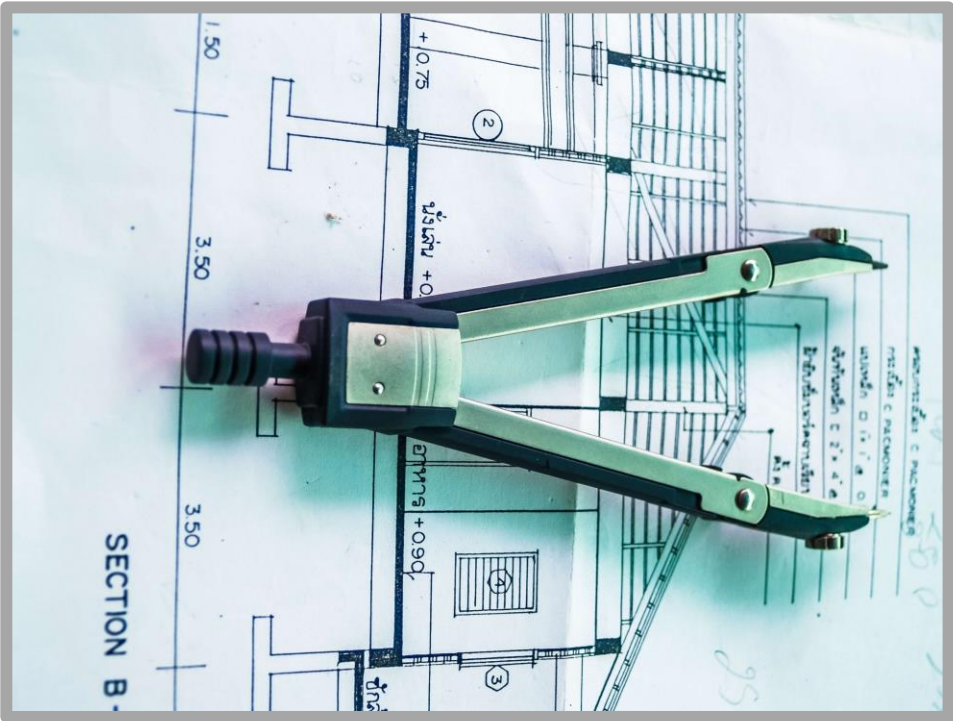




Fire Inspector I & II

CHAPTER SIX READING PLANS



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Chapter 6 – Reading Plans

Slide 1	<p>Welcome to the Chapter 6 Reading Plans.</p> <p>In this Chapter we will discuss:</p> <ul style="list-style-type: none"> • The need for the plan review process so that buildings in your community meet the applicable codes and standards • The policies for plan review in your jurisdiction • Processing a plan review application • Verification that the building complies with the applicable codes and standards • Evaluating construction methods for fire ratings • The installation, testing, and maintenance of fire safety systems and means of exit • Witnessing and documenting tests of fire protection systems • Field verification of plans, drawings, and construction documents • The verification of the operational readiness of fire protection systems
Slide 2	<p>This chapter provides an overview of plan review and building permitting process that fire inspectors should be familiar with. Not all jurisdictions have the same requirements, so this chapter is presented in general terms, but the inspector must also be familiar with the specific requirements in their jurisdiction. The plan review process usually involves multi departments within the jurisdiction such as Planning, Building Inspection, Zoning, Health, and the Fire Department. Each department has their own areas of expertise and working together as a team provides the best opportunity to meet the needs of the jurisdiction. A team approach also deters contractors in making unapproved changes to the building during construction.</p>
Slide 3	<p>From a fire prevention perspective, the plan review process provides a unique opportunity to review, address, and perhaps improve fire and life safety issues before the building is built. This is perhaps the fire inspectors best or only chance to play a proactive role to ensure that the building meets all applicable codes and standards.</p> <p>The goal of the plan review process is to make sure buildings are safe for the occupants and the public but also for your firefighters should they be called upon in an emergency. This is the opportunity to review fire department access to the building, water supplies for firefighting, fire protection systems which include both active and passive systems including fire separation, early detection, and exiting. It is also the opportunity to review or establish occupant loads within the building.</p>
Slide 4	<p>The intent of the plan review process is to ensure all applicable codes and standards have been met. The approval process may differ jurisdiction to jurisdiction but in most cases depends on the size and occupancy classification</p>

