DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

THE CONSTRUCTION OF STAIRCASE AT GENTING MALL, GENTING HIGHLAND

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It is recommended that the report of this practical training provided

By

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Entitled

The Construction Of Staircase at Genting Mall, Genting Highland

Accepted in partial fulfillment of requirement has for obtaining the Diploma in Building.

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(PERAK)

APRIL 2015

STUDENT 'S DECLARTION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Bluebros E&C for duration of 5 months starting from 25 May 2015 and ended 9 September 2015. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a practical fulfilment of the requirement for obtaining the Diploma in Building.

Name	: Ahmad Kamal Ezany Bin Azizan
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ACKNOWLEDGEMENT

Alhamdulillah praise to Allah S.W.T for giving me strenght and health to finish my practical training this semester. A very special thanks for my project coordinator, Mr. Jeffery for accepting me for practical at Bluebros E&C. Also a thanks for my site manager Mr. Rosmizan Rosland and Mr. Hanim for all the knowledge and teaching me during my practical training and with their help my practical become success. Not to forget to my project manager Mr. Tong Kok Yih which is with his dedication teach me how to manage a construction and give a suggestion to write a report. A lot of thanks and appreciation to Bluebros engineer, miss Syakirin who always spend her time for me when she is needed.

I also would to thanks to all my UiTM's lecturer for their guide during my practical training especially to my supervising lecturer, En Mohd Reeza Bin Yusof who involved directly in my practical training for guiding me in report and also logbook. With his suggestion, my practical report was finish. A thanks to visiting lecturer, En. Dzulkarnaen bin Ismail, practical training coordinator, Pn Rizalinda binti Ishak and faculty coordinator Dr. Mohd Rofdzi bin Abdullah, without them my practical training wont be success.

Last but not least, a deepest thanks for my family who always support me in whatever I have do. A big thanks to my friends who always be with me and guiding me for writing this report. Thanks for all the sacrifices.

ABSTRACT

The aim of this project is Proposed Twentieth Century Fox World at Genting Highlands, Pahang Darul Makmur for Genting Malaysia Berhad.400,000 gallon reservoir structural Works including M&E Works. The aim of this report is to know a detail about the construction of staircase which is RC staircase. This is including to study all of the process involve during the construction starting from the setting out until it fully construct. This report also focusing on the problem during construction of the staircase from it causes and factor lead to it. Normally in shopping mall, straight flight staircase is widely use as it the most suitable one. It have all the safety characteristic and structural required to support a load and can safe for daily use. To construct a staircase it must consider safety factor, design, stability and abilty to stands a force applied to it. The type of the staircase is RC staircase which is reinforcement concrete staircase with in-situ concrete. It is for the sake of strenght since it use a grade C35 concrete with rapid hardening concrete. It is suitable for a cold weather place like Genting Highland. It is realible to study about staircase as it was constructed at a cold weather place.

TABLE OF CONTENT **PAGE NO.**

LIST OF TABLES

LIST OF FIGURE

LIST OF PICTURE

CHAPTER 1.0

PREFACE

1.1 Introduction

This report will explain about the construction of staircase which is one of the important structure in a building that transport people from one floor to another floor. This project was located at Lot 9574, 9575, 9576 and 17283, Genting Highland, mukim Bentong, Pahang Darul Makmur. There are several type of staircase which are spiral staircase, hellical staircase, L stairs, winder stairs and others. On this construction, straight stairs was used which is RC straight flight stairs. With the use of reinforcement concrete, it strenght and stabilty increase. Straight flight stairs as we know is widely use in shopping mall, so do here. It is economical, suitable and people friendly and safe for daily use.

1.2 Objective

The objective of this report is to study about the construction and installation of staircase at Genting Mall during my practical training this semester. This report conducted by these objective

a) To identify the types of staircase

b) To identify the process involve in construction of staircase

c) To identify the problem and solution of construction of staircase

1.3 Scope of study

The study conduted at lot 9574, 9575, 9576, dan lot 17283, Genting Highlands Mukim Bentong , Daerah Bentong, negeri Pahang Darul Makmur and under supervision of Bluebros E&C Sdn. Bhd.

This study strictly focus on the installation and construction of staircase at Genting Mall. Since the staircase was not fully finish construct here, it is realible to study and focus on this structure as it widely constructed in others building. the scope is focus on the process involve in construction of staircase.

Lastly, this study also focusing on the method of staircase construction at Genting Mall, Genting Highland in terms of process involve and it design that suitable for daily use with safety with the planning stage untill fully concreted.

1.4 Method of study

This report was conducted based on several method of study which are :

.

1.4.1 Interview

Interview is the esiest method used to get information as its give a direct information. As the engineer placed on the same office, interview seems to be the best way to comunicate and collect information from the engineer.

1.4.2 Observation

Observation come from most of time during the practical training as the permission were given to be on site almost of all the time. By looking the installation work, information collected.

1.4.3 Internet

Internet is the access to many information yhat widely used today. It provide many information such as maps, hybrid maps and satelite maps. Others, it also provide the information that wont be able to get during the pratical period

CHAPTER 2.0

COMPANY BACKGROUND

2.1 INRODUCTION OF COMPANY

The current market condition in construction industry is very competitive and as globalization continues to bring changes globally, the Malaysia Construction industry has since not being spared with escalating cost due to regional and global economic changes.

Hence, there has been competition among players within the industry to not only being expert at their field, but also adopt a service oriental approach toward client without compromising the highest quality, on time delivery and cost accountability.

In BLUEBROS GROUP OF COMPANIES, our key success factors is our experience hand on management team with proven track record and are able to deliver our work through a synergy approach partnership with our client. Our organization strives to provide solution to our client need and transform them accordingly to our client expectation. Our management team ensures a high level of professionalism and dedication toward to our commitment to our client.

BLUEBROS GROUP OF COMPANY has proven strength compatibilities and team work lead to its fast growing. Indeed, this has contributed to the national development.

