Plan Review

LEARNING OBJECTIVES

Upon completion of this chapter, you should be able to:

•    Discuss the reasons construction plans are reviewed before construction.

•    Describe the types of plans that fire departments typically review.

•    List five potential site plan items for review.

•    Discuss the benefits of fire department involvement in plan review for the business community.

Case Study

In the following, William Koffel, P.E., a fire protection engineer and principal at Maryland fire protection engineering firm Koffel Associates, describes his interaction with a registered design professional who had submitted a plan for a five-story hotel, and makes an effective case for plan review:

In the early 1980s, shortly after I had graduated from college and was working as a fire protection engineer with the Maryland State Fire Marshal’s Office, I reviewed a set of drawings and specifications for an automatic sprinkler system. The project was fairly simple: the sprinkler protection was for a five-story, multiple-occupancy building, with most of it occupied by a hotel. There was little to indicate that the project was exceptional in any way, or that I would continue to reference it throughout my professional career.

Plan review comments were generated for this “simple” project and incorporated into a four-page plan review letter that was sent to the project’s registered engineer. Not long after, when he’d received the letter, the engineer called me with a question. He asked me, “What is this NFPA 13 you’re referring to?”

It was easily the most alarming moment in the project’s review and comment resolution process. Unfortunately, I was too inexperienced and naïve to do the proper thing, which would’ve been to report him to the State Board for Professional Engineers for not even knowing the applicable criteria for designing the system. Instead, I explained to him that NFPA 13 was the standard used to design and install sprinkler systems in the state of Maryland.

The project was eventually built, but not before a sprinkler contractor was brought in to assist with the preparation of the drawing. The result was a 25 percent increase in the number of sprinklers to be installed, in compliance with the requirements of NFPA 13.

1.   Was Mr. Koffel obligated to report the engineer’s lack of code knowledge?

2.   How did Mr. Koffel’s actions benefit the developer and owner of the building?

3.   What does this case study demonstrate about fire department/state fire marshal involvement in the plan review process?

Information for this case study came from: William Koffel, “The Oops Factor, Learning from Mistakes in the Design and Installation of Fire Protection Systems,” NFPA Journal, Nov/Dec 2001.

Introduction

Within the grand scheme of ensuring public safety, construction regulation has traditionally been the responsibility of a government official generally referred to as the building commissioner, building superintendent, or just plain building official. The need for construction regulation is rooted in catastrophic collapses and conflagrations that occurred throughout history. Similar to most forms of government regulation, it takes significant public sentiment before elected officials act.

Although building officials traditionally have been responsible for ensuring that structures are constructed and maintained within guidelines prescribed by code, the fire chief is forced to deal with emergency incidents involving those same structures. When the questions, “Why were so many people killed or injured?” or “Why did the fire spread so quickly?” or “Why wasn’t the fire department able to stop the fire?” are asked in the aftermath of a tragic incident, rightly or wrongly, public officials sometimes point fingers. After the Triangle Shirtwaist fire in 1911, in which 147 factory workers were killed, Fire Department City of New York (FDNY) Chief Edward F. Croker responded to the public outcry to place responsibility for the tragedy with: “The matter [the building was constructed with inadequate means of egress] is entirely within the discretion of the Building Department Superintendent.”1

Tip

Finger-pointing to assign blame is bad form and can lead to feuds between agencies tasked with serving the public. Interagency feuds negatively affect all agencies involved.

The review of building plans and specifications before construction has been an integral part of the building permit application process. Plans for the Asch Building, which housed the Triangle Waist Company, were reviewed and approved in 1900—despite the fact that the building lacked a sufficient number of staircases. The employee who had reviewed the plan in 1900 had risen to the position of superintendent of buildings by the time the fire occurred in 1911.2

Fire departments today are being included in the plan review schemes of many jurisdictions. In some cases, their inclusion was the result of a tragedy. Often, it has been at the request of a building official who wants to ensure that complex issues that potentially impact fire department operations at emergencies are properly addressed by personnel with adequate technical knowledge. Whether the request is a proactive outreach or an attempt to deflect criticism in the future, the effect is the same. In some cases, review of fire protection systems such as sprinklers and standpipes rests solely with the fire department. Features including fire department access roadways, structural fire protection, means of egress, and specific hazards (including fuels, hazardous materials, and special hazards) are also reviewed.

Tip

It is important that fire protection features such as alarms, sprinklers, standpipes, and fire command centers are designed and installed to meet fire department operational needs.