	<p>of the building. Large buildings usually require the involvement of a registered professional like an architect or professional engineer while the owner or contractor may apply for a permit for smaller buildings.</p>
Slide 5	<p>Most building and fire codes provide the authority for the local jurisdiction to conduct plan reviews prior to the start of construction. In most cases, the local jurisdiction creates a building bylaw to regulate construction within the jurisdiction and to provide limited review and inspection programs for public health and safety. The bylaw is not intended to protect owners or contractors from economic loss nor accept any liability, for it is normally the owner's responsibility to comply with the Building Code.</p> <p>Local bylaws usually apply to the construction, alteration, repair or demolition of buildings and structures where the occupancy or use of a building, or any part of it, is changed. For example, in a strip mall a drop-in medical clinic moves out and is replaced by a restaurant. The occupancy classification and level of hazard has changed so a building permit would be required.</p>
Slide 6	<p>When an unsafe condition exists in a building or structure the local bylaw often applies to the work necessary to correct the deficiency.</p> <p>Most local bylaws give the building inspector the authority to:</p> <ul style="list-style-type: none"> (a) Administer the bylaw (b) Issue a permit to the owner (c) Issue an occupancy certificate upon satisfactory completion of the work (d) Require applicants for a permit to provide certification by a registered professional (professional architect or engineer) that the plans comply with the Building Code and other applicable codes and standards & (e) Require progress inspections from a registered professional assuring that the applicable codes are substantially complied with
Slide 7	<p>Usually, the bylaw authorizes the building and/or fire inspector to enter any property at all reasonable times to determine if the requirements and regulations under the bylaw are being complied with. Having said that, inspectors normally have to obtain consent from the occupant before entering any occupied dwelling.</p> <p>The building inspector is usually empowered to issue a stop work Order if the work is proceeding in contravention of this bylaw, or if an unsafe condition is observed.</p> <p>Fire inspectors should familiarise themselves with the local building and fire bylaws and the authority and procedures these provide for.</p>

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	The administrative Chapter of most Building and Fire Codes provide the authority having Jurisdiction (AHJ) the authority to review plans and issue permits.
Slide 8	There are several different types of plans that can be submitted to the AHJ for review. At first glance, reviewing these drawings can seem like a daunting task due to the size and number of pages provided but most sets of plans contain standardized information that can be easily interpreted once the reviewer is familiar with the process. It is important however, for the reviewer to have the experience and qualifications required by their jurisdiction before reviewing plans.
Slide 9	Years ago, most plans were referred to as blueprints because they were created on a blue background with white lines. More recently the lines were blue on a white background. Today, plans are often still referred to as blueprints, but that term is interchangeable with drawings, construction drawings, shop drawings or prints. They are usually created, stamped and signed by a registered professional who specialises in a given discipline. For example, site plans are a diagram usually created by a civil engineer which depicts the placement of structures on a property including details such as a detached garage, power lines, driveways, right of ways, water lines and easements, etc. In many cases, it is necessary to provide a site plan to obtain building permits. Other engineers may create, stamp and sign off on mechanical, electrical, or fire protection system drawings based on their specific discipline. Architects usually create the overall building plan for larger projects.
Slide 10	An architect designs and draws up plans for buildings, bridges, and other structures. The key difference between an architect and an engineer is that an architect focuses more on the artistry and design of the building, while the engineer focuses more on the technical and structural side.
Slide 11	<p>To help the reader understand the information contained in drawings, a “title block” is usually located in the lower right-hand corner. The title block contains some or all of the following information:</p> <p>The designers name and contact info, drawing number, date, job number, project title, signatures, approval date, page number if it is part of a series of drawings, revision number if appropriate, and scale.</p> <p>Many drawings also include a legend to help with the preparation of working drawings for the building. A system of abbreviations and symbols, such as those found in NFPA 170 should be understood by plan readers. NFPA 170 provides standard symbols used to communicate fire safety, emergency, and associated hazards information. Using easily understood uniform symbols on labels and signs provides consistency, eliminates confusion, and improves</p>

	<p>communication. If the standard symbols used by NFPA are not used, consultation with the designer can help determine what the symbols represent.</p>
Slide 12	<p>A scaled drawing is a drawing which has been reduced or enlarged from its original size to a specified scale using either metric or imperial measurements, for example a scale of 1/8" equals 1' up to 3" equals 1' is frequently used by architects. Engineers commonly use ratios like 1":10', 1":100', 2:1, and 4:1. When the first number is smaller than the second, it represents scaling down or reducing. When the first number is larger than the second, it represents scaling up or enlarging. When scaling down images that are especially large, expect the second number in the ratio to also be large. A 1:5000 ratio might be used to fit a building-sized object on a single sheet of paper.</p>
Slide 13	<p>Different scales may be used on various parts of the drawing and should be marked accordingly. For example, a circle drawn around an area of a drawing with an extension to a number on the legend would indicate that that portion of the drawing has been drawn to a larger scale in order to provide more detail than would be possible at the existing scale. The different scales may be shown on the drawing or in a legend.</p> <p>Some drawings are "not to scale" or NTS, which means they are not drawn to exactly the right size and just provide a picture showing how things are positioned relative to each other.</p>
Slide 14	<p>Building and fire codes are continually changing and evolving. Code analysis provides an evaluation of the requirements of the codes to ensure that current code compliance is reached, or recommendations for achieving compliance are provided. This may involve analysis of structural design and building and fire code requirements. When a code analysis is provided it may be located on the title page of the drawings or as a separate document. The analysis should list the appropriate codes and identify the following information:</p> <ul style="list-style-type: none"> • Occupancy classification or classifications if the building has multiple occupancies • The fire resistive ratings required between the various occupancies in the building • The construction type • Building area <p>A lot of fire protection systems are based on the size and height of the building so this should be shown on the drawing.</p>