BLUEBROS GROUP OF COMPANIES is continuously developing its potential creativity and innovation with state of the most technologies.

These efforts have brought BLUEBROS E&C SDN. BHD. into Malaysia government recognition by achieving CIDB "G7'. With our commitment and acknowledgement, we prove our capable of producing high quality services.

With the indication of Malaysia is on its prowl again in its quest to regain the impressive growth rates and emerge as an Industrialized Nation by the BLUEBROS GROUP OF

COMPANIES is readily positioning itself in the magnitude and state of art momentum to be the choice of the future.

2.2 Company profile

Bluebros group of companies was incorporated in June, 2008 with a paid up capital of RM 1, 000,000.00 and since completed numerous presetige projects and has strenghened in tranforming into a dynamic team of professional that is dedicated towards our undertakings.

The activities that BLUEBROS GROUP OF COMPANIES undertake include :

a) Design and built concept

b) Infrastructure works

c) Civil engineering works

d) Building works

e) Plumbing services

f) Supply of readymix concrete in Tanah Merah & Kuala Krai, Kelantan and Genting Highlands, Pahang

g) Rental of heavy machineries & scaffolds

h) Swiflets business

Table 2.1:Company profile

location	WismaBluebros No 28-3<jalan 8/23E Taman Danau Kota Off JalanGenting Kelang 53300 Setapak, Kuala Lumpur
Office Number	
Fax	
Email	Bluebros8888@gmail.com
Company manager	• Lam Kong Chin • Lam kong foo • Lam kong Yin • Lam Kong Loong • Lam Kong Tang
Class	A

VISION & MISSION

Vision

To be a solution provider to our client and to ensure client receive the highest quality, workmanship and satisfaction with value that beyond our clients expection.

Mission

On time delivery of our project to our client with most competitiveness cost. We strive continually to fulfill our mission by providing best performance, value justification as well as cost minimization to our client.

Quality policy

Management continues to strive for improvement and innovation to provide the best possible customer satisfaction.

Company moto

- We offer high quality workmanship the highest of professionalism
- We always seek for a better partnership with our valuable client, consultants
- We provide competitive cost with excellent services.
- We continuosly seek and include the latest in products, technology and material for our project.
- We committed to supply perfecting concrete quality and deliver on time to all our valuable client, consultants at all time.

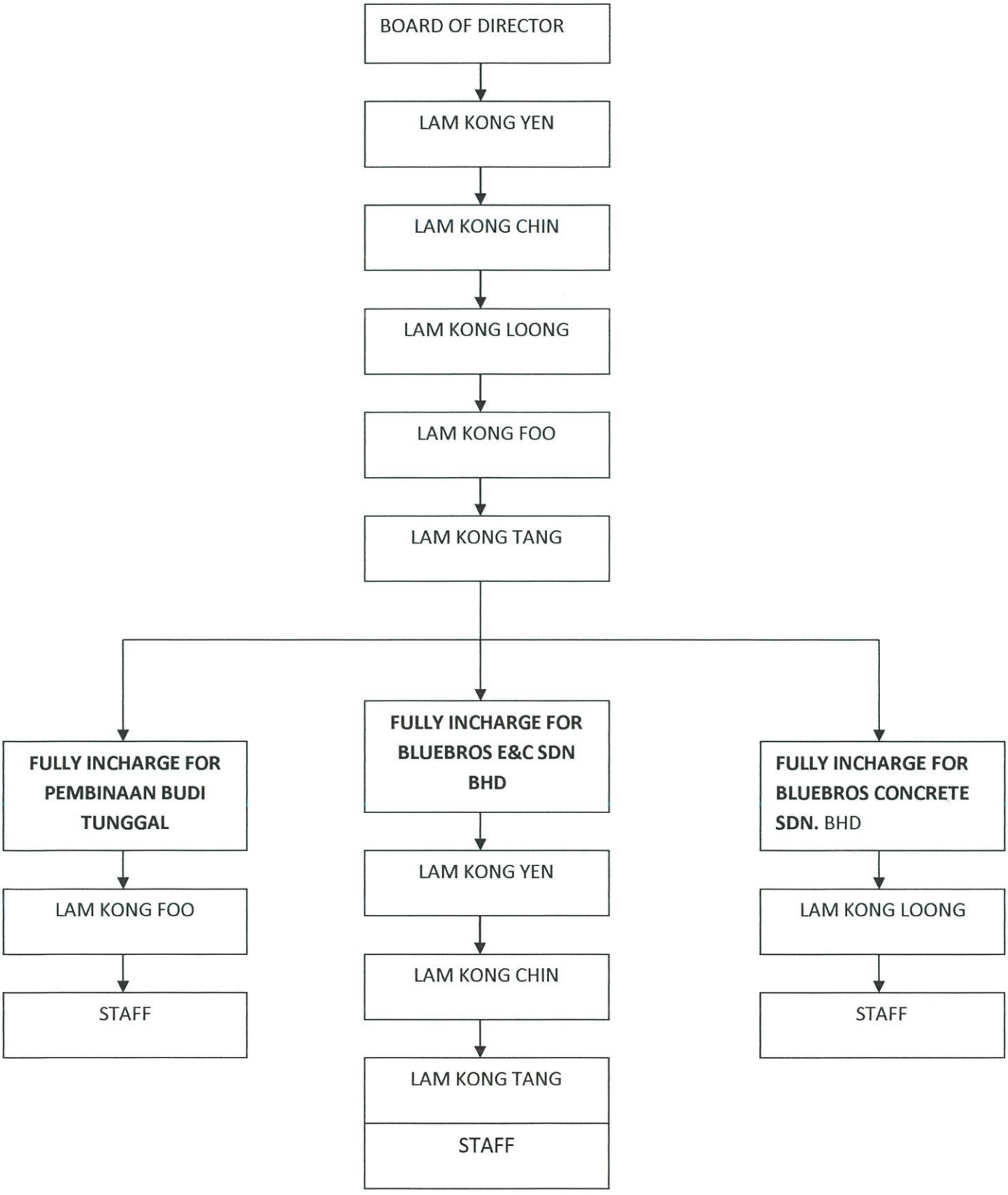
Bussiness registration certificates

- Business registration
  - Pembinaan Budi Tunggal Sdn. Bhd.
  - Bluebros Concrete Sdn. Bhd.

