



Layunin ng Department of Building Official na makapagbigay ng mabilis at mahusay na serbisyo sa pagsusuri ng mga gusali nang hindi isinasakripisyo ang kaligtasan ng lahat, at sinusunod ng may-ari ng gusali ang mga pamantayan. Mahalagang pinagtutuunan ng pansin ng Quezon City Government ang pagsiguro na matibay at ligtas ang pagtatayo ng mga tahanan.

Sa pamamagitan ng handbook na ito, mas mapapabilis ang pag-apruba sa building permit dahil mas pinadali ang Structural Design at pinabilis ang Structural Evaluation.

First Edition 2021

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Minimum Structural Design Standards for a Single-Detached House
Three (3) Storeys and Below

Minimum Structural Design Standards for a Single-Detached House Three (3) Storeys and Below 2021



Department of
Building Official

Minimum Structural Design Standards for a Single-Detached House

Three (3) Storeys and Below

*(Gabay sa Pagdidisenyo at Pagbuo ng Tahanan
na may hanggang Tatlong Palapag)*

In cooperation with



Philippine Institute
of Civil Engineer, Inc.



MINIMUM STRUCTURAL DESIGN STANDARDS FOR A SINGLE-DETACHED HOUSE THREE (3) STOREYS AND BELOW

2021 Edition



PAUNANG SALITA

(FOREWORD)

Ang handbook na ito ay isang gabay para sa mga nasasakupan ng Lungsod Quezon na nagnanais magpagawa ng kanilang tahanan na mayroong tatlong (3) palapag o pababa. Ito ay maaring gamitin, hindi lamang ng mga engineer, kundi ng mga mamamayan, barangay at iba pang opisina ng Quezon City Government na katuwang sa pagpapatupad ng Local Building Code of Quezon City.

Ang layunin ng Department of Building Official ay makapagbigay ng mabilis at mahusay na serbisyo sa pagsusuri ng mga gusali nang

hindi isinasakripisyo ang kaligtasan at matiyak ang pagsunod ng mga may-ari ng gusali sa mga pamantayan sa kaligtasan. Mahalagang pinagtutuunan ng pansin ng Quezon City Government ay ang pagsisiguro na matibay at ligtas ang pagtatayo ng mga tahanan.

Ang kaalaman sa handbook na ito ay hindi katumbas ng building permit, marapat na sumangguni sa mga pribadong civil engineers, ngunit sa pamamagitan ng booklet na ito, mas mapapabilis ang pag apruba sa building permit dahil mas pinadali at pinabilis ang structural evaluation.

Atty. Mark Dale Diamond P. Perral, C.E.

Officer-In-Charge,
Department of Building Official
Quezon City Government

MESSAGES



Message of Mayor Joy Belmonte

Ang Quezon City Government, sa pamamagitan ng Department of Building Official, ay nakikiisa sa pagpapabilis ng mga proseso ng building permitting. Tunay nga na napakahalaga na pabilisin ang mga proseso ng ating gobyerno, ngunit kalakip ng adhikain na ito ng pagpapabilis ng proseso ng building official ay pagsisiguro ng masusing pagsunod sa mga probisyon ng National at Local Building Code. Ang pagsunod sa mga nasabing mga batas ay hindi lamang para sa pagtupad sa mga legal na pamantayan sa building permitting, ngunit ang mas mahalaga ay upang matiyak ang kaligtasan ng mga pamilyang naninirahan sa kani-kanilang mga tahanan.

Ang kaalaman sa mga minimum standards sa pagdidisenyo at pagtatayo ng mga tahanan na hanggang sa ikatlong palapag ay isang ring pamamaraan ng Quezon City Government upang makapagbigay kaalaman sa mga barangay, bilang katuwang sa pagpapatupad ng Local Building Code.

Hangarin nating lahat na ang bawat pamilya ng Quezon City ay magkaroon ng kani kanilang mga tahanan at sa pamamagitan ng handbook na ito, ang mga pamilyang magpapatayo ng kanilang tahanan ay magkakaroon ng tamang paggabay upang matiyak na ang kanilang proyekto ay may matibay at matatag na struktura.

Hon. Mayor Joy Belmonte
City Mayor
Local Government of Quezon City

MESSAGES



Message of Sec RJ Belmonte

On behalf of the Infrastructure Committee of the Quezon City Government, I would like to congratulate the Department of Building Official for coming up with this handbook.