<p>Slide 15</p>	<ul style="list-style-type: none"> • Occupant load. Each area of the building should have the occupant load for which the area has been designed, shown on the drawing. This is normally based on available exiting. Occupant load calculations are fully discussed in the next chapter, Occupant Safety and Evacuation Plans. • Fire Protection Systems - All modern buildings designed for human occupancy require some level of active or passive fire protection systems to be built in. This may range from simple fire separations to fully sprinklered buildings. The code analysis should indicate what fire protection systems are required based on the size and use of the building. • Means of egress. Which should address such things as: <ul style="list-style-type: none"> • The number and location of required exits • Travel distance to exits • The path of travel to the exits <p>&</p> <ul style="list-style-type: none"> • Dead end corridors
<p>Slide 16</p>	<p>A set of plans may be made up of many pages that will be examined during the plan review process. Each page should have a description of what is on that page. For example, a site plan is usually one of the first pages in the set. The site plan provides information about the location of the building on the property. The site plan shows existing buildings and where new buildings, or additions will go. It should also include a directional symbol identifying North which orients the reader to the proposed building. It should provide the dimensions of the lot, property lines, and distance the building will be from the property lines as that can affect the required fire-resistance rating of the building walls and number and size of allowable openings in the walls.</p>
<p>Slide 17</p>	<p>The site plan should also show the location of utility lines such as water, sewer, power, and gas. These should be identified in the plan legend. If there are structures to be removed, they should also be identified by a light broken line.</p> <p>The site plan may also have contour lines that show the elevation of the property above sea level (ASL). The contour lines show the high and low points and the steepness of slopes.</p> <p>Fire department access should also be shown on the site plan. Modern fire apparatus is large and needs room to maneuver. The applicable building code or local bylaw will determine the requirements for width, load bearing, turning radius, grade, overhead clearance, and maximum length without a turnaround</p>

	<p>area. The plan should also identify the location of the fire hydrant in relation to the fire department connection (FDC) if the building is so equipped.</p>
Slide 18	<p>Site Plans are examined to ensure the layout, of buildings, structures, utilities, and access to the site is in conformance with local bylaws and policies. The Site Plan Review procedure gives a community some control over development impacts by working with the property owner to shape the development in the best manner possible, and place certain conditions on the development. The purpose of Site Plan Review is to promote development that will be beneficial to the community and to protect the community from potential harmful impacts, by determining the most appropriate use of the land consistent with the Zoning By-Law, Community Development Plan and the building and fire code requirements.</p>
Slide 19	<p>Of particular concern to the fire inspector is fire department access to the property, fire department connections to the building, dead end routes, width of travel, weight limitations, bridges, potential overhead obstructions, and parking. The distance from the fire apparatus to access to the building for firefighters should also be determined as acceptable. Fire hydrant locations and spacing will also be important so the plan reviewer can determine that this meets the required fire flows, based on the size, use, and construction type of the building. Fire flow requirements will be discussed in detail in Chapter 9 Fire Flow and Fire Suppression Systems.</p> <p>Landscaping design should also be reviewed as over time plants may grow to a point where they obstruct fire department operations, fire hydrants, and fire department connections. Also, there may be a Fire Smart program in your community which limits the type of vegetation around buildings.</p> <p>Site plans can also be used during future inspections to ensure that changes in access have not been made that would adversely affect the fire department response. They can also play a role in pre-fire planning.</p>
Slide 20	<p>The responsibilities of architects and engineers often overlap when designing buildings but both professions are integral to the design and construction of structures.</p> <p>Structural drawings can often be identified by the letter S in the title block and are usually prepared by registered professional engineers, based on information provided by architectural drawings.</p> <p>Most building codes identify the maximum height and area of buildings, based on the occupancy classification and the construction type. The type of construction can usually be determined by reviewing the structural plan.</p>