- Companies paid-up capital
  - Pembinaan Budi Tunggal Sdn. Bhd.
  - Bluebros E&C Sdn. Bhd

2.3 Organization chart

Figure 2.1 : Organization chart



2.4.1 Completed project

Table 2.2:Completed project list

NO	ADRESS	CONTRACT VALUE
1	The construction & completion (4 level of basement car park , 6 level of retail and 46 level of office) of the super structure main contract work of the proposed mixed development on lot 171 (lot c) at Persiaran KLCC , Kuala Lumpur for m/s arena MerduSdn. Bhd.	RM 5,660,459.00
2	Cadanganpengubahsuaiandalamankepadasebahagiantingkat 2 & 3 (grand ballroom) sediaada di komplekgenting hotel , di atassebahagian lot 9575 (50b) genting highland mukimbentong , Daerah Bentong , negeri Pahang DarulMakmur .	RM 2,654,776.00
4	Construction & completion of Helicopter Driveway Landing at Platform at Genting Highlands, Pahang.	RM800,000.00
5	Construction & completion of Convert Pavilion at New Gaming at Genting Highlands, Pahang. Demolition, Structural & Architectural Works	RM 18,000,000.00
7	Construction & complete of Proposed 2 storey Bungalow for at Taman Bukit Desa Kuala Lumpur	RM1,065,000.00
8	Construction & complete of Convert Grand Ballroom to Genting Club At Genting Highlands, Pahang.	RM 17,040,000.00
9	Construction & complete of Genting Hotel Main Lobby Renovation at Genting Highlands, Pahang.	RM1,300,000.00
10	Construction & complete of Patio Upgranding and Renovation at Genting Highland, Pahang.	RM1,500,000.00
11	CadanganTambahan "LandasAngkat" (Ramp) KeretaNaikTurunBaruKepadaTempatLetakKeretaBertingkat, Di Paras B3-B10, Komplek Hotel First World Sedia ada Di AtasSebahagian Lot 9575, 9576, 9577 Dan PT 12522, Genting Highlands, MukimBentong, Daerah Bentong, Negeri Pahang DarulMakmur. Super Structural Works	RM5,842,842.00

12	CadanganPengubahsuianDalamanRuangPerniagaan Maxims Sediaada Di Sebahagian Tingkat 3 &4, Komplex Hotel Genting Di AtasSebahagian Lot 9575, Geran 3629, Genting Highlands, MukimBentong, DareahBentong, Negeri Pahang DarulMakmur (private Gaming Suites @T3 Genting Grand Hotel) Demolition, Structural & Arch tactual Works	RM 2,528,965.20
13	Proposed new petrol station, workshop and rest area at Genting Highlands	RM 5,498,646.80
14	Cadanganpembangunan complex hotel 33 tingkat (2 Menara) dantamantemadalamandenganruangperniagaan di podium serta 11 paras sub-bes man yang disambungkankepadakomplek hotel first world sediaada di atassebahagian lot 9574, 9575, 9576,9577, pt. 12522 dan pt.2080/60, Genting Highlands, mukimBentong, daerahbentong, negeri Pahang darulmakmur (tower 3 and 4) Building demolition works (phase 2 : bus terminal, FW plaza, hotel entrance, link bridges, ETC)	RM 8,388,00.00

2.4.2 Project in progress

Table 2.3 Project in progress

NO	ADDRESS	CONTARCT VALUE
1	Cadanganpembangunankompleks hotel 33 tingkat (2 menara) dantamantemadalamandenganruangperniagaanserta 11 paras sub-besmen yang disambungkankepadakompleks hotel first world sediaada di atassebahagian lot 9574 , 9575 , 9576 dan lot 17283 , genting highland , mukimbentong , daerahbentong , negeri Pahang darulmakmur .	RM 849,253,891.90
2	Proposed Twentieth Century Fox World at Genting Highlands, Pahang DarulMakmur for Genting Malaysia Berhad. 400,000 Gallon Reservoir Structural Works including M&E Works	RRM 5,674,936.16

