

Wall construction of single storey residential buildings construction essay



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This finding is to determined the different types of wall having its own uses for certain factors. Wall construction contains of various types of method used , it maybe not straightforward as one using one of the more common construction methods. Walls is constructed in many different form and of various materials to achieve several functions. There are many different types of wall with its own functions ; exterior walls and interior walls or either load-bearing wall and non-load-bearing wall. Walls are often included doors and windows , which are exists for controlled passage of environmental factors and peoples through the wall line. There are many types of materials can be used for wall construction, for example stone, rock, wood, clay, cement, brick, thatch and glass. Different type of wall needed different material to achieve its main supporting function , and also others reason as well.

LIST OF FIGURE, TABLE AND ABBREVIATIONS :

List of figure

download (1). jpg

Brick

Brick is a single block which is very commonly used in construction material. It is made up by the clay. Many pieces of bricks will make up a wall,

aggregate57. jpg

Aggregates

Aggregate is a composite material that normally used in the construction material. It is also used to become mortal with the combination of cement and fine sand.

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Cavity wall

Cavity wall is a wall that consists of one layer of insulation between the brick outer leaf and the brick inner leaf. The main function of this wall is that it provides insulation that prevent heat losses. It is very suitable for the country which has 4 seasons like United Kingdom.

brick wall. jpg

Brick wall

Brick wall is the wall that made up by the brick and mortal. It's main function is that it provide a layer of protection which separate the outside area and inside area of the houses. This wall is normally can see in our country.

running_bond. jpg

Running Bond

It is also named as stretcher bond which is the most popular bonding in Malaysia. The style is referred to as running, create a straight line between the brick. One of the benefit is this bond is that there is no need to use header bricks. The structure is usually connected with wall ties and understood to be a cavity wall bond.

CHAPTER 1.0 :

Introduction

BCEC1104 Material and Construction course ask us to do some overview of material and construction for building structures and elements. Their objectives or aims are to gain knowledge on construction of building structures and elements theoretically as well as attain practically. It also to gain a better understanding on justifications of usage different materials and to be able to link and integrate with all disciplines, fields and related requirements of construction engineering with regard to buildings.

Besides, there are many study benefit that we gain through completing this assignment. That is because we are asking to prepare an item as follows for single storey residential buildings. As our case studies is a single storey residential building, so we just focus on the elements of that buildings. Due to the requirement of completing this assignment, we now know and well known all about wall. For example, we know what the common types of wall used in Malaysia. We can differentiate what the common types of wall used in Malaysia and other country. Because, one of the design factors of walls construction is based on the weather. Basically, each country has different types of weather. Besides, we also know the types of materials used and the design factors of wall construction. In addition, through this assignment, we are well known about the walls construction method according to materials used. The best moment is when we are asking to make a scale model of single storey residential buildings. It makes us easier to gain our understanding about common types of walls, its elements and the materials

used because they want us construct a scale model that exactly showing the construction of these three requirements.

CHAPTER 2.0 :

Building Biodata

Our case studies is a single storey residential buildings at Lot 320, Kg Serdang Permai, 31300, Kg Kepayang, Ipoh, Perak Darul Ridzuan and it was a hometown of one of our group members which is Nur Dania Azira Binti Azizul. This residential building plan has been designed and drawn by Mah Kwai Kuen on 13th January in 1987. He certify that the plans are submitted in accordance with the street, drainage and building act 1974 and uniform building by law (UBBL) 1984 and accept full responsibilities accordingly. Mah Kwai Kuen is a building draftsman that registered with Architects Malaysia Board. This residential building has been approved by Yang Di Pertua Majlis Daerah Kinta Barat Batu Gajah on 30th April in 1982. It is a single storey residential building at No P. T. 320, Mukim Sungei Raya, Daerah Kinta. The owner of that residential building is Mr Mohamed Shafie Bin Ismail which lived at No 608, J. K. R. Quarter, 31800, Kampar before the construction.