	<p>Structural plans show the foundation, floor, and roof assemblies of the building. These plans provide information about the size and location of structural load bearing elements in the building including columns, beams, girders, trusses, and arches. Fire inspectors should be aware of light weight wood trusses that are in wide use due to their relatively low cost. In fire events, light weight wood trusses have failed early, posing a collapse hazard to responding firefighters.</p>
<p>Slide 21</p>	<p>Architects design the space to meet their client needs, as well as the aesthetic appearance of the inside and exterior of the building. The architect is more concerned with the look of the structure, whereas the engineer is primarily concerned with safety and functionality.</p> <p>Architectural drawings are usually identifiable by the letter “A” in the drawing number in the title block. The first thing to look for when reviewing an architectural plan is the occupancy classification of the building. Lots of buildings contain more than one occupancy classification. For example, a strip mall may have assembly occupancies like a restaurant combined with a retail outlet(mercantile) and a bank which provides personal services. When two or more occupancies are combined in a single structure the most restrictive code requirements apply to the whole building unless the occupancies are divided by approved fire separations.</p> <p>Once the occupancy classifications are identified the occupant load needs to be determined. Occupant load calculations will be addressed in Chapter 7.</p>
<p>Slide 22</p>	<p>Egress requirements are established by code based on a number of factors including occupant load, the type of exit, travel distance to the exit, number of exits required, fire separation of exits, fire resistance rating, and exit discharge.</p> <p>You will have to confirm that travel distances to the exits conform to code requirements based on the occupancy classification of the room or area.</p> <p>Once this is done you can move on to examining the passive and active fire protection systems. Passive systems include things like interior finishes, vertical opening, compartmentation, and fire separations. Active fire protection systems include things like closers in fire separations, fire alarm and sprinkler systems, emergency lighting and portable fire extinguishers.</p>
<p>Slide 23</p>	<p>Next you will need to examine vertical openings in buildings. Vertical opening like stairs, elevators, escalators, ventilation ducts, HVAC systems, and laundry and refuse chutes allow fire and smoke to travel throughout the building unless they are protected. Building codes usually require vertical shafts to have a fire resistive rating and to be protected by fire and smoke dampers and</p>

	<p>smoke detection. A fire damper closes once the duct temperature reaches a high enough level to melt a fusible link. A smoke damper closes upon the detection of smoke. The codes recognize that the best method of compartmentalization is through the use of the combination fire/smoke damper. It closes not only upon high duct temperature but also upon the detection of smoke.</p>
<p>Slide 24</p>	<p>The most effective fire protection plans include detection, suppression and containment requiring both active and passive fire protection. Active fire protection includes all systems designed to suppress or extinguish fire once it has started. These include smoke detectors, building pressurization, fire alarms, sprinklers, emergency lights, exit signs, and evacuation plans. However, active fire protection systems do not prevent the spread of smoke and toxic gases, the leading cause of death from fire.</p> <p>Passive fire protection is designed to prevent smoke, toxic gases, and fire from spreading. By dividing the building into fire compartments, passive fire protection systems:</p> <ul style="list-style-type: none"> • Strengthen the effectiveness of active systems • Facilitate occupant evacuation • Protect property • Minimize property damage
<p>Slide 25</p>	<p>Doors used as a closure in a rated fire separations must also be rated fire doors. Most building codes require doors in fire separations to have a rating that is slightly less than that of the fire separation itself. For example, a one hour rated fire separation will likely only require a 45-minute rated closure. A four-hour rated separation would require a three-hour rated door. It is important that the plan checker ensure that the correct ratings are applied to the closures which in the case of doors includes all the hardware.</p>
<p>Slide 26</p>	<p>Electrical plans show the layout of the electrical system in the building and are identified with an “E” in the title block. The drawing should show the location of exit lights and emergency lighting, emergency power supply, and the fire alarm system and components.</p> <p>It will be difficult to tell from drawings if the emergency lights provided will meet the minimum lighting requirements of the building code. This will have to be confirmed during a site visit. The visibility of exit lights should also be confirmed during the site visit.</p> <p>Fire alarm systems may be part of the electrical drawing or may be on a separate drawing marked with a FP for fire protection or and FA for fire alarm. It is important for the fire inspector to determine if the fire alarm drawing is a</p>

