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Planning and Designing of Fire Station at Vattappara

Faris Rahiman M[1], Jishana P P[2], Ajmal Abdulla[3], Jamsheeda Thazhath Veettil[4]
[1, 2, 3, 4]*Department of Civil engineering, Eranad Knowledge city Technical Campus, Manjeri, Malappuram, Kerala*

Abstract: ***This project will be presenting the planning, designing, and estimation of fire station at Vattappara. The existing conditions of Valanchery town have no surrounding fire station. So, in this project we are trying to bring a new fire station with all modern facilities and emergency requirements. We would like to provide more facilities such that a spacious parking for fire engines, an office building, rest room and cottage for employees in the fire station in our project. First we would like to learn about the basic requirements and features available in an existing fire station. Then the required survey is done in our plot and the properties of soil in the site are studied well. Then the required drawings are done according to proper scale as per KMBR rule. After that we will do designing of slab, beam, column, footing, sunshade and lintel by using IS 456; 2000, IS 1875, with limit state method of designing.***

Keywords: Multi-storied Industrial building, Design of Column, Design of Beam, Detailed Estimation, Using manual calculation, Load analysis

I. INTRODUCTION

This document is a template. For questions on paper guidelines, please contact us via e-mail. Valancheri is a fastest growing city in Malappuram district. The population of Valancheri municipality is growing day to day. Currently there is no fire station the physical facilities of Valancheri town and Vattappara is very dangerous. There for there is a fire station is necessary. The nearby fire station is situated on Tirur at a distance of 25 km away from Valancheri. So Vattappara needed a fire station in its periphery.

On this reason we chosen 'PLANNING AND DESIGNING OF FIRE STATION AT VATTAPARA' as our project topic. We made a case study on Malappuram fire station. Though we understand the basic needs of a fire station. We decided to provide facilities such as garage, cottage, office building, rest room, parade ground and underground water tank etc on the basis of our case study in Malappuram fire station. The new fire station will reduce operational cost and manpower requirements, and will improve the operational efficiency of the fire department

II. LITERATURE REVIEW

A. David. M Banwart et al,(2021) Osha(Occupational Safety and Health Administration)

The purpose of this manual is safety of emergency responders and building occupants by providing information about how firefighters typically interact with building features and fire protection systems during fires and similar emergencies. By better understanding the needs of the fire service, designers and code.The faster the fire service can respond, enter, locate the emergency incident, and safely operate in or near a building, the sooner they can usually resolve the incident in a safe manner.

B. Bing Han et al (2021)

Principle of the ordinary fire station arrangement is to ensure the arrival of firefighting trucks within five minutes. The firefighting response time also varies with fire risk levels as well as road and traffic conditions in different zones Moreover, multi-objective programming models are proposed to involve more factors such as the water supply for firefighting to optimize the fire station layout with respect to the average demand.

C. Esra e. Aleisa (2018)

The modern fire station has been one of the most important and basic components in the provision of Fire Protection Services as the cornerstone of a productive and motivated workforce and as a source of community pride.

Significant risk associated with construction of fire station include lack of proper of literature and lack of knowledge ,experience and opportunities among fire workers.

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D. Paul Erickson (2014)

The London Fire Brigade (LFB) is the fire and rescue service for London. It was formed by the Metropolitan Fire Brigade Act 1865, under the leadership of superintendent Eyre Massey Shaw.It has 5,992 staff, including 5,096 operational firefighters and officers based at 102 fire stations. The 2015-16 financial year the LFB received 171,488 emergency calls. These consisted of: 20,773 fires, 48,696 false alarms of fire and 30,066 other calls for service Since 2016, the LFB has provided first aid for some life-threatening medical emergencies (e.g. cardiac or respiratory arrest).

E. Lee Amesty (1991)

The modern fire station has been one of the most important and basic components in the provision of Fire Protection Services as the cornerstone of a productive and motivated workforce and as a source of community pride. Significant risk associated with construction of fire station include lack of proper of literature and lack of knowledge experience and opportunities among fire workers.

F. Benjamin Franklin (1736)

Firefighting in the United States dates back to the earliest European colonies in the Americas who would respond to neighborhood fires with buckets. Volunteer companies were often paid by insurance companies in return for protecting their clients. Blacksmith Patrick Lyon of Philadelphia patented a hand-pumped engine that was the most powerful in the United States, and he built the first hose wagon in 1804, which eliminated the need for bucket brigades in cities. Lyon's masterpiece was the hand pumper Diligent which outperformed the new Cincinnati-built steam pumper Young America in a famous 1852 contest.