CHAPTER 3

CASE STUDY

3.1 Introduction of project

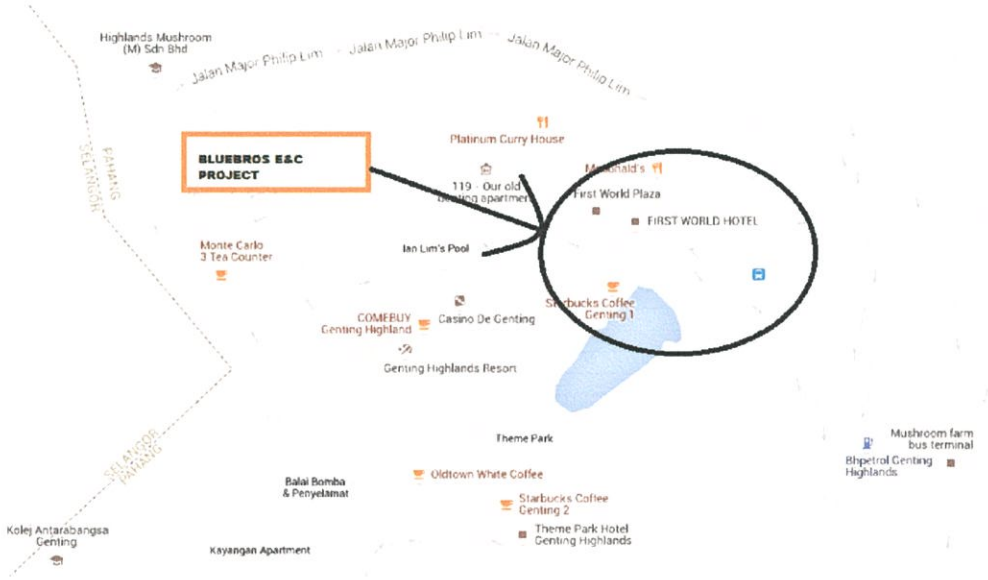
3.1 INTRODUCTION OF PROJECT

Picture 3.1 Site view of the project Genting Mall

Bluebros company is the excellent company in manage their company to give satisfaction to the client without compromising the highest quality. This company construct two project in the same time. First project is Cadangan Pembangunan Komplek Hotel 33 tingkat (2 menara) dan taman tema dalaman dengan ruang perniagaan serta 11 paras sub-besmen yang disambungkan kepada komplek hotel first world sedia ada di atas sebahagian lot

9574, 9575, 9576 dan lot 17283, Genting Highland, Mukim Bentong daerah Bentong, Negeri Pahang Darul Makmur. The contract value is RM 849,253,891.90. The second project is the proposed Twentieth Century Fox World at Genting Highlands, Pahang Darul Makmur for Genting Malaysia Berhad. 400,000 Gallon Reservoir structural work including M&E works. The contract value for this project is Rm 5,674,936.16. The first project was started on March 2014 until September 2016. Main contractor of this project is bluebros e&C Sdn. Bhd. The second project was started on 28th January 2015 until 3rd June 2015 and Bluebros E&C is still as the main contractor of this project. Genting Malaysia Berhad is the client for the both of project.

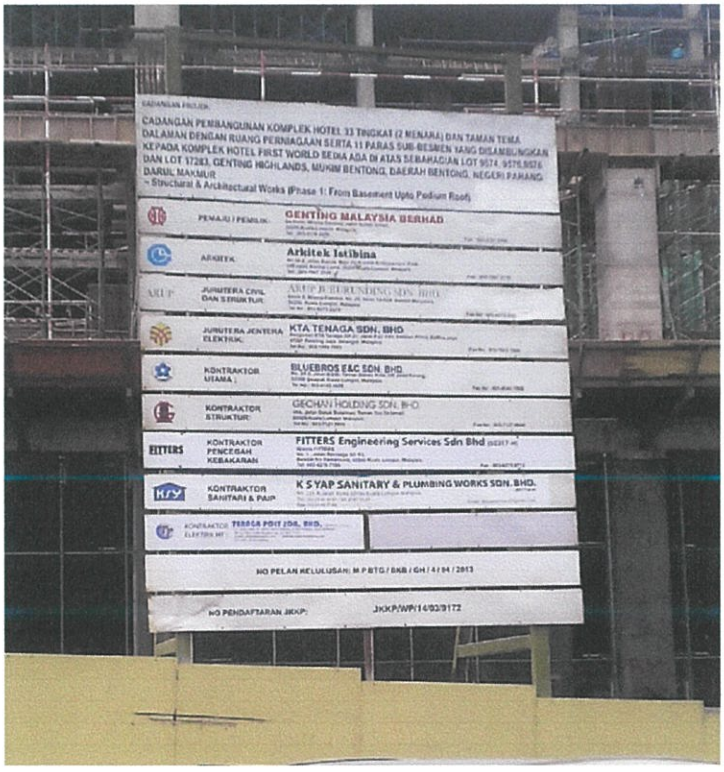
LOCATION OF PROJECT



Picture 3.2Location of the project

(sources: google map)