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	conceptual drawing or a construction drawing to confirm if code requirements are met.
Slide 27	In residential occupancies, the electrical plan may also show the location of smoke alarms and CO detectors. The building code will identify where these devices are required. Knowing what symbols are used in the electrical drawing will help identify the various fire alarm system components. Not all electrical drawings will use the same symbols but here are some common examples.
Slide 28	<p>Mechanical engineering covers a wide range of subjects including the planning, design, installation, operation, maintenance and repair of mechanically functioning equipment such as heating, gas, water, and steam systems. Mechanical plans will identify the heating, ventilating and air handling equipment in the building. The drawings are normally marked with the letter “M” preceding the page number in the title block.</p> <p>The fire inspector should verify that the mechanical equipment is displayed on the plans, and if required by code, the systems automatically shut down in the event of a fire. Often heating and ventilation equipment is required to shut down on the activation of a fire detection device. Fire and smoke dampers may also be required where duct work passes through a fire separation and should be reflected on the plans.</p> <p>Fire separation is usually required for fuel fire appliances and mechanical systems based on the type and size of the appliance and the occupancy classification of the building.</p>
Slide 29	<p>Penetrations in fire separations for mechanical and electrical purposes usually require fire stopping. Firestop, or fire-stopping, is a form of passive fire protection that is used to seal openings and joints in a fire-resistance-rated wall or floor assembly as part of the compartmentalization of the building. Understanding the tools and techniques available for firestopping is of utmost importance to designers, code writers, code enforcement professionals, and contactors alike.</p> <p>Firestopping materials are designed to maintain the fire rating of a wall or floor assembly preventing the spread of fire and smoke and come with an F or FT rating.</p>
Slide 30	<p>The F rating indicates the number of hours (or fractions of hours) for which the fire separation has been tested to keep fire from moving from one side to the other.</p> <p>Although the F Rating is widely utilized throughout the industry, the FT Rating is also an important factor in the design of firestopping for fire walls. The</p>

	<p>National Building Code of Canada requires that firestop systems for non-combustible penetrants have an FT Rating equal to or greater than the penetrated assembly.</p> <p>Procedures to be used for fire stopping should be identified on the plans or in the specifications book.</p>
Slide 31	<p>A specifications book is a written document describing in detail the scope of work, materials to be used, methods of installation, and quality of workmanship for a specific project used in conjunction with working drawings. The specifications book describes in words what cannot be shown or communicated through drawings. Created during the design stage, it is widely used by designers and architects to document all necessary information to bring the project to reality. Essentially specification books exchange information between the designer and the contractor.</p>
Slide 32	<p>A standard format for specification books is available from the Construction Specifications Institute(CSI). Their MasterFormat is the specifications-writing standard for most commercial building design and construction projects in North America. It lists titles and section numbers for organizing data about construction requirements, products, and activities. By standardizing such information, MasterFormat facilitates communication among architects, specifiers, contractors and suppliers, which helps them meet building owners' requirements, timelines and budgets.</p> <p>Not all the information contained in the specifications book will be useful to the fire inspector but the sections on fire suppression systems, fire separations, fire doors and hardware should be.</p>
Slide 33	<p>There are basically four types of views in a plan set. They are Plan View, Elevation View, Sectional View and Detail View.</p> <p>A plan view is an orthographic projection of a 3-dimensional object from the position of a horizontal plane through the object. In other words, a plan view is a section viewed from the top. In such views, the portion of the object above the plane is omitted to reveal what lies beyond. In the case of a floor plan, the roof and upper part of the walls may be left out. Basically, a plan view is just another name for the top view of a 3D object. Floor plans and site plans are examples of Plan Views.</p>
Slide 34	<p>An Elevation Plan shows the exterior of the building. It is an orthographic projection that shows one side of the house. The purpose of an elevation drawing is to show the finished appearance of a given side of the house and furnish vertical height dimensions. Four elevations are customarily drawn, one for each side of the building.</p>

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Slide 35	A sectional view or cross section represents a vertical view of a building as if it were cut in half from top to bottom. Sectional views are used to show the relationship between different levels of a building that would be difficult to understand from plans alone. Sectional drawings can also be used to show structural members as they are positioned vertically. Sectional drawings can be used to show construction details such as the roof construction as shown in this photo.
Slide 36	Detailed views show features that have been enlarged for ease of viewing and understanding. The view is provided in a larger scale which will show the exact construction of the object. Detail drawings are used to show construction details that would not be possible to see on more general drawings. Detailed drawings are provided for things that will need to be constructed or assembled on site to exact specifications.
Slide 37	Building permits are usually required for new construction, renovations, alterations, or when there is a change in use or occupancy classification of a building. Building permits are normally issued by the AHJ. Part of the permitting process is the submission of an application and plans by the owner or their agent. The actual process goes something like this:
Slide 38	<ul style="list-style-type: none"> • An informal meeting is held between the owner, their registered professional, the builder and the AHJ to discuss the proposed undertaking. The meeting helps to set out the expectations of the AHJ and communications amongst various parties. This provides the opportunity to explain the plan approval process and the fee structure of the AHJ. • The application for a permit is made by the owner or their agent • The application and plans are reviewed by the AHJ, usually the building department with input from the fire inspector • Feedback is given to the builder by the AHJ • Changes are made by the applicant and the plans are re-submitted • The approval is granted • Construction begins • Site inspection visits are made <p>&</p> <ul style="list-style-type: none"> • At the completion of construction, the building is commissioned, and occupancy is granted <p>That sounds pretty straight forward but it is not always so simple.</p>
Slide 39	Once the permit application is submitted to the AHJ, the following process takes place: Usually, the first step is to conduct a Zoning Review. Most jurisdiction have Zoning By-laws that set out rules governing land use and the placement of buildings on a lot.