The primary purpose of a plan review process is to verify that the proposed structure complies with the code before work begins. Plan review serves other useful purposes as well. The system provides an additional level of safety by ensuring that conditions are evaluated by another set of eyes. The plan reviewer evaluates the structure on a drafting table Figure 5-1. Inspectors in the field then compare the structure with the approved plans and the code. Building permits universally contain a caveat that might well be considered the 11th commandment of building safety: “Approvals are subject to final field inspection.” No matter how thorough and competent, reviewers at a drafting table cannot be expected to anticipate every condition or contingency. Sometimes conditions in the structure “as built” go well beyond what could be anticipated on a blueprint.

Tip

The primary purpose of a plan review process is to verify that the proposed structure complies with the code before work begins; however, reviewers in an office cannot be expected to anticipate every condition or contingency based solely on a plan.

The 1922 National Building Code required the submission of “all necessary plans of such proposed work” and “detailed structural drawings” with the permit application.3 The building official was obligated to approve or reject the plan “within a reasonable time.”4 The 1940 Uniform Building Code, developed and published by the Pacific Coast Building Officials Conference (later known as the International Conference of Building Officials), contained much more detailed requirements, requiring plans to include “plots of the property, strain sheets, stress diagrams computations, and other necessary data.”5 Plans had to be prepared on substantial paper or cloth and be drawn to scale. Code writers were well aware that building plans and specifications would be the objects of intense scrutiny after any catastrophic event. Plans on “substantial paper or cloth” could be expected to remain legible and thus prove to be extremely useful evidence within the courts.

Figure 5-1 Plan review increases safety by ensuring that conditions are evaluated by a second set of eyes.

Courtesy of Bonnie Diamantes.

Plan Issues of Interest to the Fire Service

Fire department access roadways to structures; the locations of fire department connections, hydrants, and fire command centers; and access to building services as well as control features for fire protection systems all have a significant potential operational impact in the event of an emergency Figure 5-2. Imagine the entrance to a hospital complex with a security gate that is too narrow for fire apparatus to enter. Consider the impact of a fire department connection 6 feet above grade that a beleaguered pump operator must reach using a ground ladder, all the while hearing the call for water because the building fire pump is not supplying the standpipes. The fact that fire apparatus is bigger than it was 20 years ago or the problems inherent in having to use a ladder to reach a fire department connection is significant and might not be readily apparent to a plan reviewer outside the fire department. Fire department operations expertise can resolve potential problems in the early stages of development.

Site Plan Issues

The first plan normally submitted for review is a site plan. Site plan approval is the first step in the regulatory process and may even be part of a rezoning. Approval by the jurisdiction constitutes authorization for construction of a structure or structures for specific uses and of a specific construction classification. The location of the structure on the property, building height and area, and road configuration (including parking) are determined at this stage in the process. If there is a time in the process that is conducive to requests from the fire department that might exceed code-required minimums, it is at the site plan review. Problems brought to the developer’s attention after the site plan has been finalized usually result in costs that exceed budget projections and are cause for conflict.

Tip

Problems brought to the developer’s attention after the site plan has been finalized usually result in costs that exceed budget projections and are cause for conflict. Instead, inform the developer of new demands in advance.

Figure 5-2 Fire department access is a key element evaluated during plan review.

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At times, the jurisdiction’s approval may be subject to certain conditions. These may include buffers between proposed structures and existing development, green space, parking restrictions, and other requirements. Site plan items typically include building construction type and location, fire department vehicle access issues, fire protection systems, and fire flow requirements. The plan submission checklist developed by Chesterfield County, Virigina, provides an example of typical site plan items Figure 5-3.

Building Plan Issues

In addition to site plan review, many fire departments review plans for structural fire protection and separation or fire protection ratings, emergency egress, and fire protection systems. Building departments typically review all aspects of the building, including structural ratings, construction classification, and means of egress, even though many of the issues are also reviewed by the fire department. Fire service review generally provides a second set of eyes to compare the proposed structure with the code and to attempt to identify potential problems or conflicts ahead of time. Issues involving hazardous materials or processes often require a level of expertise that goes beyond architecture or civil engineering. Emergency evacuation and the establishment of areas of refuge, where those incapable of evacuation can be sheltered, must be evaluated with an eye toward fire department operations. Again, the plan reviewer with fire operations experience or the civilian plan reviewer with an in-depth knowledge of fire department operations is a valuable asset that can complement the review by the building official’s staff.

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Fire Protection System Plan Issues

Perhaps nowhere in the plan review process is fire department input more valuable than in the review and approval of sprinkler, fire alarm, smoke control, and other fire protection systems. Fire operations personnel become the end users of these systems. There are numerous instances within the model codes and referenced fire protection system standards in which fire department approval is specifically required. The location of fire department connections and the configuration and access to fire command centers are just two examples. It is preferable to get fire department approval within a formal framework, similar to the plan review process. Asking for opinions from numerous operations personnel may lead to inconsistent decisions regarding what works best operationally.