Picture 3.3: Layout of the project



Picture 3.4 Project signboard

PROJECT ORGANIZATION CHART

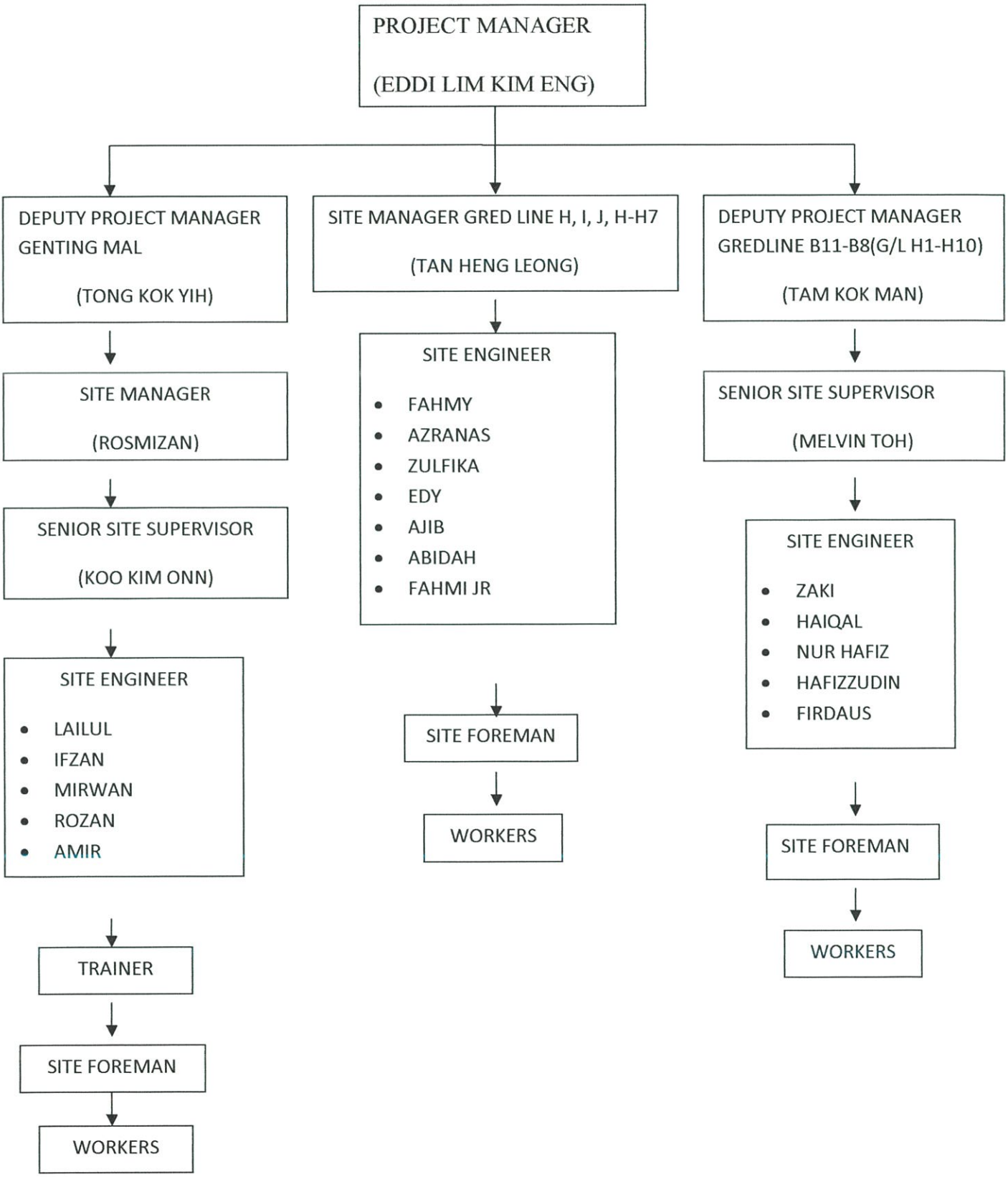


Chart 1 : Genting Mall Organisation chart

Source : Bluebros E&C

3.2 Case Study

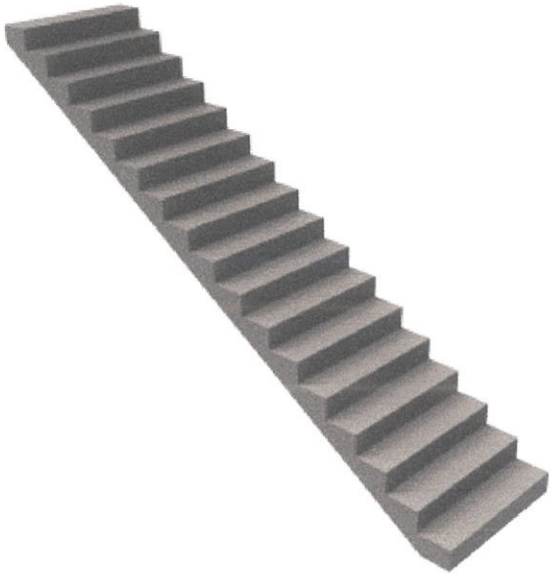
Nowadays, there are many ways to transport people from one floor to another floor. One of them is staircase. The main function of staircase is to get people from one floor to the next floor or lower floor. Staircase connecting between two floors by providing an easy access to people suitable with it function to transport people.

Designed like walking path, it provided with step to allow people walk on it. It was designed by Arkitek Istibina SDN BHD while the structural design was made by ARUP Jurunding which is Engineering Consultant. After both parties agreed with the design and calculation, it was submited to client and after approval from client the details and data was handed to the main contractor which is Bluebros E&C where the company that currently I train with. Designed with suitable for shoping mall purpose and load carried, the staircasewas straight flight staircase. Hence, all the staircase in this project woud be a straight flight stairs.

Straight flight staircase widely used at shoping mall as it economical and have enough strenght to support load forced on it including live load, dead load and moving load. The strenght of staircase was depend on the average load force to it. So the design for it beam, landing beam and column depends on the load to support. After several discussion, the staircase here not provided with column but stiffener. Stiffener is an alternative and effective way to replace column as the average load need to be support not too big. Besides that, the load more focused on the beam and landing beam, not the column. The stiffener have enough strenght to support the staircase and prevent it from collapse.

3.2.1 Type Of Staircase

Straight stairs



Picture 1.0 : Straight flight stairs

Source : http://www.ustudy.in/node/2806

Straight stairs are certainly one of the most common types of stairs found in both residential and commercial properties.

Advantages of straight Stairs:

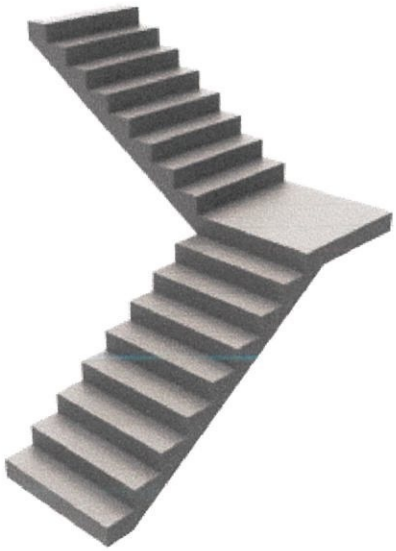
Straight stairs tend to be the easiest to go up and down or ascend/descend as said in the industry. They are typically the easiest to build however this depends allot on the level of detail in the design. Straight stairs only need to be connected at the top and the bottom (no intermediate supporting structure is required). It work well with minimalist designed homes due to their inherent simplicity. By selecting thinner treads, open risers and thin metal stringers, straight stairs can be made more transparent than other types of stairs allowing less obstruction to the view beyond. No landing is required if the number of risers are kept under 16 or the overall vertical height is less than 12 feet.Its relatively easy to build railings and handrails for straight stairs.Measuring for railings is simpler also. (https://www.keuka-studios.com/types-of-stairs/ , 2013)

Disadvantages of straight stairs

Straight stairs use up a fair amount of linear space which has to be planned for in your design.Some of the other stair types create a privacy barrier between the floors of your home. Straight stairs do not offer this privacy.A stair 12 feet high requires a landing to break up the span. The addition of a landing will use up allot more space and therefore these types of stairs are seldom used in residential construction. You will see these more frequently in large commercial buildings.(https://www.keuka-studios.com/types-of-stairs/ , 2013)

L Shaped Stair

The L shaped stair is a variation of the straight stair with a bend in some portion of the stair. This bend is usually achieved by adding a landing at the bend transition point. The bend is often 90 degrees, however it does not have to be. If the landing is closer to the top or bottom of the stairs it is sometimes referred to as a long L stair.