While this handbook will be very helpful for the construction industry sector of QC, this work will tremendously be helpful also for the QCitizens and their families in ensuring that their home projects will be designed and constructed in compliance with the minimum standards of the National and Local Building Codes, taking into most important account, the safety of family occupants.

In line with the principles enshrined in the Ease of Doing Business Law, compliance with the requirements in this handbook will translate to a faster and more efficient processing and approval of building permits, a mandate provided under the 14-point agenda by our dear Mayor Joy Belmonte.

Mr. Ricardo T. Belmonte Jr.
Secretary to the Mayor
Chairman, Infrastructure Committee

MESSAGES



Message of Mr. Ricardo B. Corpuz

Hangad ng Lokal na Pamahalaan ng Lungsod ng Quezon na maihatid ang magandang serbisyo sa mga nasasakupan nito. Sa pamamagitan ng Department of Building Official, natitiyak ang mabilis at maayos na proseso sa pagkuha ng building permits na hindi nasasakripisyo ang kalidad ng bawat strukturang itatayo. Kalakip nito ay kaginhawaan at kaligtasan para sa QCitizens na siyang pangunahing layunin ng pamahalaang lungsod.

Nakikiisa ang Barangay and Community Relations Department (BCRD) sa hangarin ng handbook na ito na makapagbigay kaalaman tungkol sa minimum structural design standards para sa mga strukturang may hanggang tatlong palapag na siyang makatutulong sa pagdidisenyo at pagbuo ng isang LIGTAS at MATIBAY na tahanan para sa lahat ng pamilyang taga-Quezon City. Mabisa rin itong gabay ukol sa mga alituntunin ng National at Local Building Codes na magagamit hindi lamang ng mga inhinyero ngunit pati ng ibang sektor na katuwang sa pagpapatupad nito.

*Ang handbook na ito ay isang magandang hakbang upang mapalaganap ang tamang impormasyon at kaalaman ukol sa mga prinsipyong pang-inhinyero. Isa itong patunay sa hindi nababagong pangako ng pamahalaang lungsod sa nasasakupan nito —
“Sa Lungsod Quezon, kasama ka sa pag-unlad!”*


Mr. Ricardo B. Corpuz
Department Head
Barangay and Community Relations
Department (BCRD)

MESSAGES




Message of Dr. Erdsan Rene S. Suero

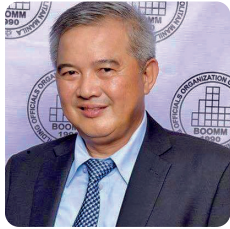
The Philippine Institute of Civil Engineers (PICE) congratulates the Department of Building Official of the Quezon City Government in crafting this handbook: Minimum Structural Design Standards for a Single-Detached House (Three (3) Storeys and Below).

The Civil Engineers' primordial duty is to ensure the safety and resiliency of built structures, most importantly, residential infrastructures which serve as residential dwellings, or simply, homes. The crafting of this handbook presents a medium of knowledge transfer in a manner so simple, that even non – Civil Engineers will still be able to understand. Nonetheless, it is always important for the project and property owners to always ask their Civil Engineers.

The idea of coming up with this handbook, in which PICE provided the necessary technical support, is very helpful, not only for the Civil Engineers of Quezon City, but for all Filipino Civil Engineers. Indeed, another laudable accomplishment milestone by the Quezon City Government.


Engr. Erdsan Rene S. Suero, DPA
President, Philippine Institute of
Civil Engineers, Inc.

MESSAGES



Message of Engr. Isagani R. Verzosa, Jr.

Layunin ng Lokal na Pamahalaan ng Lungsod Quezon na masuri ng eksperto ang bawat struktura sa buong lungsod upang matiyak ang kaligtasan ng nakararami. Sa pamamagitan ng Handbook na ito ay maisasakatuparan ang hangaring ito dahil mabibigyan ng kaalaman ang mga mamamayan patungkol sa “minimum standards” sa pagtayo ng struktura na tatlong palapag pababa. Malaki ang maitutulong ng Handbook na ito upang masiguro na sumusunod lahat ng nasasakupan ng Lokal na Pamahalaan na sumunod sa alintuntuning itinatakda ng batas at para na rin masiguro ang tinatayong bahay o gusali ay sang ayon sa “minimum engineering standards”.