III.DETAILS OF FIRESTATION

Total area of the plot = 50.83 cent, Building includes with Office building, Quarters, Garage, Record room, Dormitory, Hose tower, Water tank, Rest room and smart class room, ground,

General specification for the building PCC: 1:4:8 using 40mm normal size broken stone 300mm thick, Basement: RR masonry in cement mortar 1:6, 600*600. Super structure: Literate masonry in CM 1:5 200mm thick, Flooring: PCC 1:4:8 using 20mm nominal size broken stone 10cm thick and top plastered with CM 1:3, 10mm thick, Pointing: The exposed face of basement is pointed with CM 1:3, White washing: The surface of building with coats of lime, Painting: Wood work and iron work are painted with two coats over priming coats, Electrification, water supply and sanitary work: provision for internal electrification water supply and sanitary work shall be provided on percentage basis.

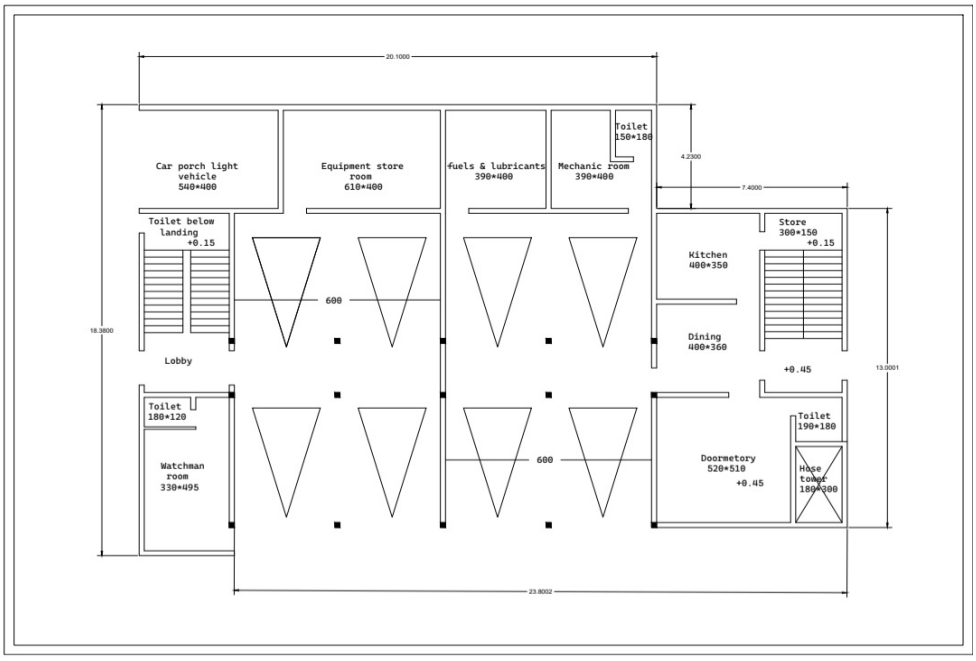


Fig.1 Ground floor Plan

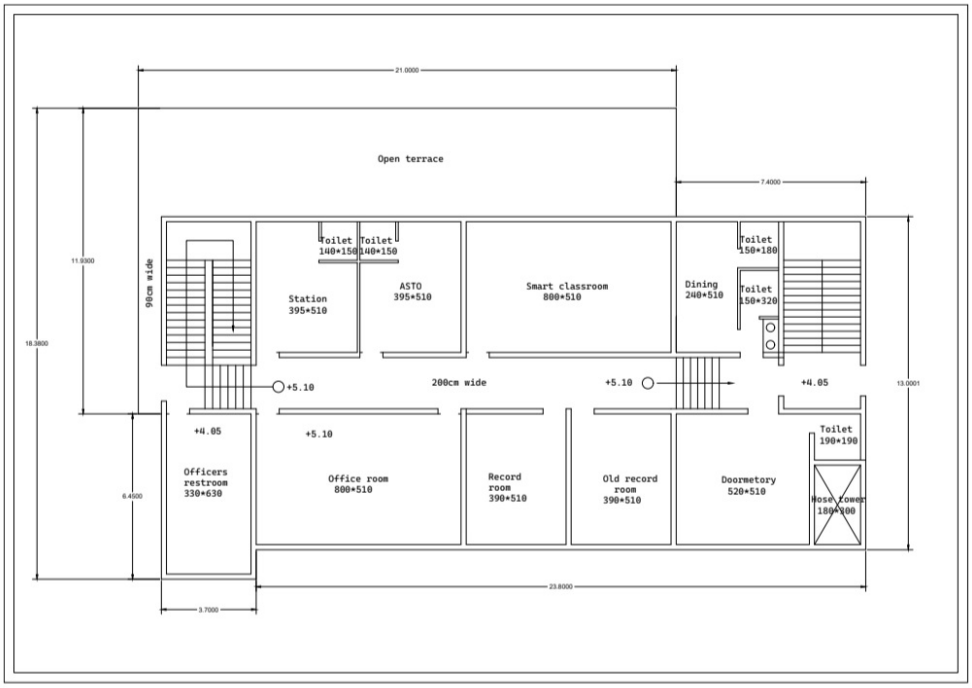


Fig.1 First floor Plan

IV. BAR BENDING SCHEDULE

Beam

SL NO	description	Nos	length	Shape	Total length	Wt/m	Quantity (kg)
1	Beam 1						
	Main bar 16 mm dia (straight)	4	4.208		17	1.5	25.5
	Main bar 10mm dia (stirrup holder)	2	4.208		8.416	0.591	4.97
	stirrups 8mm dia	14	1.26		17.64	0.37	6.68
	Total						37.15
	No of beam	20					
	Net total						743kg
2	Beam 2						
	Main bar 16mm dia (straight)	4	5.108		20.4	1.5	30.64

	Main bar 10mm dia (stirrup holder)	2	5.108		10.216	0.591	6.04
	stirrups 8mm dia	17	1.26		21.42	0.37	7.92
	Total						44.6
	No of beam	22					
	Net total						981.2kg

Column

SL N O	description	Nos	Length	shape	Total length	Wt/m	Quantity (kg)
1	Column 1						
	Main bar 25 mm dia (straight)	5	6.35		31.75	3.853	122.33
	Lateral ties 6 mm dia	27	1.18		31.56	0.213	6.78
	Total						129.11kg
	No of column	33					
	Net total						4260.63 kg

SL NO	description	Nos	length	shape	Total length	Wt/m	Quantity (kg)