	<p>Zoning bylaws can cover things like:</p> <ul style="list-style-type: none"> • Land and building uses • Building size or density • Location of buildings and other structures on a lot • Minimum lot sizes and dimensions, parking requirements and building height <p>The AHJ will need to confirm that the application complies with the zoning bylaw. If it is non-compliant, an application for a variance may be made. If the variance is approved a Building Permit application can then be submitted for a Building Code Review.</p>
<p>Slide 40</p>	<p>Many jurisdictions have one or more Building Permit Application forms and checklists. One may cover small residential projects like houses and duplexes while another is provided for commercial, industrial, assembly, institutional, or multi-family projects. Some jurisdictions require checklists to accompany the Building Permit Application at time of submittal along with payment of the plan review fee. The Building Plan Review Fee, established in the building bylaw, is usually based on the value of the work being performed or it can be a flat fee.</p> <p>When the plans are submitted, they will be reviewed for compliance with the applicable building code which sets out the minimum requirements for health and safety, fire protection, structural integrity, and construction materials used in buildings. In the case of some multi-family residential, commercial, industrial and institutional applications with fire protection systems, these will be reviewed for compliance with the applicable fire and building codes.</p>
<p>Slide 41</p>	<p>The review process consists of typically one to three reviews. Most projects require at least two reviews. The number of reviews will depend on the level and complexity of the review, and the completeness of the submittal. Projects with complete drawings and thorough responses to the AHJ comments should be approved fairly quickly.</p> <p>As with all jurisdictional dealings, complete records of all communications should be maintained. A log should be established for each project that records the approval process in detail.</p>
<p>Slide 42</p>	<p>The building code requires the installation of fire protection systems in buildings based on the size, occupancy classification and occupant load. A good example is that panic hardware is required on exit doors in assembly occupancies when the occupant load of the room or area exceeds 100.</p> <p>Another example is a sprinkler system. The building code requires sprinkler systems to be installed but also allows a sprinklered building to be larger than</p>

	<p>a building without a sprinkler system. The building code also requires the installation of a fire alarm system when the building is sprinklered with a system having more than 9 sprinkler heads.</p>
Slide 43	<p>Most sprinkler systems installed today are designed and installed in conformance with NFPA Standards. NFPA has three standards that govern the type of system that is installed. These are NFPA 13, NFPA 13R (residential) and NFPA 13D (dwelling).</p> <p>NFPA 13 is the Standard for the Installation of Sprinkler Systems. NFPA 13 protected buildings are considered ‘fully sprinklered’ to provide both life safety and protection for the facility. This means there’s fire protection throughout the entire building, including unoccupied spaces such as attics, closets, etc.</p> <p>Comparatively, NFPA 13R facilities are ‘partially sprinklered’ to provide life safety and a moderate level of building protection. In other words, NFPA 13R requirements provide for a level of protection that allows occupants to escape a building in the event of a fire. Conversely, NFPA 13 provides protection to not only get people out but also to control or extinguish the fire – saving the building and its contents.</p>
Slide 44	<p>NFPA 13D is a residential sprinkler designed for one- and two-family dwellings and manufactured homes. The intent is to provide an affordable sprinkler system in homes while maintaining a high level of life safety. The installer of the system must provide the owner with instructions on the inspection, testing and maintenance of the system but this is usually very simple and can be completed by the homeowner. These systems will be discussed thoroughly in Chapter 9 Fire Flow and Fire Suppression Systems.</p>
Slide 45	<p>With some specified sprinkler design considerations, the 2020 Edition of the National Building Code has expanded the permitted use of NFPA 13D to include rowhouses that contain more than two dwelling units. Rowhouses sprinklered to the requirements of NFPA 13D, rather than NFPA 13R, would not be permitted to have stacked units (i.e. one dwelling unit would not be permitted to be located above another), and 1 h fire separations, constructed to be continuous to the underside of the roof deck, would be required to be provided between suites.</p> <p>With any of the systems mentioned here, the plan review process will be essentially the same.</p>

