practices, making changes to construction practices that are not consistent with construction site safety, and maintaining good communication.