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Fire Protection: Architect's Role during Construction of Buildings

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Abstract
With technological advancement each year and improved awareness of fire safety measures, fires needlessly cause many casualties as well as material damages. Contractors and consultants can utilize past experiences and involvement whenever a property becomes a building site. The past knowledge of existing buildings especially those that have fire certificate and fire safety systems will be invaluable to the architects and contractors. Advance planning for fire protection and vigilance in construction safety can greatly reduce the risk of disasters. Actions necessary to minimize the chances of fire loss lies in recognizing probable causes, implementing adequate prevention measures, and preparing a plan for battling a fire should it strike. Undertaking construction work increases the risk of fire. Some are caused by tools and products used during the construction process, while others are due to carelessness on the job. Most fires can be prevented by taking routine safety precautions and eliminating the opportunities for a fire to start.
Keywords: construction, building, fire, safety, site.

INTRODUCTION

During construction of buildings, fire Protective systems must conform to the requirements of building code and building regulations that was in effect on the day the building permit was applied for. Enforcement for compliance is usually the responsibility of statutory authorities. An up to date fire protection plan containing a complete inventory and maintenance details of all fire protection components, such as fire stops, fireproofing, fire sprinklers, fire detectors, fire alarm systems, extinguishers etc. are typically major requirements for demonstration of compliance with applicable laws and regulations.Badassara, C F (2007).

CAUSES OF FIRE DURING CONSTRUCTION WORKS.

The leading cause of construction-related fire is the use of open-flame torches. Torches are frequently used to join roofing materials and to solder, weld, or cut metal. The possibility of setting fire to decorative woodwork, structural wood, paint, building paper, or a nest or dry vegetation in a wall cavity is usually high. Often a smouldering ember flares and ignites hours after workers have left the job site. Paint removal with electric resistance coil units such as heat plates or heat guns is also a potential source. Heat coils can ignite paint chips, building paper, or fibrous wood or debris. Careless use a match can result in the burning of drop clothes or other flammable objects. Fumes from chemical solvents often used in paint stripping and wood refinishing can also be easily ignited by an electric spark or a struck match. Materials subject to spontaneous combustion, like mops and rags soaked with paints, oil or solvents, are obvious hazards. The storage of flammable materials on the job site can accelerate the spread of a small fire. Of particular concern are paints, solvents, papers, and fuels such as propane and kerosene. New York Landmark Conservancy October, (1996).

Carelessness in disposing of smoking material can lead to fire. This can be a match thrown in garbage or a partially extinguished cigarette dropped among wood shavings. Vandalism and arson are potential threats since unprotected construction sites, scaffolding, and plies of flammable building materials may attract unwanted attention. Buildings that appear to be abandoned are frequently targets. The disturbance of old wire coated with brittle insulation can cause sparks that can lead to fire. Old wiring may overheat due to the increased electrical load associated with construction. Multiple extension cords running to heavy equipment are a good indicator of a potentially electrical system. New York Landmarks Conservancy, (1996).

ARCHITECT'S ROLE DURING CONSTRUCTION OF BUILDINGS:

Hazard control:
In building construction site, non-commercial cooking appliances like microwaves, toasters, ovens and electric heaters are potential hazards. Architect must ensure that they are in proper working conditions and do not impose fire hazard.
Smoking: A building site should be a smoke free environment; therefore all smoking must be prohibited right from entrances to the building site.
Deliveries and storages: They should not be placed where they obstruct access to visibility of exists, fire alarm or fire fighting equipment.
Heat producing appliances. All heat producing appliances and cords meant for their intended use must obtain written permission of the safety officer. They shall only be used on non-combustible surfaces and must be used about 450 mm from combustibles. A clearance of 900 mm is maintained between combustibles and heaters.

Portable heaters shall have automatic tip-over shut-off control. All appliances should have a visual lamp indicating that power is turned onto the unit. Other appliances that pose fire hazards include: - liquefied fuel gas such as propane, fuel fired heaters such as kerosene stoves, electric lamps, electric irons etc.
Tar kettles and bituminous meters used for road surfacing can be potential hazards.
Cooking and warming appliances such as ovens, toasters, electric kettles, hot plates etc are potential hazards. Cooking and warming must be performed on temporary kitchen facilities approved by safety officer.
Multipurpose- portable extinguisher must be provided within 9 m of any heating or cooking operation.
Utility rooms: They include mechanical rooms, boiler rooms, electrical closets, fuel storage rooms etc. These demand the highest level of housekeeping at all times. Combustible materials shall not be stored in these areas.
Lightening protection: Lightening Protection systems are very essential for buildings with steeples, towers, and high roof peaks. These systems if ungrounded during construction can constitute serious danger as a fire hazard. Lynch (1986).

