

Case Studies of Fire Affected Buildings and Safety Improvement Strategies

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Abstract— Property management is entrusted with the responsibility of protecting and preserving commercial buildings. Constant attention is required to minimize adverse impact due to fire. Fire safety system is the essential part of any building although its been not taken into considerations by the building developers and planners, thus it is necessary to take initiatives for development of fire safety system. The present fire safety system of surat city is good but have some of the lackings as it is not developed as per the municipal corporation norms, so more cases of fire bursting out has been arised due to improper fire safety system and also due to less maintainance . Thus at the time of fire the building structure gets damage heavily and there are chances of casualties. In these project the commercial buildings suffered by the fire problems would be surveyed and compared with SMC norms and lackings in the safety system will be shown and its upgradatiopn will be given so as to provide a better and safer fire safety system. Also upgradation and lacking in comparision with international fire safety norms will be given so as to develop the building life to its maximum. Thus properly designed, installed, and maintained, these upgraded systems can overcome deficiencies in risk management, building construction, and emergency response. These may also provide enhanced flexibility of building design and increase the overall level of fire safety.

Key words: Fire Safety, Fire Causes, Maintenance, Sprinklers, Pumping Systems, Fire Effect On Concrete

I. INTRODUCTION

This Chapter is divided into two sections. The first one is background to the research project which describes what research project is and why is interesting to do research on it. The second section is about aim and objectives of this research project. This research project is based on some specific areas and these are describing in section.

A. Background to Research Project:

Fire protection engineering impacts every aspect of building design. Civil Fire protection engineering impacts every aspect of building design. Civil engineers, structural engineers, architects, mechanical engineers and electrical engineers all need to know how the principles of fire protection engineering will affect their involvement in the design of buildings and related infrastructure. This project will provide an introduction to fire protection engineering for the building design team. It will facilitate the building design process and result in safer and more cost-effective buildings and infrastructure for public agencies and companies. Fire engineers, like their counterparts in other engineering and scientific disciplines, undertake a formal course of education and continuing professional development to acquire and

maintain their competence. This education typically includes foundation studies in mathematics , physics, chemistry, and technical writing. Professional engineering studies focus students on acquiring proficiency in material science , statics , dynamics , thermodynamics , fluid dynamics , heat transfer, engineering economics , ethics , Systems in engineering , reliability , and environmental psychology . Studies in combustion , probabilistic risk assessment or risk management , the design of fire suppression systems , the application and interpretation of model building codes, and the measurement and simulation of fire phenomena complete most curricula.

The present fire safety system of surat is good, but has some of its lacking. Thus more cases of fire busting is been arising daily. This problems are due to improper fire safety system and due to less maintenance. Currently the fire cases are increasing in surat city as recently some of the commercial buildings like Landmark building, empire state building, world trade centre (WTC), etc. were struck by fire heavily. Due to lack of fire safety systems these commercial buildings had suffered serious damages of goods and property.

Thus appropriate measures should be taken to protect the buildings and life of people from the fire accidents so as to cause minimum damage of life and property for a better and smooth working of the business and so to protect any building from fire following five fundamentals should be taken into considerations:

- 1) Building material and design
- 2) Water supply
- 3) Fire extinguisher
- 4) Fire alarm system
- 5) Special occupancies and hazards

II. SCOPE OF THE WORK

The aim of this research project is to study surat city's current fire safety system of commercial buildings. Also this project will give safety improvement strategies and also upgradation as per the foreign fire safety techniques will be given so as to give a dependent fire safety safety to the commercial buildings.

There are three objectives for the aim of this project. The first objective is to identify the problems related with fire and its safety. It is essential to identify the problems related with safety at any site. Without identifying and analysing the problems it is very difficult to adopt or suggest an appropriate safety practices. Thus after any fire incident the first formal is thing to identify and detect and to find the source from where the fire has taken place.

The second objective is to identify safety initiatives that were applied on the fire affected building. In these objective it is to be identify that which safety system were installed in the particular buildings and reasons are to be found that due to which lackings the system got failed and was unable to prevent the fire.

After analysing and identifying the above two problems, safety evaluation are been done to measure the effectiveness of the initiatives and as per it actions are been taken to improve the safety measurements.so third objective is to give proper fire safety allowances as per the study of above two objectives.

By studying this proper upgradation will be given and a better and safer fire safety system would be provided. This upgradation and lacking with international fire safety norms will be given so as to developed the building life to its maximum.

III. METHODOLOGY

As our project is related on different cases affected by fire in Surat. Thus, here our plan of the work will be to visit the sites affected by the fire and plan out the different measures, problems, defects and causes due to which how fire affected the buildings and damages the interior as well as exterior of the building.

Here we have to plan out and find out that what were the specific reasons to which fire strikes out at the sites and affected the whole building.

The major sites affected by fire in Surat city to which we have considered as our cases to study are as follows:

- 1) Orchid tower (also known as Vipul market) – Parvat patia- Surat
- 2) Landmark building – Parvat patia - Surat
- 3) Embroidery factory – Amroli – Surat

Other cases were fire struck are:

- 1) Icchapore oil Depot – Hazira –Surat
- 2) Next Electronic Show room- Near Rusabh Tower- Adajan-Surat

This are the cases which are affected by fire and we have considered this cases in our project.

Survey And Plan of These Sites Are As Follows:

A. Orchid Tower:

- A major fire erupted in this textile market around 10.30 A.M – 11.A.M on Thursday dated 29/5/2014.
- While surveying it was found out that this market was used as high rise goddown for sarees and raw clothes.
- By Further resources we found out that on 2 and 3 floor of this market welding work was on progress which helped it to spread faster through the many windows in tower.