Resistance to Fire Department Plan Review

Fire department involvement in plan review is sometimes met with resistance. Possible sources of opposition may include design professionals, developers, contractors, elected officials, the building department, and perhaps even the fire chief! Each group has different concerns, and many are valid issues that must be addressed before the fire department ever becomes involved in the process. Fears that the plan review process will take longer and become more convoluted if the fire department gets involved are legitimate. Another concern of business interests is that fire officials will ask for anything they believe will improve safety, disregarding the code, and will attempt to pressure developers into spending extra money to achieve an enhanced level of safety. Building officials may feel the fire department is unnecessarily intruding into their territory. Fire chiefs may view the prospect as a method to siphon away already thin resources, coupled with another political headache. Each of these concerns is legitimate, and unfortunately, in some circumstances, rooted in fact.

Figure 5-3 Typical site plan items are included in Cobb County’s checklist.

Courtesy of Cobb County Fire and Emergency Services and Cobb County Government.

Resistance from Design Professionals and Developers

Time is money and neither is unlimited. Informing the business community that it will take an additional 2 weeks to process a building permit will result in complaints to elected officials. When design professionals and developers find out that additional time is needed to permit the fire department to review the plan, the complaints may increase. Design professionals may feel that they must jump through an additional hoop, since the building official had already checked plans for fire protection. Complaints from the business community may be minimized or eliminated if they are informed that fire department involvement does not entail additional requirements. Rather, it simply involves another set of eyes on the same issues and perhaps more consistency relating to fire department approvals.

Care must be taken to do whatever is necessary to streamline the plan review process. The model codes specifically state that they contain minimum acceptable levels of protection, but fire officials must use the bully pulpit with care. Fire officials should strive for the safest buildings and promote increased levels of protection without putting architects and engineers on the defensive. Developing formal plan review procedures and making guidelines readily available for download from the department’s website will help to allay fears that the fire department will make unrealistic demands Figure 5-4.

Tip

Care must be taken to do whatever is necessary to streamline the plan review process. Co-locating fire department plan review staff at the building department reduces the number of steps in the process and saves time.

Resistance from the Building Official

Strive for the building official to view the fire department as an ally, not an adversary. It should be clear that the fire department is not undercutting the building official’s authority. Needless delays can result from plans being transported between agencies. Delays in permit processing may lead to political pressure. Establishing a fire department plan review office at the physical location of the building department saves considerable time and leads to improved communication among agencies. If disagreements occur, they should be settled behind closed doors; if developers see a rift, they could use it to their advantage.

Tip

Good communication and a commitment to a team effort will ensure that the building official sees the fire department as an ally and not an adversary.

Figure 5-4 Publishing concise plan review guidelines allays developer fears of additional or unnecessary requirements.

Courtesy of Fairfax County Fire and Rescue Department.

Knowledge, Skills, and Abilities for Plan Reviewers

A position in the fire prevention bureau requires a different skillset and demeanor than a job performing fire department operations. The job of reviewing construction plans and meeting with developers and design professionals is even further removed from the world of the fireground. Plan reviewers require a specific set of knowledge, skills, and abilities (KSAs).

Tip

A job in the fire prevention bureau requires skills and demeanor that do not necessarily match those we look for in firefighters. The ability to read architectural and engineering plans and interact with developers and design professionals are very different skills than those used on the fireground.

Design professionals and other code officials may wonder what qualifies a member of the fire department to operate in their world. Some departments have the luxury of hiring engineers to serve as plan review staff. These civilian personnel should receive in-depth training on fire department operational objectives and operational needs. They must have access to senior officers within the department when operational expertise is needed.

Tip

Fire personnel should be trained and maintain the same certifications as their counterparts in the building department.

Firefighters serve admirably as plan review staff in many jurisdictions. Training courses from the National Fire Academy; International Code Council (ICC); National Fire Protection Association (NFPA); and technical schools, colleges, and universities are available.

Certification

NFPA 1031, Standard for Professional Qualifications for Fire Inspector and Plan Examiner, contains job descriptions for two levels of plans examiner, Plan Reviewer I and Plan Reviewer II. Both review building and fire protection system plans for compliance with applicable codes; represent the fire department at meetings with architects, engineers, and developers; and make recommendations for variances and code modifications. The Plan Reviewer II has additional experience and is tasked with training personnel at the Plan Reviewer I level.