Picture 1.2 : L Shape stairs

Source : http://www.ustudy.in/node/2806

Advantages of L shaped Stairs:

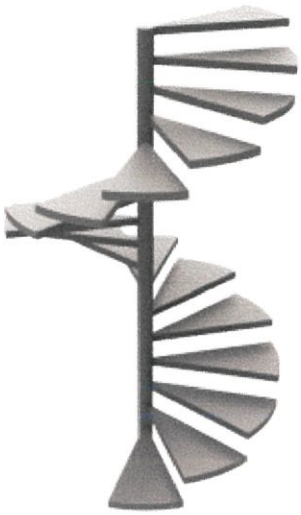
L Stairs can be more visually interesting. It provide a visual barrier between floors so they can add some privacy. Also L Stairs can help somewhat with sound transmission between floors if the stairs are contained within walls. Some believe they are safer than straight stairs as the central landing reduces the number of treads one could fall in a given flight. The landing can provide a place to stop and rest while ascending.They can be located in a corner of a room if this works better for your design.

Disadvantages of L shaped Stairs:

L shaped stairs are a bit more difficult to build.A support is typically required for the landing in a L type stair. Often this is built into the surrounding walls so it goes unnoticed. In modern dwellings however it is usually desirable to open up the space leaving the stair structure visible. In these cases thesupporting structure can bevisually minimized by taking advantage of the strength of steel to create slim supporting members. Through careful engineering,it is possible to eliminate the landing support all together. Handrails for these types of stairs require more skill and planning to construct.In climates where basements are used, stairs are typically stacked over each other for efficient use of space. Since basements are often used for storage, large items can be difficult to move in and out of the basement. (https://www.keuka-studios.com/types-of-stairs/ , 2013)

Spiral Stairs

Spiral stairs are a often confused with curved stairs. Although, both types of stairs follow a helical arc (like the shape of a spring), spiral stairs usually are made very compact and the treads radiate around a center pole.



Picture 1.3 : Spiral stairs

Source : http://www.ustudy.in/node/2806

Advantages of Spiral Stairs:

One of the key advantages of spiral stairs is their compactness. They are very popular on beach front decks where space is at a premium. They are also used extensively on city lofts for the same reason. Spiral stairs can be attractive and there are may variations on railings styles which can have a major impact on the overall appearance of the stair. Since the center pole and landing typically provide the structural support for the stairs, they do not need much in the way of extra support structures making installation easier than many other types of stairs.

Disadvantages of Spiral Stairs:

Spiral stairs are more difficult to navigate than other types of stairs. It is for this reason that codes do not allow them to be used as the primary access to a full second floor of a home. Walk ability improves as the outside diameter gets larger so if you have the space, you may want to consider going a bit larger. It is recommend going 5 feet in diameter if you can. It is difficult to carry large items up spiral stairs. Only one person can go up or down the stairs at the same time. (https://www.keuka-studios.com/types-of-stairs/ , 2013)

3.2.2 Setting out for staircase

On the early stage of the construction, work started by sureveyor who mark and measure the distance for staircase also the rise of high. Most of staircase here not bear on cassion pile or column, it stands on slab and beam and for the landing and flight was supported by stiffener. The tools used by surveyor was tape, theodelite, and reflector.

Picture 3.5 : Theodolite

This one is the most used by surveyor to take a level or make a transfer level. It supported by tripod which is its leg. It also provided with buble level to make it horizotally straight.

Picture 3.6 : Surveyor on work

3.2.3 Formwork for staircase

Before the installation of formwork, the staging and scaffold must be done first. So, scaffold works done by carpenter and sometimes by general labour. The installation of scaffold and staging must follow the mark that had be done by surveyor for the height, distance of flight and landing.

Prop in staging installation :

a) Hollow section

b) Scaffold

c) Jack base

d) U base

e) Jointing

Picture 3.7 : Stagging work

In case if the staircase was construct on a void, a safety barricade must be install first for the sake of safety. A carpenter will guide his worker during the stagging installation. The stagging normally made by hollow section, indeed the hollow must be on good condition as it will act as the main stage to sipport the load during construction of staircase.

Picture 3.8 : Mark made by surveyor

After staging installation is finish, scaffold will be install for landing and flight platform. This work need a strict monitoring and guiding work by supervisor or person in charge as it affect the rise of the flight and the level of the landing.

Picture 3.9 : Formwork for staircase

The scaffold come with jack base as it foot to suite the hollow section for grip purpose and prevent it from collapes. For the jack base, it high must not exceed 450mm as stated by safety department. This is realiable because if the heigh of jack base increase, it tend to bend when force applied to it and soon it will collapse.

Picture 3.10 : stiffener formwork

The formwork for stiffener must be proceed with only 3-sides first. If it fully proceed with 4 sides, there is no space to install the bar soon. The verticallity of stiffener need to be check

before beam and slab can be proceed. It is because if the stiffner not in verticallity, it have a potential to collapse soon and the design will look ugly. Normally, verticallity frequently asked to check by architect. It for the sake of design and soon it will affect the whole design.