The chronological development has been stated in the plans given by Mr Shafie. Firstly, all brick wall to be in cement mortar 1: 3 and reinforcement concrete to be in 1: 2: 4 mix. Secondly, glazed pipe have to be jointed with cement. Thus, joints in cast iron pipes must be made with molten lead over a gasket of packed yarn and men holes and inspection chamber should be grease sealed. Next, the inspection chambers must be bended render and corner rounded off. After that, the ends off tipper must be supported on

bearing fixed, brass fixed with oiling cups. At the same time, all inverts of manholes and inspection chamber are must be built S. W. G. half round channel and all manholes inspection's covers and frames must be in standard municipal type. Mosquito proof conv. covers to inlet and outlet tee pipe should be provided while all sanitary appliances pump and mortars should be of the approved types by the council. But before commencement of works the sources of supply of C. I and S. G. W, pipe must be submitted to the council together with sample of these pipes for approval. All pipes must be of an approved brand and made complying relevant British standard specifications and manufactures by the approved manufactures. In addition, elect - mortar pump must be provided with auto float switch and all M. H covers must be 18" - 24' iron grease sealed typs. Lastly, all sanitary appliances shall be provided with proper trap.

CHAPTER 3. 0 :

Building Elemental Construction

F: DCIM102AZMIRbuilding element drawings. jpg

Figure 1. 1 Show the wall construction drawings of case studies.

F: DCIM102AZMIRdetails drawings. jpg

Figure 1. 2 Show the wall construction details drawings of case studies.

Building & Element Construction Process Explanations & Elaborations

As we know, wall is the structures constructed to enclose and area, to support floors and roof or divide the floor area of a building into a required

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number of rooms. Building construction process is activities done on construction site. Building construction process usually started with site clearance, earthworks, setting out, substructure, superstructure, finishes, services, external work and lastly is completion. However, site activities are different according to site location and topography and also the type of building.

Building construction process can be divided into five parts. The first part is site preparation. While doing the site preparation, usually they will do some clearance, earthworks, site marking, hoarding, dewatering, temporary building and also temporary road. Thus, the second part is sub structure. While doing the sub structure process, they usually will do the piles, foundation, ground floor slab, ground beam and column stump. Next, the third part is super structure. While doing the super structures process, they will make a frame, upper floor slab, walls, roof, doors & windows, finishes and utilities. Then, the fourth part is services. While doing the services process, they usually do the process of sanitary, cold water supply, air conditioner and also fire fighting. Lastly, the last part is external works. While doing the external works, they will do the roads, car park, drainage, fencing, truing and landscape.

Based on everything mentioned above, the element which is wall is an element that made in the third part of construction process. The third part of construction process is super structure. This means that wall is an element in super structure process. The construction process of each wall is different according to the types of wall itself. For solid bricks wall, it is made from clay or sand plus lime. Each bricks will be arranged in a wall or column. It is called <https://assignbuster.com/wall-construction-of-single-storey-residential-buildings-construction-essay/>

as bonding. The purpose of bonding is to obtain maximum strength, ensure the lateral stability and to be an acceptable appearance. There are many types of brick bonding. Take for examples are English bonding and Flemish bonding. Solid wall of brick or block work usually has an inside finish of plaster. The external face is often rendered or painted to prevent rain and moisture penetration.

Another type of wall is solid blocks wall. It has no specific size but more than bricks size. It is made from pre-cast concrete and it is suitable for external walls. For cavity walls, it is a better thermal insulation and weather resistance. It is been constructed by two leaves of a cavity wall are tied together with wall ties. The outer leaf normally is brick. While the inner leaf of brick or block work, usually with a plastered finish. The partial cavity is fill insulation. Some walls may have no insulation or may be fully filled. Thus, for parapet wall, it is a low wall projecting above the level of a roof, bridge or balcony. It is used to form a guard or barrier at the edge. Other than these is curtain walling. For this type of wall, it is lightweight non loading bearing. In the low rise buildings, it is use timber or patent glazing. However, in the high rise buildings, it is use steel or aluminium alloy. The last one is retaining walls. It is act as an earth retaining structure. CHAPTER 4. 0 :

Wall are designed and constructed in many different form and of various materials to achieve several functions. There are many different types of wall with its own functions ; exterior walls and interior walls or either load-bearing wall and non-load-bearing wall. Walls are often included doors and windows , which are exists for controlled passage of environmental factors and peoples through the wall line. Nowadays, modern building wall including bearing and <https://assignbuster.com/wall-construction-of-single-storey-residential-buildings-construction-essay/>

curtain wall as a combination of both in response to the construct the needs of buildings as a whole. Both types may appear similar when complete but their sequences of construction usually not.