Ang konsepto ng pagkakaroon ng Handbook na gabay ng bawat mamamayan na gustong magtayo ng struktura ay isang magandang innovation ng lungsod para makasunod sa pagbabago na likha ng teknolohiya.

Ang Handbook na ito ay ginawa sa pakikipagtulungan ng PICE sa Lokal na Pamahalaan ng Lungsod Quezon upang magsilbing gabay sa lahat ng nasasakupan ng Lokal na Pamahalaan.

Nawa’y umpisa lamang ito ng maraming pagbabago para sa ikauunlad ng ating Mahal na Lungsod.

Engr. Isagani R. Verzosa, Jr.
Officer-In-Charge - City Engineer
Engineering Department
Quezon City Government

ACKNOWLEDGEMENT

In the preparation of this handbook, **Minimum Structural Design Standard for a Single-Detached House Three (3) Storey and Below**, we have to acquire the guidance and support of some respected persons and employees, who deserve our deepest gratitude.

As to the completion of this handbook, we would like also to extend our gratitude to all the personnel and individuals who have directly and indirectly provided guidance and valuable suggestions. We are hoping to obtain more support in the future improvement of this valuable work.

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Department of Building Official

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We promote transparency, to establish effective practices, aimed at efficient turnaround of the delivery of government services and adoption of simplified requirements and procedures under Section 2 of RA11032 Ease of Doing Business and Efficient Government Service Delivery Act of 2018.

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PAGLILINAW

1. Ang lahat ng mga resulta ng disenyo sa handbook na ito ay batay lamang sa minimum na pamantayan ng disenyo ng istruktura para sa mga nag-iisang nakatayong bahay, na may tatlong (3) palapag o pababa lamang.

Ang anumang mga pagbabago na lumalagpas sa itinakdang parameter ay hindi na sakop ng mga itinatakadang pamantayan ng handbook na ito.

2. Ang impormasyong nilalaman ng handbook na ito (mga guhit, pormula, salik atbp.) ay para lamang sa pangkalahatang kaalaman at paglalarawan.

Ang handbook na ito ay inilaan para sa pangkalahatang kaalaman ng mga mamamayan na hindi mga Civil Engineer. Ang handbook na ito ay isa lamang gabay at hindi para gamiting disenyo ng bahay.

3. Ang layunin ng handbook na ito ay upang turuan ang publiko at matulungan silang maunawaan ang mga pangunahing pamantayan ng structural design para sa isang ligtas na bahay na may tatlong palapag at pababa lamang.

4. Responsibilidad ng Structural Design Engineer na inupahan ng magpapagawa ng bahay na tiyakin na ang kanyang Structural Design at Plans ay tumpak at naaayon sa nakapaloob sa National Building Code of the Philippines (NBCP PD 1096), National Structural Code of the Philippines (NSCP 2015), at sa mga referral codes nito.

Responsibilidad naman ng Builder o Kontratista o ng Full-Time Project Engineer na itayo ang bahay alinsunod sa Building Permit at mga kalakip na Approved Building Plans, at tiyakin na ang mga materyales at pamamaraan sa konstruksyon, kabilang ang kinakailangang pagsusuri ng mga materyales, ay alinsunod sa general notes and specifications na nakalahad sa Structural Plans.

5. Ipinapalagay na 144 kPa ang soil-bearing capacity ng lupa o mga katangian ng bato sa site ayon sa Sec. 304.2 ng NSCP 2015 ED. Sumangguni sa table ng 304-1 ng NSCP para sa tamang impormasyon. Dapat ding tiyakin ng Site Engineer ang kalagayan ng lupa sa site at iulat sa Structural Designer on-record ang kondisyon ng lupa bago simulan ng Site Engineer ang konstruksyon.



Paano ko malalaman kung ang aking bahay ay nakasunod sa Minimum Structural Design Standards ?



Sa pamamagitan ng guidelines na ito, matuturuan at matutulungan ka na sagutin ang iyong katanungan!

UNANG HAKBANG







Ano ang pinakamababang lakas ng materyal na tatanggapin sa istrukturang pagsusuri at disenyo ng mga gusali?

A. KONGKRETO



Ano nga ba ang kahulugan ng KONGKRETO?