Fig. 1: Orchid Tower

B. Landmark Tower:

- The Landmark Empire, a commercial building textile shopping hub on Parvat patia where a major fire struck on Wednesday -Dated 23/4/14 .Time 5:00 PM onwards.
- While surveying it was found that this building was equipped with one if the best fire safety system yet it was struck by fire.
- While looking further we found out that fire was held on 5 and 6 floor if the building.
- Here there was loss of 2 peoples of life due to panic
- 2 people jumped off from 7 floor due to panic



Fig. 2: Landmark building (Tower A)

C. Icchapore Oil Depot:

- On January 5 2013 a major fire took place at the POL depot- Petrol Oil and Lubricant depot, Icchapore.
- The fire took place during the maintenance on roof top caused a huge blast.
- At around 12:30 pm the fire took place on 5th January 2013 and led to huge destruction of the area of the depot.

- In these fire case 3 persons killed among which bodies of two persons were recovered from near the tank number 4 which caught fire.



Fig. 3: Icchapore Oil Depot

IV. NEW METHODS USED FOR EXTINGUISHING FIRE

The below listed Method is of the great method which is use internationally but is not been taken in use by India. Thus those newly found methods are as follows:

A. SEFS System (Self Expanding Foam System):

Firefighting foam, exactly (almost) like you know it but completely unlike any foam you've ever seen.~ A new revolution in firefighting technology, brought to you :

B. Description of the SEFS System:

A method has been developed which eliminates the limitations of conventional systems.

The concept of this new system is that perfectly prepared foam is stored under pressure in a vessel. On release of the foam from the vessel, expanded foam is formed at the location where the expansion takes place.

The patented system is called "Self-Expanding Foam" system, abbreviated as SEF®.

Applications where the SEFS concept can be used:

- New concept airport crash tenders
- First intervention vehicles
- Skid mounted units
- Fixed installations for restaurant cookers, fuel storage, underground fuel bunkers, portable and wheeled fire extinguishers
- SEF® tanks on vehicles, replacing or complementing conventional fire fighting vehicles
- Foam supply on sites handling flammable liquids that have no firewater system
- Foam supply for road car loading facilities handling flammable liquids

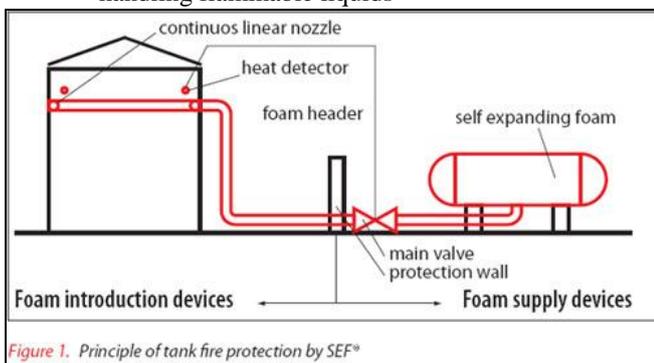


Figure 1. Principle of tank fire protection by SEF®

Fig. 4:

C. The Bombardier 415 Aircraft:

This is one if the best technique in todays life.The Bombardier 415 aircraft is the only aircraft designed and built for firefighting. It uses a range of firefighting techniques, including its unique ability to scoop large amounts of water from a nearby water source, mix it with foam suppressant, and make repeated drops on a fire without having to return to base to reload water.



Fig. 5: Bombardier 415 Aircraft

Thus ,if is this types of techniques came and adopt by India and specifically the states where water are easily available then it can be very helpful for fighting against heavy Fire and can be easily dissolve fire and take control over it.

V. CONCLUSION

From the whole project and overall survey we have come to the conclusion that following considerations are necessary for the protection of commercial buildings against fire:

- Proper fire safety as per structure requirement should be installed necessarily.
- Components of the safety system should be efficient and in working condition whenever it needs to be used during fire.
- Proper maintainance should be done of all the components at regular intervals.
- Electric connections should be provided properly and they should be sealed properly.
- Storage of toxic materials should not be done near the source of the fire.
- Compartmentation is necessary in the long and continuous shops.
- Stairs should be centrally located which can ease the reach of people.
- Lifts should also be provided centrally so that escape becomes possible during fire.
- Emergency exit and fire lift should be necessarily provided for the escape during the fire.
- The maintainance staff should have proper knowledge of using the installed fire systems.
- Sufficient ventilation should be given at all intervals and at all floors for the proper circulation of air.

Out of all these factors we consider that the installation of 'ELECTRIC SUPPLIES' should be done with most care because in most cases the short circuit is the main cause for the production or struck of fire.

Some of the above information regarding our cases was collected by us with the help of MR.S.K Acharya- Chief & Head of Fire Department- Surat

VI. LIMITATIONS:

Limitations of this case studies are divided into two types as literature review limitations and plan of the work limitations.

A. Literature Review Limitations:

- This project may not cover all the aspect of fire safety field.
- Only limited cases of fire in Surat city are selected
- There may be some other fire safety problems which are not described.
- There may be some other fire safety initiatives which are not described.
- There may be some other way for solving fire safety problem which are not mentioned.

B. Plan of the Work Limitations:

- Although this project is about fire safety of Surat city, but research data were collected from only 5 commercial buildings.
- Such kind of small data would not reflect fire safety improvement strategies of commercial buildings of Surat city.
- The selected sites were not available for detailed survey as some of them were sealed by the government.
- Also the plan of the buildings and cctv footage of fire were not provided in these project as they were restricted.

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