Exterior walls used to protect the building from external environment and accidental factors or effects such as climate changes , fires , ultraviolet radiation , bacteria and virus , dust and sound , by considering the desirable interior environmental conditions. These walls are usually a load-bearing walls and always constructed to be tough and strong enough to resist the horizontal and vertical forces impose upon them safely , which is as defined by building codes. A load-bearing wall not only supports its own weight within a building , but also supports weights of other parts of the construction which is usually placed at the strategic points within the structure in order to supports a ceiling , roof or the others building elements , for example like floor joists or ceiling beams which many types of buildings make use of those 2 elements to produce a large degree of strength to the spaces , it willl considered to be not enough for any building that occupies an appreciate amount of space. So , a load-bearing wall is gauged to appropriate thickness to carry the weight above them , if not its possible that an outer wall could become unstable state. If the load exceeds the strength of material used , potentially causing to collapse of the structure of building. Even a small space of not more than thousands square feet will be largely enhanced by the existence of a bearing wall to help to support a stable roofline and augment to the stability supported by joists and rafters. If without a bearing wall , the structure is likely to collapse or weaken at a speed up rate. Ceiling beams and rafters will slowly weakens from the raised

stress , leading to a weakened ceiling and roof that is less likely to resist to strong blowing winds or storms. In the case of a doubled storey building , without the exist of bearing wall placed on the first floor will almost guaranteed that the flooring for the second storey will be weaken eventually and very fast. Therefore , exterior walls normally construct with concrete , block or brick to provide a stronger grip between the structures of building. The alterations of a load-bearing wall can be made is also limited , it may required the placement of temporary supports for certain types of remodelling those construction or renovation projects. A bearing wall does not must have to be a solid expanse of wall. Walls of this type can include doors and others openings such as windows and vents. Additional framing built to it. When renovate or reconstruct the interior home or other building, it's necessary to identify the supporting wall of the building. If at all possible, movement of walls should be restricted to any part that determined to be non-bearing wall. If the new renovation or construction does call for removing a bearing, caution steps should be taken to shove up the structure until a newly placed bearing wall is put into a place and support system for the structure is restored to full efficiency. In housing, most common used in light construction method known as platform framing and each load-bearing wall lies on a wall sill plate which is match to the lowest base plate. The sills are connected and assemble to the masonry or concrete foundation.

On the other hand, interior walls normally used to separate rooms in a house or building. Interior walls usually are not load-bearing walls. This type of walls are support only themselves , it might run perpendicular to the floor and ceiling joists , it will not be aligned upon support beams , for example

partition walls is a type of non-load bearing interior walls. A non-load bearing wall can be altered or even removed completely without weakening the structure of the building. Most of the material used for the elements of interior building have to be safe, and should be compatible with the lighting schemes which can produce a comfort and harmless environment for occupancy. Besides that, the ways to construct and the type of materials used for interior construction or renovation should be easy to maintain well and keep it from clean. Interior walls commonly may construct with blocks or bricks from clay , reinforced or hollow, terra-cotta or concrete, sometimes glass blocks may also be used for certain visual purposes. Other than that, timber is also been used for partition walls which consists of wooden framework either supported on the floor side walls or below.

Bearing wall construction may be masonry wall, cast-in place wall or precast reinforced concrete wall, stud and sheathing wall and composite type's wall. Bearing wall must be erected before supported building component above can be built. Meanwhile, curtain wall including lighter versions of those used for bearing walls. These walls also comprise the combination of ceramic-coated metal panels, glass panels, or corrugated metal sheets, each laterally supported by light sub framing members. Since it receives vertical support by spandrel beams, or relieving angles, at the wall line, the curtain wall can be built after the building frame is completed.