Ang KONGKRETO ay ginawa sa pamamagitan ng paghahalo ng semento, buhangin, graba at tubig.

PROPORSYON NG KONGKRETO				
KLASE NG PAGHAHALO	GINAGAMIT PARA SA	SIMENTO (40KG)	BUHANGIN (40KG)	GRABA (40KG)
A	Pundasyon, Poste, Biga at Sahig	1 Bag 	2 Bags 	4 Bags 
B	Pundasyon ng Pader at Pader	1 Bag 	2.5 Bags 	5 Bags 

PAALALA: Ang halaga ng tubig na kinakailangan ay hindi ibinibigay sa talahanayan. Ang halo ay dapat maglaman ng sapat na tubig upang makamit ang kinakailangan. Ito ay maaaring masuri ng mata o masukat sa pamamagitan ng pagsasagawa ng isang Slump test.

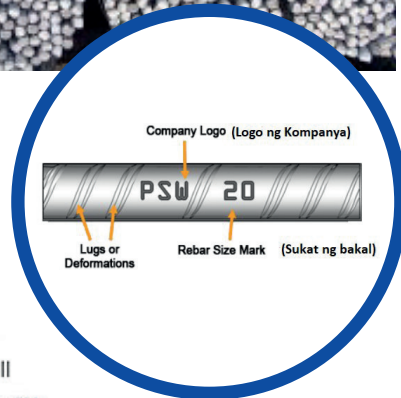
B. BAKAL



Ang BAKAL ay katulong ng konkreto upang palakasin ang istruktura.



Halimbawa ng pagkakakilanlan ng bakal



NOTE: No Grade markings for Grade 40 below (Walang marka para sa Grade 40 pababa)

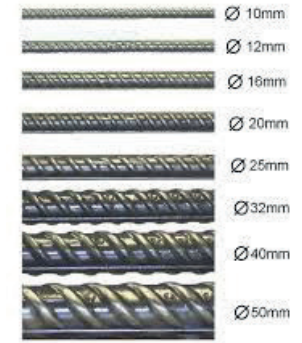
Karaniwang ginagamit na bakal para sa pangbahay na istruktura