1	Footing (1x1)						
	Main bar 10 mm dia (straight)	6	1.14		6.84	0.591	4.042
	Distribution bar 10 mmdia	6	1.14		6.84	0.591	4.042
	Total						8.084
	No of footing	33					
	Net total						266.772kg

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LINTEL

SL NO	description	Nos	length	Shape	Total length	Wt/m	Quantity (kg)
1	LINTEL (W3)						
	Main bar 8mm dia (stirrup holder)	2	1.904		3.808	0.378	1.439
	Main bar 8mm dia (straight)	2	1.904		3.808	0.378	1.439
	stirrups 6mm dia	16	0.648		10.368	0.213	2.208
	Total						5.086
	No of lintel	6					
	Net total						30.516kg

SUNSHADE

SL NO	description	Nos	length	Shape	Total length	Wt/m	Quantity (kg)
1	Sunshade(W3)						
	Straight bar in 6mm @ y direction	3	1.868		0 4	0.213	1.193
	Straight bar in 6mm @ x direction	8	.0.869		6.952	0.213	1.480
	Total						2.673
	No of slab	4					
	Net total						10.7kg

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Staircase

SL NO	description	Nos	length	shape	Total length	Wt/m	Quantity (kg)
1	Stair						
	Main bar 12 mm dia @100 mm c/c	9	3.95		35.55	0.39	35.94
	Main bar 12 mm dia along slab	10	6.594		59.346	0.39	23.1449
	Distribution bar 8 mm dia 175 mm c/c	75	1.676		125.7	0.85	106.845
	Total						165.929
	No of flight	1					
	Net total						165.929kg

V. CONCLUSION

We completed our project report FIRE STATION at VATTAPARA with planning designing and estimation by using KMBR and limit state method of design. Necessary drawing like beam, column, footing etc. are included by our team to the best our ability. This project required the collection of data from various place and report is completed and no features have been omitted is specification have been taken into account where necessary the Kerala Building Rule have been studies and inserted necessary details. We should like to remark that we about to complete the project through mutual co-operation and understanding.