As the staging and scafflod finished, formwork installation take place. Formwork work done run by carpenter with supervision of supervisor or person in charge. There are two types of formwork which are wood or steel. In this construction, wood formwork is widely use here. Only certain structure use steel formwork such as base for tower crane and cable car platform. Hence, the normal structure like column, beam, slab, staircase and others made by wood. The formwork will be made by :

a) Plywood

b) 2x2 hard wood

c) 2x3 hard wood

d) Nail

e) Water-proof plastic

The formwork will be made by certain objective and qualification :

a) Waterproof

b) Can be reuse

c) Strenght to support the load

d) Have a flat surface inside

Waterproof

The formwork must have waterproof to the wood. It is to avoid any water or liquid affect the formwork or else the forwork absorb the water and damage the quality. It also to avoid water absorb and affect the concrete strenght during concrete casting process and curing process.

Can be reuse

Normally, one formwork can be reuse up to 2 – 4 times. It is for the sake of economical and reduce the time to make a new one.

Strenght to support the load

Formwork use to give a shape to structure that to be concrete. It support the load of concrete until the concrete hard. Hence, in the period until the concrete hard, it need a sufficient strength to support the load forced to it.

Picture 3.11 : Formwork for staircase

Picture 3.12 : Formwork for steps

Picture 3.13: Plywood supported by a 2x3 wood

This formwork had enough strenght since it complete it specification which is a plywood must be supported by a 2x3 or 2x2 wood.

Flat surface inside

The propose of structure need to be flat and clean surface. Hence, formwork are designed to give a clean and flat surface inside it. It use playwood in the inside and have a support as "bone" by using 2x3 and 2x2 wood outside of it.

Tool and machine to make formwork :

a) Jigsaw

b) Nail

c) Hammer

d) Wood cutter machine

3.2.4RC Bar Installation

A bar installation work run by a bar bender here. Type of steel use is R type or T type which is high tense steel. For staircase, it use T12 for all the structure except for it stiffener which use T25.

The installation of RC bar will follow the details provide to main contractor and sometimes it change due to client need or structural factor. The work conducted by one skill labour and be helped by 3 or 4 general labours. The works including a bar bending work, arrange for distribution load, lapping and spacing work. All lapping for RC bar must follow the formula of 40D (D = diameter) and in any case of bar lapping with different size of bar, the 40D aplied to the bigger size bar. For example, T12 bar lapped with T25, so for the lapping needed must be 40(25).

All work including bar here use in milimeter (mm). Normally, it takes 1 – 3 days to finished the bar installation work. If the bar in rust condition, it need to be brusg firt to remove it rust metarial. If the rusted bar proceed for the installation, it need to be open back to change with new one. A rusted bar lost it strenght in a many years soon and drive to structure failure.

If the staircase currently construct at lower floor and soon to be construct at next floor, a starter bar must installed. It is a important thing because if the starter bar not installed, soon a lot of work to do to install it. The work including drilling work which is complicated and wasting time.

3.2.5Cleaning process

Before have a permisson to cast, the staircase need to be clean to remove unwanted materials and dust in the formwork. It cleaned by using air blower. In case the dust trapped in beam, a hole need to be make to allow the dust flow out and close it back when finish. Normally, it be done by 2 general labour, one of them control the pipe and the other one clean all the obstacles.

3.2.6Inspection with consultant

After all the work are finish, supervisor or person in charge appoint consultant to come and check. Them are engineer, architect and mechanical & electrical (M&E) consultant. But before all these parties come to inspect, safety supervisor will come first to check the staging and scaffold if it safe or not. If the permission was given by safety, other parties come and inspect for their part.

Since all parties had inspect their part, Request For Inspection(RFI) form signed by consultant. Means, the next process can be proceed which is concrete casting process. In case the inspection was failed, something must to be fix with consultant order. Normally there was mistake in RC bar arrangement, size and lapping. It need to be fix in a certain short period. After correcting work, consultant will come again to inspect.

3.2.7Concrete casting

The concrete work done by a concretor. For staircase, about 5 – 7 worker involved with supervision of supervisor or person in charge. For the concrete, all staircase in Genting Mall use gred C35 concrete with rapid hardening concrete. It is suitable to use rapid hardening concrete here because of cold weather and sometime lack of sunlight due to fog. There are certain type to concrete a staircase here and it depends on the location and easiest way to work it.

Staircase can be cast by using :

a) Static pump

b) Elefant pump

c) Tower crane

d) Mobile crane

For the saircase here, all method of cast had be done before except for mobile crane.

Static pump

A pump with a high power and pressure to pump the concrete through it pipe. This machine must be connected with it pipe which can be connect easily. The pipe are seperated with each other. This machine can pump a concrete up to 20 storey high. This machine was handle by two skill workers which arrange everything about the pump and the installation of pipe. Each pipe distances to 3m lenght and jointed each other with pipe lock.

Type of pipe :

a) Straight pipe

b) U pipe

c) Straight flexible pipe

Elephant pump

Elephant pump was catogorise as heavy machinery. It is the smartest way to concrete a staircase because it easy to handle can reduce a workers energy during concrete casting process. Its pipe lenght is about 38m can reach the target easily. It was control by a single operator with help of his assistant/signalman.

Picture 3.14 : Elephant pump

Picture 3.15: Elephant pump

But this machine must be provided with easy access to park and enough space to pull out its pipe.

Tower crane

Usually the last choice machine that use to concrete a staircase. As known, tower crane is a heavy machinery. All tower crane here can bear a load up to 3 tonne. This machine will be hook a buckect to it lump. There are two types of bucket here which can carry 0.5m cube and 1m cube.

Picture : 3.16 : Tower crane

Picture 3.17 : Concrete bucket

During concrete casting process, all workers have their own specific work including pouring, even concrete, controlling the pump and vibrate to make the concrete flat.

Tools and machine used during concrete:

a) Vibrator poker

b) Trowel

c) Groovers

d) Hands float

Picture 3.18 : Vibrator poker

3.3 Problem in staircase construction

There are certain problem during the construction of staircase in Genting Mall here. The problem including from the early stages untill it fully concreted. Some of these problem can be avoid and some of them cant. The problem mostly come from workers and a bit from an accident in site. The problems are :

a) Drawing and details error

b) Unskilled workers

c) Planning

d) Accident

3.3.1 Drawing and details error

This problem came from misunderstanding and miscomunication between engineer and person at construction site. Sometimes, drawing and detail are changed due to a certain factor but person in charge or supervisor are not informed about it. So the current staircase on construct need to be reinstall and follow a new details provided.

