



Presentation Topic :

**Design of a Fire Detection and Protection System for a
Single Storied Shopping Mall**

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Overview

1. Course Outcome
2. Introduction
- 3.Objective
4. What is Fire Alarm System
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6. Floor Plan
7. Possible location of fire hazard
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Course Outcomes

CO3: Design electrical building service systems subject to specifications and constraints considering applicable standards and codes.

CO4: Prepare and present basic technical documentation of a new building services system.

CO5: Consider safety and societal issues in design of electrical service systems for buildings.

Introduction

Fire Detection and Protection System are designed for safety issue. Many shopping malls and other malls contain lot of valuable materials. So without proper fire system plaining life and products both are in danger situation. This systems have numerous advantages and also quick process to protect an area from fire accident.

Objective

The objective of this project is to design a proper Fire Detection and Protection System for a single storied 3000 square feet shopping mall.

The shopping mall has different size of store. Considering the size of different store, the rang of the safety and security equipment. The number of customers and employees, the Fire Detection and Protection System must be designed.

What is Fire Alarm System?

A fire alarm system warns people when smoke, fire, carbon monoxide or other fire-related emergencies are detected. These alarms may be activated automatically from smoke detectors, and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns.

For protection and safety following equipment's are selected:

- Smoke detector



- Alarm



- Sprinkler



- Fire Extinguisher



5 Kg



CCTV : 360 camera

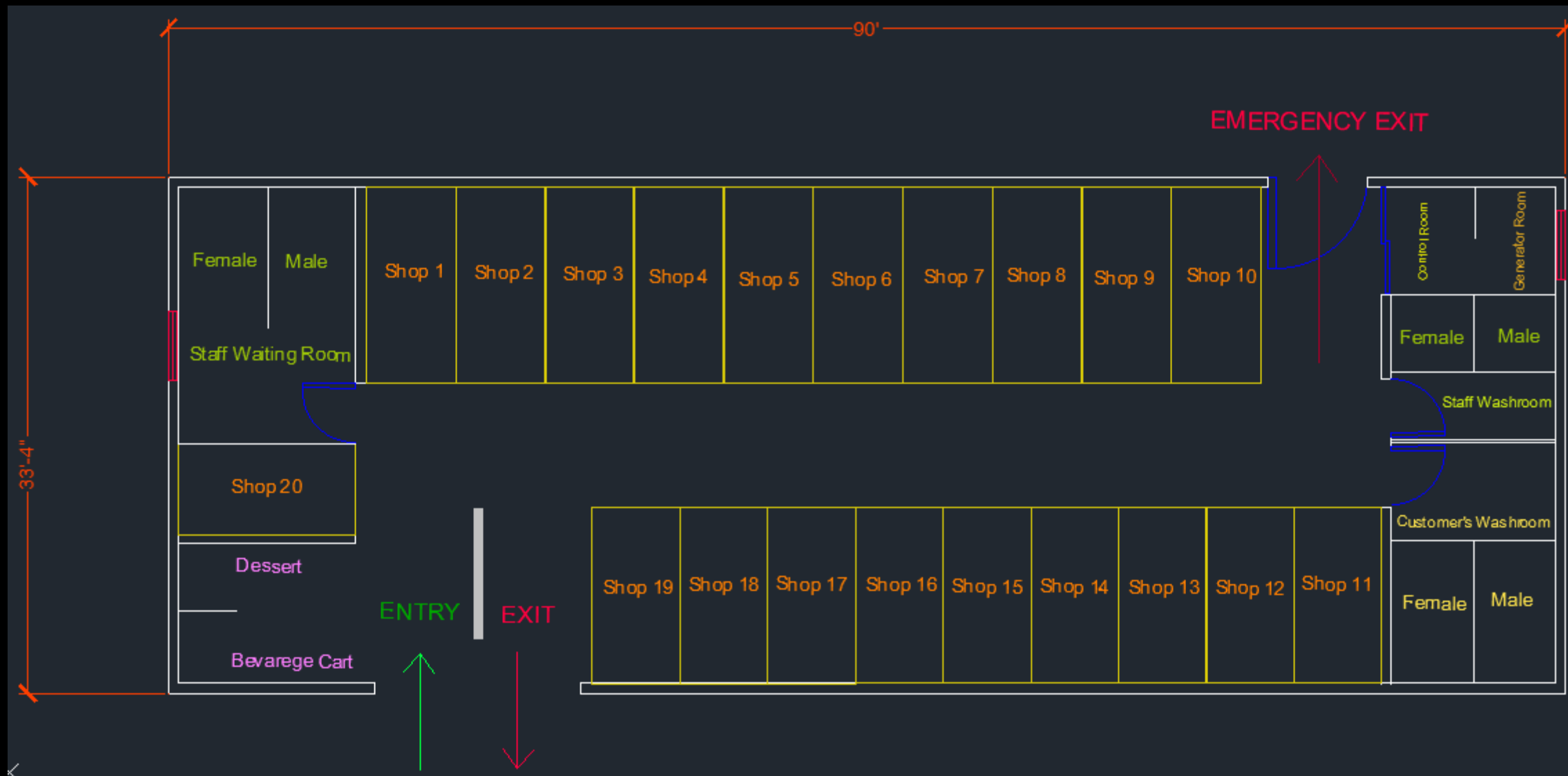
Monitor



DVR

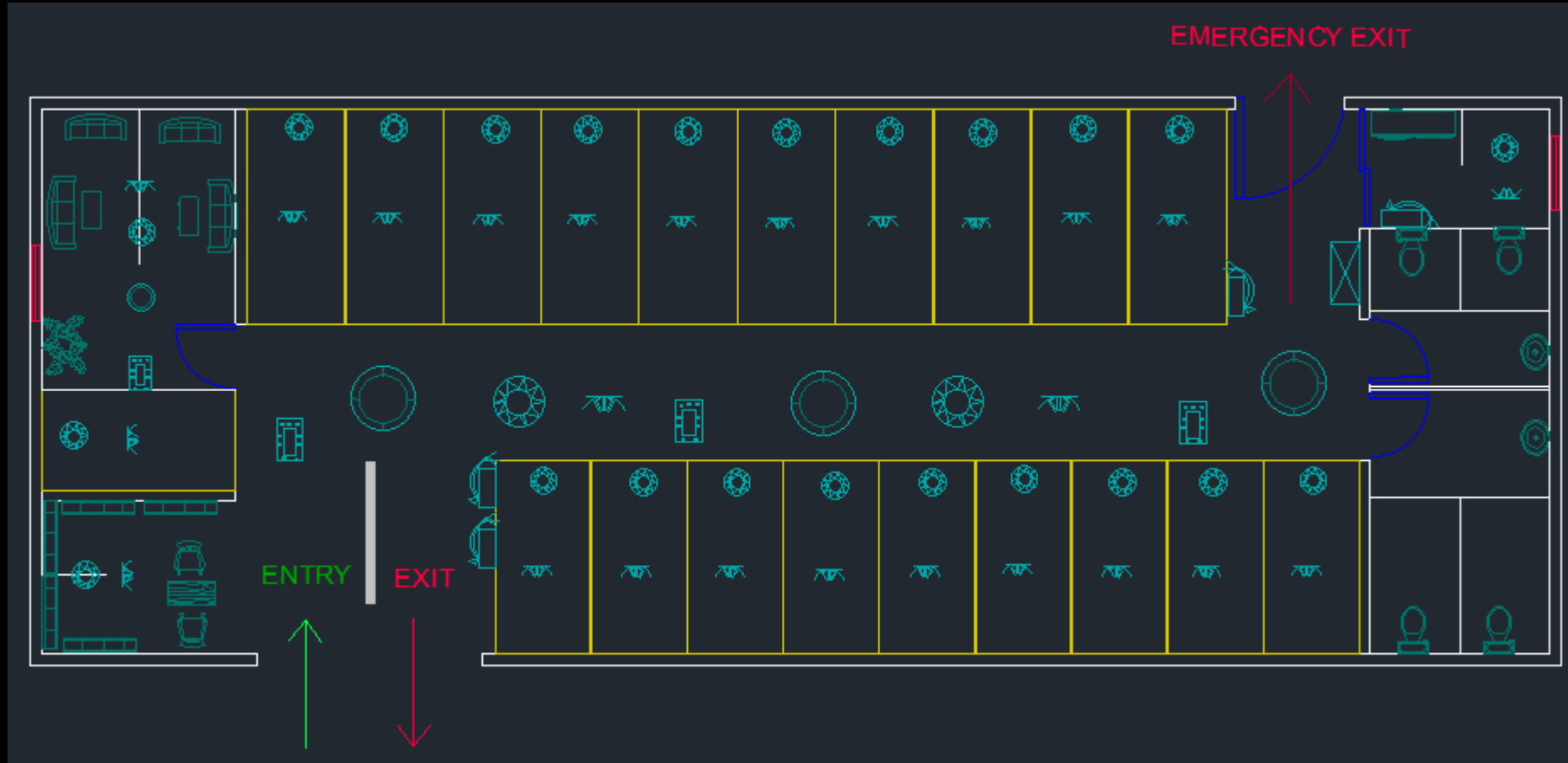


Shopping Mall Floor Plan



[C04 achieved]

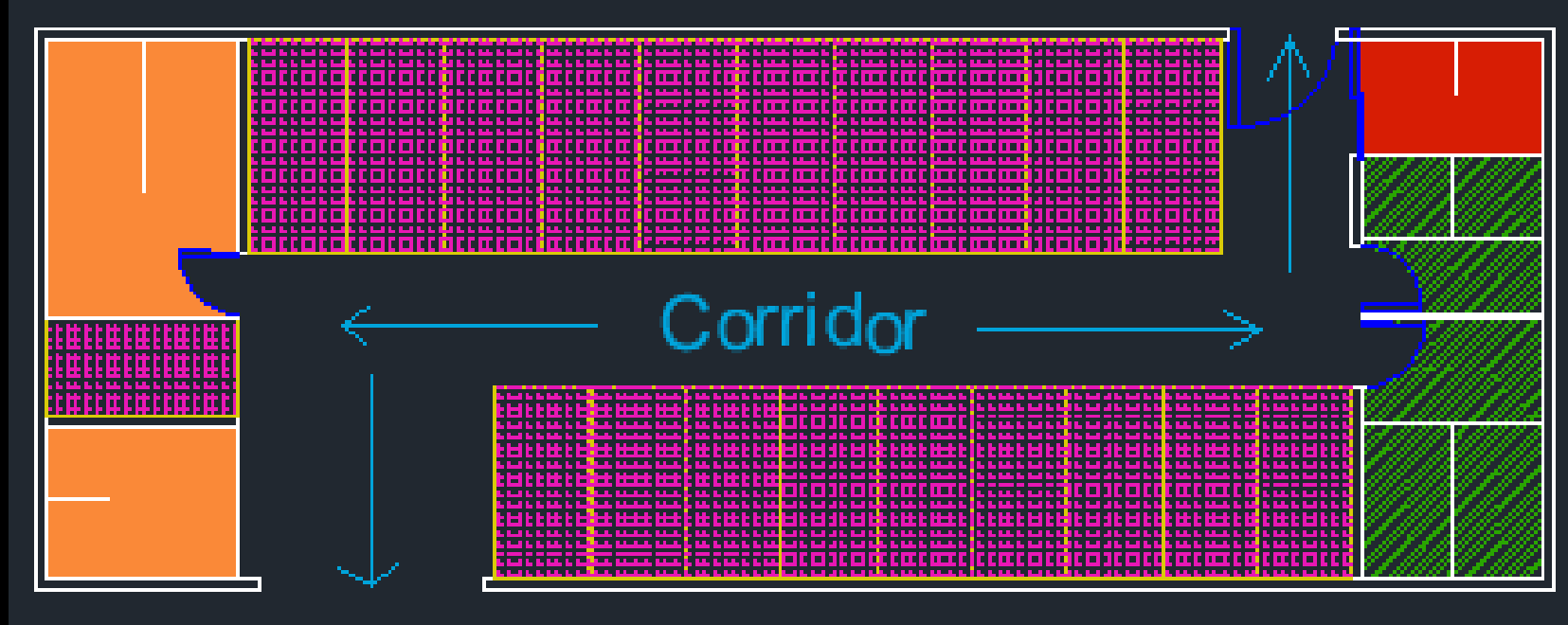
Safety and Security Equipment Locations





Legends :