<p>Slide 46</p>	<p>Early detection of a fire, fire separation, and adequate exiting provide for the safe evacuation of building occupants in the event of a fire. The building code determines when fire detection is required. The first concern for the plan reviewer is to determine the intent of the system. If the system consists solely of smoke alarms the location of the alarms will be determined by the building and fire codes.</p>
<p>Slide 47</p>	<p>If a fire alarm system is required, it will need to be installed in conformance with the building code and other applicable standard like:</p> <ul style="list-style-type: none"> • CAN/ULC-S524 Installation Code for Fire Alarms, • CAN/ULC-S525 Audible Signal Devices for Fire Alarm Systems, Including Accessories • CAN/ULC-S526 Visible Signal Devices for Fire Alarm Systems, Including Accessories • CAN/ULC-S527 Control Units for Fire Alarm Systems • CAN/ULC-S528 Manual Stations for Fire Alarm Systems, Including Accessories • CAN/ULC-S529 Smoke Detectors for Fire Alarm Systems • CAN/ULC-S530 Heat Detectors <p>The Fourth Edition of CAN/ULC-S529 (2016), Standard for Smoke Detectors for Fire Alarm Systems has been harmonized with UL in the USA so both jurisdictional requirements are the same.</p>
<p>Slide 48</p>	<p>Initiating devices in a fire alarm system are the devices that send a signal to the fire alarm control panel and initiate the activation of the fire alarm system. Initiating devices include manual pull stations and heat, smoke, or other automatic detection devices. Initiating devices can also function in other ways such as shutting down equipment, recalling elevators, closing doors, unlocking doors, and activating equipment such as smoke control devices. When reviewing the plans, you should make sure that these devices are listed by an approval agency for the desired function. The plan review should also confirm that the initiating devices are properly located in conformance with the applicable code. For example, the National Building Code of Canada states that pull stations must be installed near every principal entrance and exit and other egress facilities defined in the code.</p>

Slide 49	<p>A fire alarm notification device is an active fire protection component of a fire alarm system. A notification device may use audible, visible, or other stimuli to alert the occupants of a fire or other emergency condition requiring action. Audible appliances have been in use for many years, but other notification methods are emerging technology.</p> <p>The visibility and audibility of notification devices cannot be determined by reading the plans so their acceptability should be confirmed during the site visit. The building code will address the audibility of the fire alarm notification devices and restrict the sound pressure level in normally occupied area and areas designed for sleeping.</p> <p>Often sprinkler system devices like valves and flow switches are monitored and will activate the fire alarm system if water flows or a valve is moved. Information on the plans or in the Specifications Book should describe the design function of the fire alarm and other fire safety systems. This should also be verified on site after the systems are installed and operational.</p>
Slide 50	<p>If special fire extinguishing systems are utilized in the building, the plan reviewer should be familiar with their operation and applicable requirements. The most common special suppression systems are found in commercial kitchens. These systems are governed by the building and fire codes which often reference NFPA 96, the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. NFPA 96 provides the minimum fire safety requirements relating to the design and installation of all public and private cooking operations. It specifies the clearance requirements and clearance reductions which should be confirmed during the plan review and site visits.</p> <p>Other fire suppression extinguishing systems may be found in aircraft hangers, computer rooms, and for the protection of special equipment. Information about the listing agency and the specific standard for the installation should be provided by the coordinating professional.</p>

Slide 51	<p>When deficiencies or variances are identified during the review of the plan, they should be brought to the attention of the coordinating professional. Depending on the nature of the deficiency, it may have to be corrected prior to the issuing of the building permit. It is important to remember that your job is to review the plan does not redesign the building. If the designer is not familiar with the codes, it may be in their best interest to hire a code consultant.</p> <p>If for any reason the designer cannot meet the code requirement they may have to apply for a variance. This usually involves the retrofitting of an older building, as new construction should be able to meet the current code requirements. An alternative is for the designer to consult with a fire protection engineer that may be able to recommend and alternate solution that meets or exceed the minimum code requirements.</p> <p>As construction proceeds, changes may be made in the field that deviate from the approved drawings. Those changes may require the plans to be re-submitted for review and approval.</p>
Slide 52	<p>Once the plans are approved and the permit is granted construction can start. The process of approving the construction requires site visits to ensure the building is being constructed in accordance with the approved plans and that no unauthorized changes have been made. You should review the plans prior to attending the site.</p> <p>Upon arrival at the site be sure to check in with the person in charge and explain your reason for being there. You will be expected to don personal protective equipment appropriate for the hazard. This would normally include hard hat, eye protection, steel-toed boots, and hearing protection but other items may be required depending on conditions at the site.</p> <p>If the work is not being done in accordance with the approved plans this should be brought to the attention of the site manager immediately. If the issue can't be resolved, then a "stop work order" may have to be issue in accordance with your jurisdictional bylaws and policies.</p>