Among these types of walls , the commonly wall used in our buildings is masonry wall , reinforced concrete wall , stud and sheathing wall , prefabricated wall , glass , metal or ceramic-coated metal panel wall and tilt-up wall. Masonry walls is one of the traditional type and now commonly used <https://assignbuster.com/wall-construction-of-single-storey-residential-buildings-construction-essay/>

in most wall construction of buildings. It is kind of durable form of wall construction that normally used in both bearing and curtain walls. It is designed in conformity with building codes and is constructed by individual placement of blocks of stone, bricks, cinder concrete, cut stone, or combinations of these materials. These units are held together by putting a mortar between them, this can helps to provide high performance enclosures, which fulfil support, control and finish functions. Load-bearing walls, infill walls, and partition walls are physical barriers that help to provide privacy, security and fire and sound separation from external environment. When it is the section or part of the building envelope, masonry walls also act as a durable support for barrier and cladding, elements and maybe useful to provide the cladding as well.

Reinforced concrete is one of the most widely used materials for wall construction in modern buildings. It is made from artificial stone obtained by mixing of cement, sand and aggregates with water. Fresh concrete can be compressed into almost any shape, leaving an inherent advantage over other materials. However, its restricted tension resistance is initially prevented its widely use in building construction. To solve the problem of poor tensile strength, steel bars are lodged solidly in concrete to form a composite material called reinforced concrete (RC). Except for the combination of cement and steel, the production of concrete does not needed expensive manufacturing mills. Basically, reinforced concrete walls are used for enhancing strength purposes. Some walls may be in place or pre-cast, such as bearing or curtain walls. Some pre-cast concrete walls are

constructed are commonly used for floor or roof deck construction. They can be located vertically, side by side, and caulked at adjacent edges.

Stud and sheathing walls are a light type of wall construction which is normally used in residential houses or other light constructions where they are usually act as light bearing walls. It is usually consists of wood and sheathing nailed to wood or steel studs. This is always sheetrock which is a sandwich of gypsum between cardboard facings. Sheetrock, so called a wallboard or gypsum board is a panel of gypsum covered on both side with papers and used as the primary wall materials in building construction. Wall sheathing is often using plywood or other laminate and always applied to the framing prior to erection, relieve the positioning of studs and raise the speed and cutting workforce needs and expenses. Some type of exterior sheathing is such as asphalt-impregnated fibreboard, plywood, oriented strand board and wafer board, which will provide required to resist lateral loads and make sure the wall square, where rigid glass-fibre, asphalt-coated fibreboard, polystyrene or polyurethane will not do so. In case, the wall should be reinforced with a diagonal wood or meal bracing infix into the studs.

Composite walls are a more vital substantial type of stud walls, they are constructed of cementations materials such as pre-cast concrete and weatherproof sheetrock as an external sheathing, and sheetrock as an internal finishes. With subject to strong wind storms local codes or state law will finally require both the wind braces and the stiff exterior sheathing regardless to the type and the kind of outer weather resistant coverings.

Prefabricated wall is also a type of commonly used for curtain wall construction; it's frequently known as prefab wall. Prefab wall usually made

of corrugated steel or aluminium sheets, although they sometimes are constructed of fiber-reinforced plastic sheets, attached to light horizontal bearing a known grills, spaced several feet apart. These type of wall are usually made of sandwich construction which the outside part can be corrugated sheet, an inside part may be liner or flat or corrugated sheet, and an enclosed insulation are attached together by screws and to form a thin, effective sandwich wall. These walls often have tongue-and-groove vertical edges to allow sealed joints when the united are built at the building sites by being attached to framing grills. Glass-coated, metal-coated or ceramic-coated metal panel wall often used in high-rise construction are now commonly used in curtain walls. These walls are typically gathered as a sandwich by using glass, formed metal, or ceramic-coated metal sheets on external side, and some form of liner, including possible masonry; on the inner side, insulation on enclosed. Tilt-up walls are usually non-load bearing wall, which is constructed as in thinner versions of some of standard wall types, and they are often constructed for some resistance to fire and sound. These walls are sometimes used for construction efficiency. It is a wall that constructed in a horizontal position at ground level, and it is then tilted up and connects at its adages to adjacent tilt-up wall sections. The internal partition is a lighter form of wall used for making separations of the interior areas in the buildings.