PREVENTIONAL MEASURES: THE ROLE OF ARCHITECT IN CONSTRUCTION SITE.
Having identified the probable causes of construction-related fires, the architect needs to reduce the threat starting or spreading by adopting the following measures. He should:-

- Make fire safety an essential consideration in site organisation, checking material specification and compliance to standards.
- Consult with fire preservation professionals, fire departments or fire service within his locality and discuss the project at the onset about the safest procedures for performing the necessary works.
- Explain the safest expectations to the contractor during the day of site possession.
- Check if there is need to install temporary fire fighting systems such as fire extinguishes fire alarms etc.
- Ensure that contractor's workers are properly trained and supervised in safety practices.
- Ensure that the contractors are familiar with the location of phones and calls boxes, fire extinguishers and the nearest water source.
- Report all acts of carelessness to the contractor immediately they are observed.
- Ensure that an electrician inspects all temporary wiring prior to the start of construction.
- Ensure that all old wires that are brittle or frayed should be replaced or disconnected before replacement.
- Ensure that all welding and cutting of metal materials are as much as possible be performed off site or a far distance from the main buildings.
- Ensure that the contractors and his operators follow safety procedures for handling hazardous devices and materials.
- Carefully supervise all open-flame and electric coil works on site.
- Ensure that all flammable liquids are stored at a far distance from the main buildings or off site.
- Ensure that all areas where chemical solvents are used are properly ventilated to prevent the accumulation of fumes that can cause explosion.
- Ensure that all rags, papers, and construction debris are disposed off site or stored in an air tight container.
- Ensure that smoking of all kinds is prohibited on construction site.

OTHER OPERATIONAL ISSUES TO BE ADDRESSED BY THE ARCHITECT:
Site offices: Contractors are usually untidy in terms of storages, deliveries, etc. there is need for strict house-keeping in order to maintain standards.
The project team: The project team should understand that the same safety and housekeeping standards are expected throughout all accommodation areas. Occasionally, senior project team should take part in fire safety routine inspections of sensitive areas such as:-

- Remote plant rooms and fuel storage rooms.
- Storage, delivery and refuse points.
- Consultants and contractor's offices.

Induction talk: Induction courses to be organised occasionally with contractor's staff for large projects and staff compliance must be ensured.
Office fire warden and site fire officer: Resident consultants and contractors team should monitor fire safety systems for evacuations, fire instructions, and organise periodic safety inspections.
Site inspections reports: Avoid typing formal site inspection reports. Use simple carbon copied duplicate/triplicate book with handwritten reports made during the inspection, with a space for contractor's

replies which should be promptly made before the next inspection. Seweryn,(2006).

Communication and record keeping: Those concerned with construction of buildings should maintain a steadfast discipline with all communication and record systems. They should organise fire safety review meetings, health and safety reports, general inspection notes, or logistics plan updates.

RECOMMENDATION

- The general fire safety of a building will need a combination of passive fire protection and active fire precaution which will together provide a structure the ability to withstand fire and the provision of means of escape for building occupants.
- There is need for proper education for the providers of fire safety and the end users including the general public.
- Advancement in building design and construction can have significant impact in fire prevention.
- If we must improve the safety of our buildings and environment, we must learn of initiatives, safety schemes, new products and strategies that have been adopted throughout the global village.
- Periodic inspections of buildings by fire service/ fire department is a welcome idea.
  Statutory regulations must be adhered to before commencement of construction works.

CONCLUSION

As contractors and consultants come and go during the course of the project, they need to ensure that consistent standards are expected from everyone on site. Good project records are usually presented to enforcing authorities whenever they visit site.

Structural or fire integrity use is subject to regulatory scrutiny. A contemplated change in facility requires a building permit or a review by a local fire officer. Such reviews help to prevent potential problems that may confront the end-users. Cusa, T (1986).

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