GRADE 33

- $f_y = 228 \text{ MPa}$ (33,000 psi)
- Para sa 12mm sukat ng bakal pababa

GRADE 40

- $f_y = 276 \text{ MPa}$ (40,000 psi)
- Para sa 16mm sukat ng bakal pataas



PAMANTAYAN NA SUKAT NG MGA BAKAL

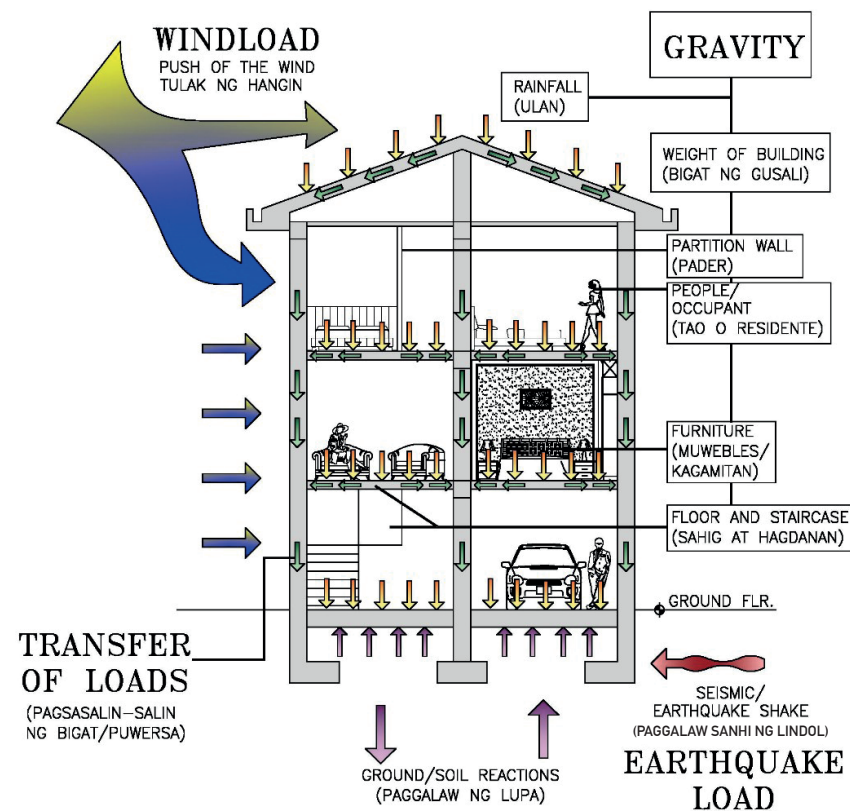
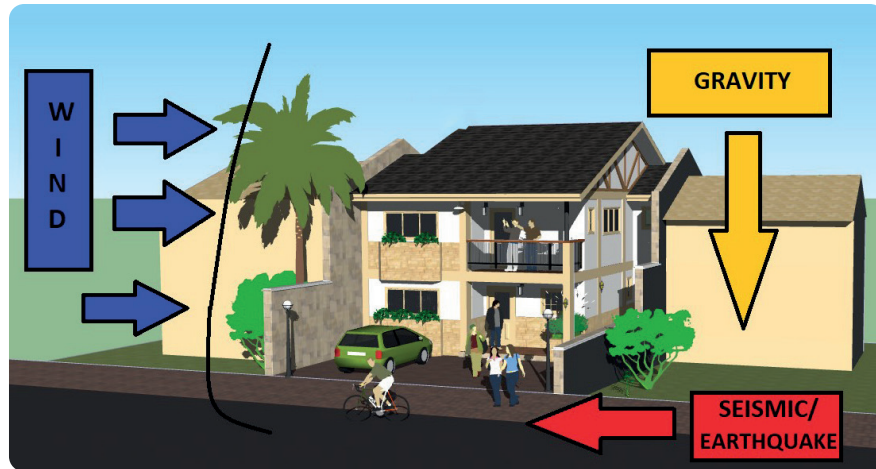
BAR NO. (Sukat base sa bilang)	INCHES (Sukat base sa pulgada)	MILIMETER-MM (Sukat base sa milimetro)	CROSS SECTIONAL AREA (MM ²)
3	1/4	10	78.54
4	3/8	12	113.10
5	1/2	16	201.10
6	5/8	20	314.20
7	3/4	22	280.13
8	1	25	490.87

IKALAWANG HAKBANG

Anong mga bigat o puwersa ang isinasaalang-alang sa isang istruktura?



Ang mga bigat o mga puwersa na isinasaalang-alang sa isang istruktura ay ang gravity, hangin at lindol.



A. GRAVITY LOADS

- **DEAD LOAD**
bigat ng gusali at permanenteng mga nakalagay sa isang gusali.
- **LIVE LOAD**
bigat ng mga residente / tao, muwebles,

ulan at kagamitan.

B. WIND LOADS

Ang tulak ng hangin sa isang istruktura.