There are many types of materials can be used for wall construction, for example stone, rock, wood, clay, cement, brick, thatch and glass.

The stone can be used as the wall material because it is attractive, durable, low maintenance, strong, and high thermal mass. The stone can divided into <https://assignbuster.com/wall-construction-of-single-storey-residential-buildings-construction-essay/>

many types and can be divide into two categories which is hard stone and soft stone. The example of the hard stone is granite stone and the examples for the soft stone are limestone and sandstone. The stone wall are very strong and can last for over hundreds years and still maintain in a very good condition but it depend on the types of the stone used in the wall construction. Since the stone is available in every part of the earth therefore it's cost is much more cheaper than other wall construction materials.

Besides that, the stone wall have a high thermal mass which can slowed down the heat transfer from the outdoor get into inside the houses and also can prevent the heat loss from the indoor to the outdoor. In the other words, the stone wall can regulated the inside the room temperature. Not only this, the stone wall also very easy to maintain. What we need to do is just to check the mortar in between the stone wall is in good condition, if crumbling is happen we need to do repair or replace the mortar. Besides that, we need to clear the surface of the stone wall so that can keep it clear but by the way it may reduce the life span of the stone wall.

Wood also is commonly been used for wall construction. Wood are been used for construction at many of the countries although the climate and soil condition are difference in all countries. This is because wood are flexible and resistant against climate harshness. Therefore wood was highly recommended use for construction but we must take into account the wood quality and the condition it grown up. Clay is also one of the most common types of the material used to build houses. For example, the houses in country sides mostly are made from clay and mud. The reason is because clay has the ability to keep the house warn during cool weather and can

keep the house cool during hot summer, which mean that the clay has high thermal mass. Cement is been used in almost every countries. Cement is used to join brick or stone together. When cement is mixed with water it can be used to sick the brick together and when it is dried, it will become very hard and difficult to remove these brick apart. Thatch is not very common been used in Malaysia but it is commonly be used for building material in Africa. This is because the thatch is made from a grass which is easy to hardest and it is a natural insulator. Nowadays, glass also been used in wall construction. In modern structures, the glass is used for outer beauty of the structure. Besides that, using the glass as wall can allowed more visible light to get into the houses and the amount of light entry into the house is depend on the refraction index of the glass. Although the glass can allow the visible light to come into the house but at the same time it also can block or eliminated the heat energy to transfer into the houses.

Brick also is one of the most common materials used in wall construction because it was available in everywhere. In different countries will have different type of brick where are different in size, colour and material used.

In our case study, the walls are made from brick. Nowadays, brick are made by pressing clay into a block and firing them in kiln. At the past time, the brick are not be fried but the brick are just putted outdoor and dried by the sun. Since the Middle Ages, the brick is been widely used as the building material in many of the countries. A good brick are very durable and can resistant to atmospheric action and high temperature. Therefore brick also can be used for fire wall construction. This is the reason why a lot of the old building or wooden houses are replaced or rebuilt in brick. Brick become <https://assignbuster.com/wall-construction-of-single-storey-residential-buildings-construction-essay/>

even more important during the Industrial Revolution. How the brick was made? The brick is made by clay. After the clay has been dug out for soil, it will be mixed with water and made into the wanted shape. After that, these are allowed to dry slowly before they are fired in a kiln at a temperature of 1000C - 1200C. At this temperature, the clay undergoes metamorphosis. When the water is totally driven off, a new anhydrous mineral, namely aluminosilicates, is formed. This is broken down from the mineral name as kaolinite. Aluminosilicates are more stable at high temperature. Besides that, minerals like mullite crystals, quartz and supercooled liquid in the brick are making the brick become harder and stronger. Why are bricks red in colour? This is because clay contains iron minerals. At the beginning, the iron exists as ferrous iron (iron II) but after firing, the iron in clay is oxidised to become iron III, which forms red-brown iron oxide haematite.