The other one is details that writen by hand and not too clear. In case the area are put on critical area means it need to be focus and finish it first, the drawing and details yet not be provided by consultant, main contractor's engineer draw it by themself or follow typical lower flight of the staircase. For the sake of time, the detail and drawing drawed not too clear and sometimes it confusing

3.3.2 Unskilled workers

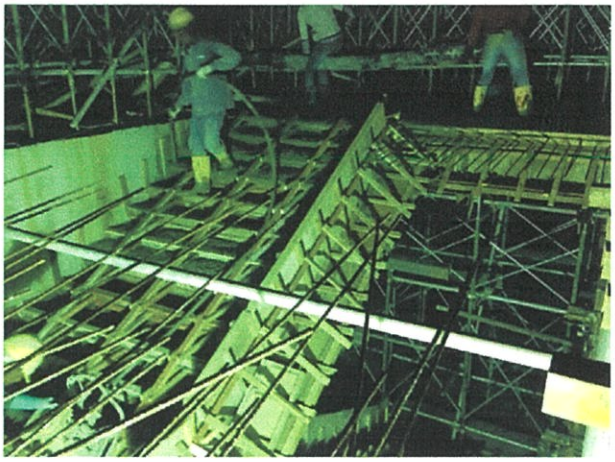
This is the most problem during the construction of staircase. There are many case that staircase need to be reinstall because of error in formwork work and mostly it comes from landing beam and it stiffener. They did not follow exact drawing and frequently construct wrong size of landing beam and steps.

Picture 3.19: Wrong size of stiffener need to be open

It very difficult and wasting time to reinstall the staircase that the formwork had finished and be locked. This problem continuosly happen if workers cant read the detail of drawing very well.

3.3.3 Planning

Planning is an important factor need to be consider in this construction as it all start with planning work. Usually, there is not many problem with scheduling and estimating time to construct a staircase, mostly it comes from concreting planning. In certain case, it is hard to concrete a staircase because there is no space for access concreting machine for example there is no access for pipe to reach a staircase due to scaffold stand around it.



Picture 3.20: Scaffold around staircase area

This problem lead to delay of work time. Normally its only took 2 – 4 hours to finish the concreting work. It would be difficult to install a pipe between a scaffold due to lack of space. It normally a clash and misunderstanding betweeen supervisor. They cant deal with each other to make a way for concrete pipe to reach the staircase.

3.3.4 Accident

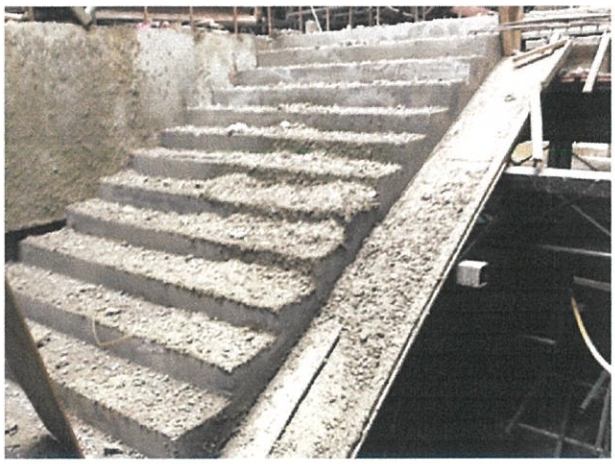
Accident is widely happened in construction work. There are many type of accident which is accident to human, machine, structure and others. In this case it happen to structure with failure of machinaries. Machinaries with lack of mentainence tend to drive a problem around it.

Picture 3.21 : Excavator accidently hit staircase

this excavator was accidently hit the staircase cause it roller chain was slide-out from it roller. It is clear that this excavator have a problem and need a maintainence but it still on site and frequently used.

Picture 3.22 : Staircase were hitted

This one cause a waste of material (wood) to make a new one and also a cost to repair a machine. It also delay a time when it near to fully finish and can be concrete, hence a lot of work to do including report, safety aspect, rebuild and mentainence.



Picture 3.23: Concrete poured from upper floor

This problem come from a concreting machine, spider machine. It accidently explode and concrete blasting anywhere. Since this staircase was exposed, it take a hit.

Picture 3.23 : Spider machine broken

In other word, a maintenence is important for machineries to avoid unwanted situation and case happen. There are lot of benefit if construction free from accident.

Solution

There are several solution for those problem stated. They are :

a) Work ethics

b) Working skills

c) Technical skills

Work ethics

Mostly the problems came from weak work ethics. Lack of diciplines tends to multi error during work for example delay a work and ect. With an enhancement from work ethics the quality of work increased and became more productive.

Working skills

Labours is an important workers in site project. The lack of skiled worker just ruined a quality of work including every aspect. Employer need to reqruit a skilled and experienced worker to boost their work productivity. The skill required including :

a) skill to conduct heavy machinaries

b) skill in their specific work

c) diciplines

Technical skills

This one required more to staff as error from staff lead a continuos problem to the site. Staff and employer should know basic skill in computering, drawing and communication. These components enhanced the quality and productivity of the organization. The most problem came from drawing and computering errror during draw a temporary plan or details.

CHAPTER 4.0

CONCLUSION

In conclusion, straight flight staircase is the most suitable and easiest staircase to be construct at a shoping mall where is people widely use with different age and gender. It is not like spiral staircase which complicated to construct and not suitable for daily use in shoping mall. The decison to construct a stiffener also realible as it have enough strenght to support the load to replace column which is need higher cost.

Finally, it is safe to say that straight flight staircase suitable, strong and safe to construct at a shoping mall and the method is not too complicated.

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APPENDIX