	MDB
	Smoke Detector
	Fire Alarm
	Fire Extinguisher
	Sprinkler
	360 deg CC Camera
	Control Monitor
	Basin
	Toilet
	Sofa
	Table
	Window

Mentioning Fire Hazard Location



- | | | | |
|---|---|---|---|
|  | Zone 1 (Control-Generator Room) :
higher possibility |  | Zone 3 (Washrooms): lower possibility |
|  | Zone 2 (SHOPS) : Lower than Zone1 |  | Zone 4 (Waiting Room & Food Court): lower possibility |
| | |  | Zone 5 (Corridor) : lower possibility |



 Possible Locations of Fire Hazard

Two Layer Fire detection and protection System:

- Mainly we used two layer detection system for the protection from Fire hazard.
- Sensor are always working but if somehow it doesn't work or fail then from the control room CCTV cameras can always monitor the whole shopping mall.
- This two layer detection can very useful for any shopping mall.

Compare among Two Smoke Detectors :

Product:

1.Brand:



Price: 510 taka

Efficient ,low buzzer sound.

2. Brand:

NANOSOFT TECHNOLOGY

Price:490 taka. Low maintenance cost, Long in **endurance**.

Model: NS-AL0

Comment: We choose **NANOSOFT TECHNOLOGY** brand for its reliability, low maintenance cost , long endurance.

Specifications:

Material: ABS Plastic
Size: Ø102*35mm (with base)
Weight: 105g (with battery)
Power supply: 9V battery
Standby current: 8µA
Alarm current: 16mA
Operating Temperature: 40°F to 100°F (4.4°C to 37.8°C)
Relative Humidity: 10 to 85% RH, non-condensing
Buzzer Output: louder than 85dB at 10 feet (3m)
Self Check Function: Yes
Interconnection: Up to 40 units (optional)
Low Battery Warning: Up to 30days warning signal
Certificates: CE, ROHS, EN 14604



Compare among two fire extinguisher :

- **Brand:** ABC 5 Kg Dry Powder Fire Extinguisher with Wall Bracket

Price: 1,500 Taka

- **Brand:** Taifun ABC 5KG Extinguisher with Wall Bracket

Price: 1,550 Taka

Comment: We choose ABC dry powder 5kg fire extinguisher because of low cost and also for high range. This Fire Extinguisher. Providing Best ABC Dry Powder Fire Extinguisher which suits all types for Fire. Suitable for Office, Kitchen, House or any outdoor fire Purpose.

Specifications:

ABC 5 kg fire extinguisher with wall bracket is suitable for fire on ordinary combustible, highly inflammable liquids, gases expelled under pressure and fires under electric tension. The extinguisher 30 Kgf/cm² testing pressure, 15 Kgf/cm² working pressure, 5 mtr jet range, 0-60 °C temperature range.



5 Kg



Compare among Two Alarms :



Price: 635 taka

- Brand: XS
- Model: WFFCS01

Price: 510 taka

Comment: We choose XS WFFCS01 since it is less costly, reliable, having built in strobe system for visual & loudness.

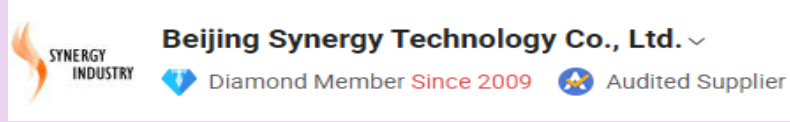
Brand Specification:

- **Voltage:** 24VDC/12VDC
- **Alarm current:** $\leq 100\text{mA}$
- **Audio alarm:** $\geq 100\text{db}$
- **Flash intensity:** $\geq 100\text{times /minutes}$
- **size:** 135X115X48mm
- **Sound:** $\geq 105\text{dB}$



Compare among two sprinkler :

- Brand:



Price: 61 Taka

- Model: Diameter 15mm

- Brand:



Price: 164 taka

- Model: Crome Finish 68 Degree Quick Response Sprinkler

- Comment: We choose Diameter 15mm model because compliance for low cost and high effective range and also long in endurance.