We mostly use bricks to construct the wall because they have many advantages and only a few disadvantages to use them to construct the wall. The advantages are attractive, durable, low maintenance and they have high thermal mass. The disadvantage is the time to build or to install is slow as compared to other wall materials. The brick used in wall construction can be divided into two types which are solid brick and veneer brick. The solid brick are more commonly used in house wall construction because they have high thermal mass so that they are good in slowing down the heat transmission and can regulate the temperature in the houses although they are more expensive as compared to veneer brick. The brick wall is not only good in heat insulation but also good in insulating the sound. The brick wall can block most of the unwanted noise from

outside such as traffic noise getting into the house. Besides that, the brick also used as fire wall since the brick are not easy burn material. If the fire accident is happen it may take a least 8 hours to let the fire to spread to the other house. Used brick to construct a wall is very attractive also, this is because the brick itself already have it own colour, so that we no need to paint it after we built it. Other than that, the brick is been used because it is easy to maintain and it can stay in a good condition for a very period. The brick wall would not get rot or dent so that we no need paint the wall within a short period.

In our group, we are going to discuss the topic entitle WALL. Wall is a basic unit that needed to build up a building or houses. So it is a very important compartment. However, its design factors may affect its function. In the below contents are the different design factors of the wall.

First of all, wall construction can be classified into two types that are external wall and interior wall. There are a lot of wall type in the world, while our group only discuss two types of wall that are normal brick wall which can normally be found in our country, Malaysia. Another type of wall that we are going to discuss is the cavity wall which can normally be found in the country that have four seasons such as United Kingdom, United State, Portland and etc.

This normal brick wall that found in our country can be divided into two types that are one brick wall and half brick wall which its thickness is 90mm. These walls are made up by the cement, sand, and aggregate in the mixture of the ratio in 1: 2: 4 which is 1 portion of cement, 2 portions of sand and 4 portions

of aggregates. While the cavity walls consist of a half brick or block outer leaf, a brick or 90 mm /100mm lightweight load bearing concrete block or stud framed structure inner leaf, a 50 mm or 75mm cavity or air space in between the outer and inner leaf.

The design factors of the normal brick wall and the cavity wall are almost the same. The main design factor of these walls is that they provide sufficient strength and stability to resist the loading imposed on it. The loadings which the wall need to withstand included dead load and live load. The example of dead load is the furniture and etc while the example of live load is rain, snow, occupants and etc.

Another design factor of the walls is that it acts as an envelope that differentiates the outdoor and indoor area. It is also a shelter that can resist the unpredictable climate change for example rain, snow to enter the interior area of the houses. Besides, wall also plays an important role to resist the transmission of sound which will eventually causes the pollution. So, the wall acts as a barrier to resist the entering of the unwanted sound to the houses.

Nowadays, owing to the fast development of the country, there is a lot of pollution happened in our surrounding especially air pollution. To minimize the contact of the occupants to these pollution, wall plays an important role which act as a barrier to prevent the outside contaminant to enter the houses such as dust, pollen, hazardous particle and etc. These contaminated particles will cause the indoor air quality in a bad condition and thus will influence the indoor environment quality and hence some diseases may occur because of this poor condition for example asthma. So, with the

presence of the wall, these problems can be solved and a good quality of the indoor air can be achieved.

Besides, wall also acts as a barrier to resist the fire which is call the fire brick wall. In order to slow down the rate of flame spread in case of fire within the building, the architects apply various techniques including the creation of compartments which would contain the fire for some time before spreading to other parts of the building. So, to achieve this, one method to use is to take the block walls between rooms up to the underside of the roof, for instance and depending on the quality of the aggregates used. These brick wall may have a Fire Resistance Rating of up to one and half hours (100mm thick solid brick wall).

Walls are probably the most noticeable and important part of the interior wall and also the exterior wall. Another meaning is that it provides an appearance. When entering into the room, people will notices the colour, kind and the surface of the wall and hence, they will determine the psycho physiological atmosphere. So the function of walls is that to create space where a person feels comfortable. Besides, the good appearance of wall is a wall with no crack which the infiltration will not happen. Without infiltration, there will be no extra air to flow into the building, so the extra heat flow will not enter or leave the building, indirectly, the thermal comfort can achieve.

The design factors of brick wall and the cavity wall are almost the same.

However,