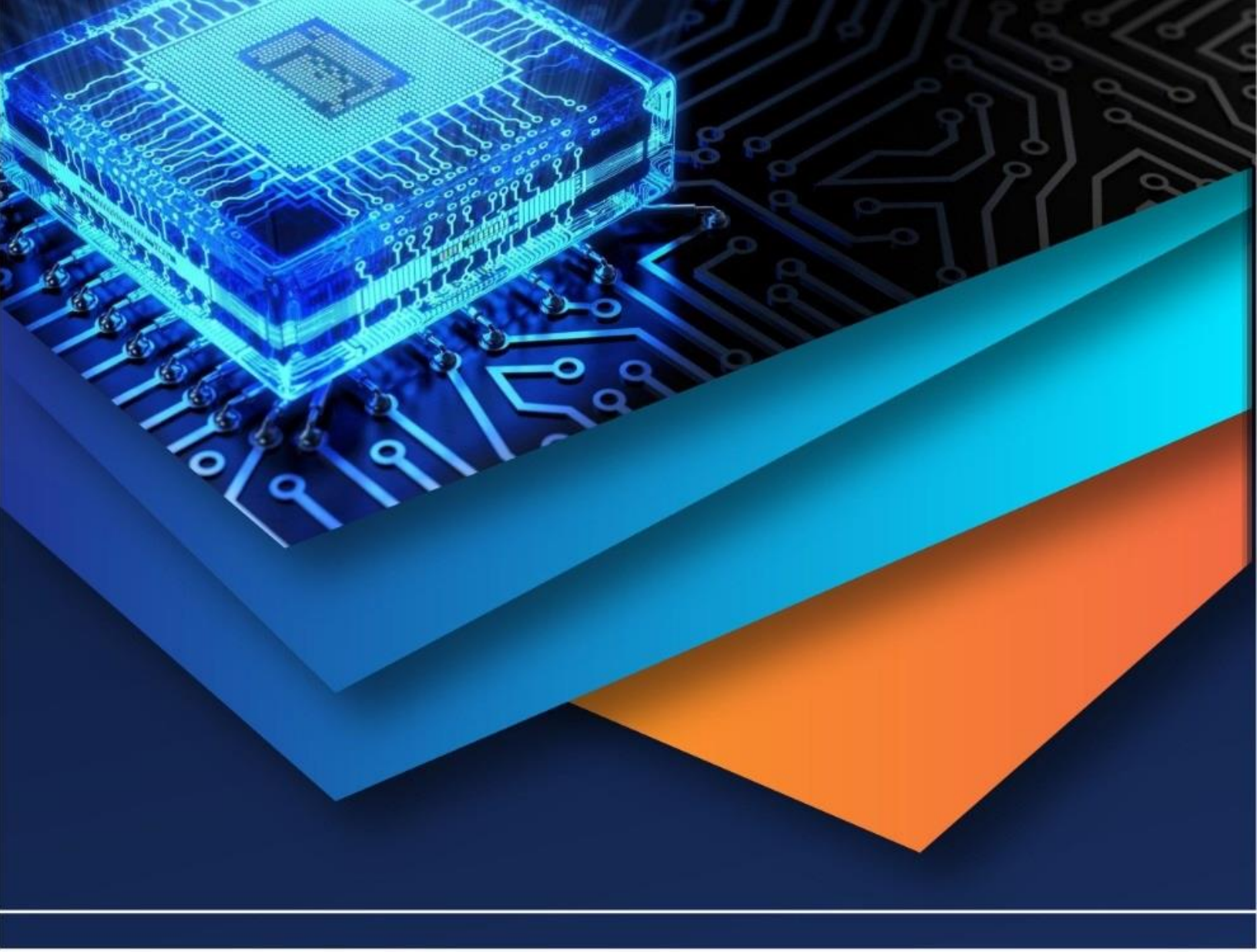
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REFERENCES

[1] Punmia, B. C, Ashok kumar Jain and Arun Kumar Jain, Tenthedn, “Limit state design of reinforced concrete structures”, Laxmi publications private Limit. New Delhi, 2003.
[2] IS: 875 (Part-I)-1987, “Indian Standard Code of Practice for Design Loads (other than earthquake) for Building and Structures”, Bureau of Indian Standards ,New Delhi,1997.
[3] IS: 875 (Part-II)-1987, “Indian Standard Code of Practice for Design Loads (other than earthquake) for Building and Structures”, Bureau of Indian Standards, New Delhi, 1997.
[4] IS: 875 (Part-III)-1987, “Indian Standard Code of Practice for Design Loads (other than earthquake) for Building and Structures” Bureau of Indian Standard .New Delhi, 1997.

[5] IS: 1893 (Part-I)-2002- Indian Standard- "Criteria of for Earthquake Resistant Design of Structures", Bureau of Indian Standards, New Delhi, 1997.
[6] IS456:2000 Indian Standard- "Plain and Reinforced Concrete –Code of Practice", Bureau of Indian Standards, New Delhi, 2007.
[7] IS: 2911(Part1/Sec 1):1979, "Indian Standard Code of Practice for Design and Construction of Pile Foundations", Bureau of Indian Standards, New Delhi, 1997.
[8] Kerala municipal building Rules, 2019.
[9] SP16:1980, "Design Aids for Reinforced Concrete to IS: 456-1978", Bureau of Indian Standards, New Delhi,1993.
[10] Unnikrishna Pillai. S. & Devadas Menon, "Reinforced Concrete Design", Fourthre print Tata Mcgraw –Hill Publishing Company Limited, New Delhi,2010.
[11] Vargheese, P.C, "Design of Reinforced concrete shells and Folded plates" ,PHI Learning Private Limited, New Delhi,2011.
[12] Vargheese. P. C, "Advanced Reinforced Concrete Design", Prentice –Hall of India Private Limited, New Delhi, 2008.IS 1875 Part 1 ,part 2
[13] KERALA MUNICIPALITYBUILDING RULES IS 456:2000
[14] WWW.CENSUS INDIA.COM



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