The standard specifies what are considered “minimum standards” for professional competence in terms of job performance requirements (JPRs). The standard does not address management responsibilities, and as with all of the NFPA’s standards for professional certification, it states that it is not the intent of the standard to restrict any jurisdiction from exceeding or combining the minimum requirements. The standards can be used to establish minimum requirements for those seeking assignment to plan review and to establish a list of KSAs to be used in selecting applicants for appointment. Many organizations require those appointed to obtain certification under the standard within a specified time frame.

National certification from the model code organizations is also available and shows that the fire department official is serious about performing well. The consolidation of the Building Officials and Code Administrators International, International Conference of Building Officials, and Southern Building Code Congress International into the International Code Council (ICC) has led to a merger of each group’s certification registers. Testing and recertification are now accomplished through the ICC. Fire department plan review personnel can obtain the same certifications as their peers in the building department. Firefighters performing plan reviews should have to meet the same standards as members of the building official’s staff. In addition to the JPRs contained in NFPA 1031, other KSAs include:

•   Ability to read blueprints

•   Technical math skills

•   Ability to communicate orally and in writing

•   Ability to interpret complex technical codes

•   Good mechanical aptitude

•   Knowledge of basic construction principles

•   Demonstrated firmness, fairness, and flexibility

•   Impeccable honesty and forthrightness

•   Willingness to serve as a member of a team

National Institute for Certification in Engineering Technologies

Founded in 1961, the National Institute for Certification in Engineering Technologies (NICET) is a nonprofit division of the National Society of Professional Engineers. The NICET maintains technical certification programs for civil, mechanical, and electrical technicians in construction, geotechnical engineering, transportation, utilities construction, security systems, communications, and fire protection. Fire protection technicians are certified through testing, verification of work in the field by immediate supervisors, employment history, and personal recommendation. The NICET certifies fire protection technicians in the following disciplines:

•   Fire Sprinkler System Layout

•   Fire Alarm Systems

•   Inspection and Testing of Water-Based Systems

•   Special Hazards Suppression Systems

Many state and local governments require NICET certification in order to design, repair, perform maintenance on, or inspect fire protection systems. NICET certification is also the gold standard for employers who hire fire protection technicians. Code officials involved in plan review and inspection of fire protection systems should consider NICET certification. Seminars held by state and regional associations that prepare candidates for NICET examinations are a wise investment.

WRAP-UP

Chapter Summary

•    The fire department is included in the plan review process in many jurisdictions.

•    The primary purpose of the plan review process is to verify that the proposed structure complies with the code before work begins, but it also provides an additional level of safety by ensuring that conditions are evaluated by a second set of eyes.

•    Fire department involvement can help to address problems or operational impediments before building construction begins.

•    Fire departments typically review three types of plans: site plans, building plans, and fire protection systems plans.

•    The site plan is usually the first plan submitted for review, and typically includes building construction type and location, fire department vehicle access issues, fire protection systems, and fire flow requirements.

•    Many fire departments review plans for structural fire protection and separation, emergency egress, and fire protection systems.

•    Fire department input is invaluable in the review and approval of sprinkler, fire alarm, smoke control, and other fire protection systems.

•    Fire department involvement in plan review is sometimes met with resistance from design professionals, developers, contractors, elected officials, the building department, or the fire chief. Clear communication, including the development of formal plan review procedures and readily available guidelines, can help the fire department to be seen as an ally.

•    Plan reviewers require a specific set of knowledge, skills, and abilities (KSAs).

•    NFPA 1031, Standard for Professional Qualifications for Fire Inspector and Plan Examiner, contains job descriptions for two levels of plans examiner, Plan Reviewer I and Plan Reviewer II.

•    National certification is available for fire department plan review personnel through the International Code Council. Certification programs are also available through the National Institute for Certification in Engineering Technologies.

Key Terms

Construction classification Classification of a building or structure into one of the five types or subtypes included in the model building codes, based on types of materials and structural protection afforded.

Fire command centers Fire resistance–rated rooms normally found within high-rise buildings and other large structures that contain controls for fire protection systems, building systems and utilities, and communications systems.

Fire department connections External hose connections to supply fire protection water for automatic sprinklers and standpipes.

Fire protection ratings Protection provided for building elements from the effects of fire expressed in terms of time.

Knowledge, skills, and abilities (KSAs) A competency model used to recruit and retain qualified individuals for successful job performance.

Site plan A plan for proposed development; it is typically the first plan submitted to the jurisdiction and includes location of structures, occupancy and construction type, proposed roadway and parking facilities, and available fire flow.

Standpipe A system of piping, valves, hose outlets, and allied equipment installed in a building to distribute fire protection water.

Structural fire protection Protection afforded to structural elements to resist the effects of fire; protection is generally provided through encasement with concrete, gypsum, or other approved materials.