Slide 53	<p>The commissioning of a building is the final step in the plan review and construction approval process.</p> <p>The term commissioning comes from shipbuilding. A commissioned ship is one deemed ready for service. Before being awarded this title, however, a ship must pass several milestones. Equipment is installed and tested, problems are identified and corrected, and the prospective crew is extensively trained. A commissioned ship is one whose materials, systems, and staff have successfully completed a thorough quality assurance process.</p> <p>Building commissioning takes the same approach to new buildings. When a building is initially commissioned it undergoes an intensive quality assurance process that begins during design and continues through construction, occupancy, and operations. Commissioning ensures that the new building operates initially as the owner intended and that building staff are prepared to operate and maintain its systems and equipment.</p>
Slide 54	<p>The fire inspector is primarily concerned with the commissioning of the fire protection systems. The specifics on how each system is commissioned is contained in the installation standard identified in the building and fire codes. You should be familiar with the test procedures, but the work should be carried out by a qualified technician. Records of the verification and testing should be made available to you upon request.</p>
Slide 55	<p>Building codes are a set of regulations that govern the design, construction, and alteration of buildings. Understanding the building code helps all parties involved in design and construction understand the specific requirements involved in compliance. There are two primary paths for compliance: prescriptive and performance-based codes.</p> <p>Historically the building code was a prescriptive based code where specific requirements had to be met. Use fire safety for example, a prescriptive based code would specify what fire separation ratings had to be achieved to separate exits in the building. A performance-based code would say that the building must be built to withstand a fire long enough for the occupants to escape but would not prescribe exactly what materials had to be used to achieve the desired outcome.</p>

Slide 56	<p>Prescriptive codes were straight forward and relatively easy for the designer, builder, and 3rd parties like the fire inspector to understand. The problem was that they created a barrier to innovation. Improved or less expensive products may have been available but could not be used because they were not provided for in the prescriptive code. The other problem was that changes to the code took a long time.</p> <p>Performance-Based Building Design is an approach to design and construction of a building to meet certain measurable or predictable performance requirements without a specific prescribed method. This contrasts with traditional prescribed building codes, which mandate specific construction practises, such as stud size and distance between studs in wooden frame construction.</p> <p>Using a Performance Based approach is more complex and expensive than using the simpler prescriptive route but is valuable in certain situations. Performance based does not preclude the use of prescriptive codes that will continue to be useful in many applications.</p>
Slide 57	<p>Alternative solutions, formerly known as “equivalencies,” allow for flexibility in building construction. They provide the design team with a means to employ design methods that are different from the prescriptive building code requirements.</p> <p>Alternative solutions can apply to new construction or existing buildings but must demonstrate that the proposed approach provides an equal or greater level of performance than that required by building code.</p> <p>Most jurisdictions require alternative solution proposals or applications to be prepared by a registered professional architect or engineer.</p>
Slide 58	<p>In this Chapter we discussed the importance of the plan review process and that it is an opportunity to ensure the building meets current building and fire code standards and your jurisdictions requirements. We discussed:</p> <ul style="list-style-type: none">• Your authority to review plans which is granted by the codes and your local bylaws• Blueprints and the title block on the plans that provides necessary information about the project• Drawings that are to scale and not to scale• Code analysis using the building and fire codes and other related documents like NFPA Standards• Types of plans including site plans, structural plans, architectural plans, electrical and mechanical drawings, and fire stopping.

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Slide 59	<p>We also talked about:</p> <p>Specification books that describe in words what cannot be shown or communicated through drawings.</p> <p>Types of views in a plan set which include Plan View, Elevation View, Sectional View and Detail View.</p> <p>Those building permits are issued by the local government agency having jurisdiction, commonly referred to as the authority having jurisdiction or AHJ. The building permit application and approval process including forms and checklists.</p> <p>Plans for fire protection systems like sprinklers, fire alarms, and other special suppression systems based on the size, occupancy classification, use of the building and occupant load.</p> <p>What to do when deficiencies or variances are identified during the review of the plan</p> <p>Site visits to ensure the building is being constructed in accordance with the approved plans</p> <p>Commissioning the building and the fire inspectors concern with the commissioning of the fire protection systems.</p> <p>And we concluded the Chapter talking about prescriptive and performance-based codes and Alternative solutions.</p>
Slide 60	Chapter quiz
Slide 61	<p>That's the end of Chapter 6 Reading Plans. You are now ready to move on to Chapter 7 Occupant Safety and Evacuation Plans but please complete the quiz for chapter 6 first.</p> <p>If you have any questions now is a good time to contact your instructor.</p>