- Specifications:

Airproof test pressure : 3Mpa,

Rated working pressure :1.2Mpa,

Thread : R3/4

K coefficient: 115

Flowing calculation: $Q=K\sqrt{10P}$ (P=working pressure)



Compare among Two Dome Cameras:

- Brand:

HIKVISION

Price: 4,550₹

Key Features

Model: DS-2CE72DF8T-FSLN
2.8mm, 2MP, 1920 × 1080 resolution
24/7 color imaging, F1.0 aperture
130 dB True WDR technology
Up to 40m white light distance

- Model: DS-2CE72DF8T-FSLN

- Brand :

DAHUA
TECHNOLOGY

₹ 4,490

- Key Features : 1 / 2.7" 4 MP CMOS,ICR
- Lens : 3.6 mm /6mm
- Viewing angle : 89.9 / 59.4Degree

- Model: DAHUA HAC-HFW-1400DP

Comment: We choose HIKVISION camera for its excellent angle of view, cover 360 degree, and better IR coverage.

Specification

General

Pan/Tilt/Rotation Pan: 0° to 360°, Tilt: 0° to 75°, Rotation: 0° to 360°

Camera

Image Sensor 2 MP CMOS

Electronic Shutter Speed Shutter Time: PAL: 1/25 s to 1/50,000 s; NTSC: 1/30 s to 1/50,000 s
Slow Shutter: Max. 16 times

Minimum Illumination 0.0003 Lux @ (F1.0, AGC ON), 0 Lux with white light

IR Distance Up to 40m white light distance



Compare among Two Monitors :

- Brand: 

Display resolution 1920*1080,brightness 200cd/m2,response time 5ms, price is about 11,720taka

- Model: **HP V214a**

- Brand: 

Display resolution 1920*1080,brightness 200cd/m2,response time 5ms, price is about 15,720 taka

- Model: **Samsung T35**
- Comment: We choose Hp brand because of low maintenance cost and we need for just monitoring.
- Specifications:

Display Size (Inch)	20.7
Display Type	FHD LED
Panel Type	TN
Display Resolution	1920x1080 (WxH) FHD
Aspect Ratio	16:09
Display Surface	Anti-glare
Brightness (cd/m2)	200cd/m2
Contrast Ratio	600:1 (static), 5000000:1 (dynamic)
Refresh Rate (Hz)	60Hz
Response Time (ms)	5ms
Horizontal Viewing Angle	90 degree
Vertical Viewing Angle	65 degree



Block Diagram for CCTV System



Cable1



Cable15



Legend

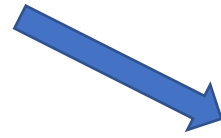
Cable1 = 1 BNC Cable For Camera

Cable15= 15 BNC Cable For Camera

[C03 achieved]

Block Diagram for Fire Alarm, protection and safety System

Smoke Detector



CCTV



Control System



Fire alarm



Fire service

Tabulation Sheet and cost Calculation

Device Name	Type	Brand Name	Number of Equipment	Price
Smoke Detector	Detector	NANOSOFT TECHNOLOGY	25	12250 ₺
Fire Alarm	Alarm	XS WFFCS01	4	2040 ₺
Fire Extinguisher		ABC 5 Kg Dry Powder Fire Extinguisher with Wall Bracket	4	6000 ₺
Sprinkler	Sensor	Beijing Synergy Technology Co., Ltd.	25	1525 ₺
Monitor		HP	1	11,720 ₺
DVR		Dahua DHI-XVR 4232 32-Channel Digital Video Recorder	1	23,500 ₺
360 Camera		HIKVISION	4	18,200 ₺
Total Estimated Cost				= 75,235 ₺

Conclusion

In this project , we design a Fire Detection and Protection System for a single storied shopping mall. We try our best to full-fill every requirement of the project. Here, we insure the best fire security and protection system and also used highly updated feature equipment. Also here we consider default situation and how to protect. So, now we can learn how to design a fire detection and protection system.

Reference

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5. Camera: <https://www.startech.com.bd/hikvision-ds-2ce72df8t-fsln-2mp-colorvu-audio-fixed-turret-camera>

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6. Monitor: <https://www.ryanscomputers.com/hp-v214a-207-inch-fhd-1920x1080-led-monitor-hdmi-vga-speaker>

7. DVR: <https://www.bdstall.com/details/dahua-dhi-xvr-4232-32-channel-digital-video-recorder-49619/>

THANK YOU