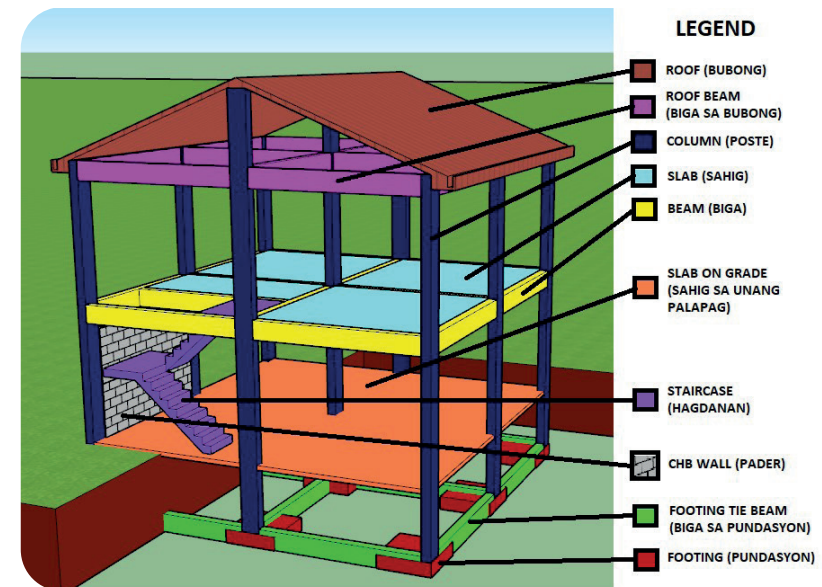
C. SEISMIC/EARTHQUAKE LOADS

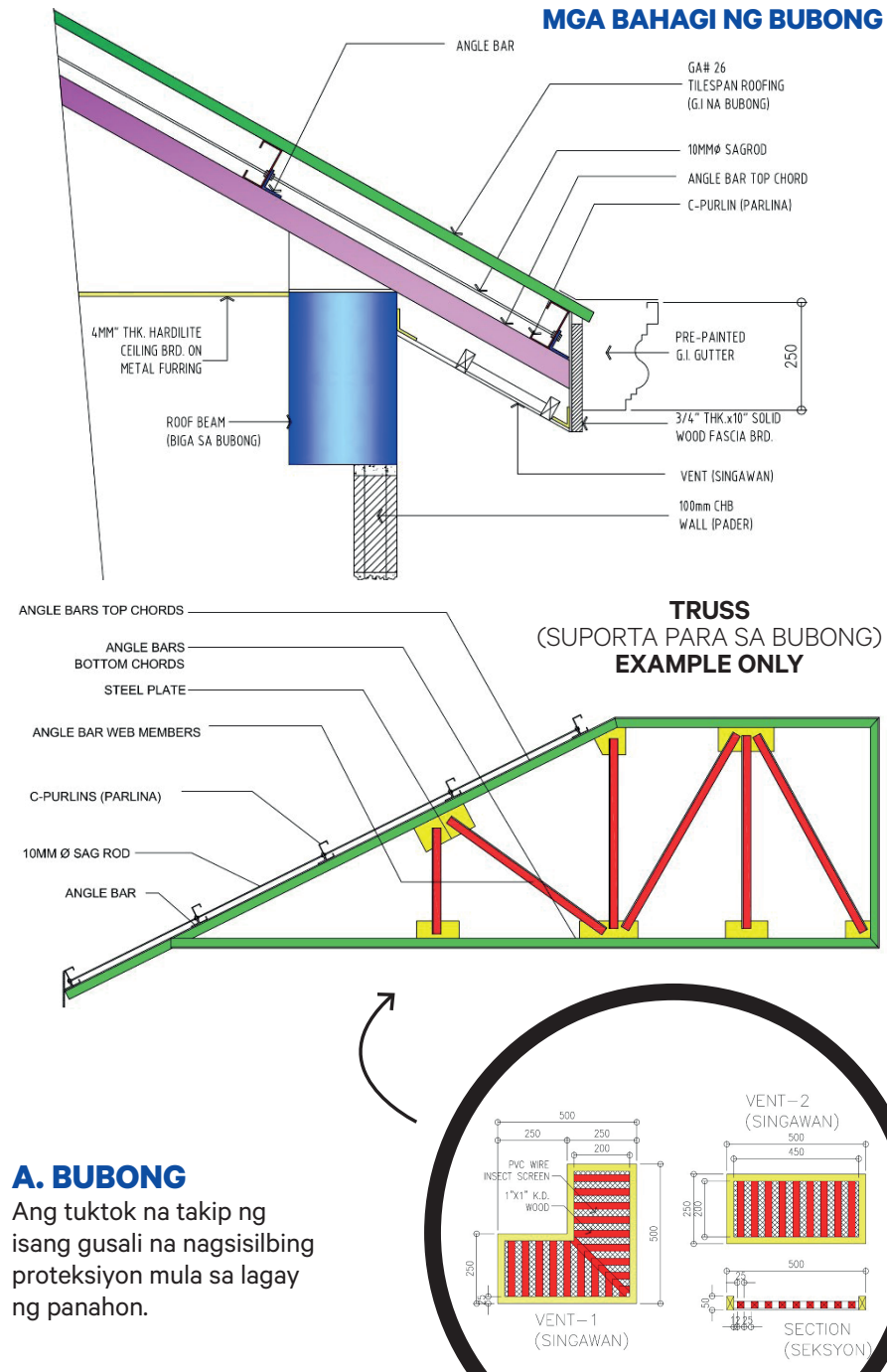
ang puwersa na dulot ng isang lindol.

IKATLONG HAKBANG

Ano ang mga bahagi ng isang istruktura?

Ang mga bahagi ng istruktura ay **BUBONG, BIGA, POSTE, SAHIG, PUNDASYON, HAGDANAN, at PADER.**





A. BUBONG

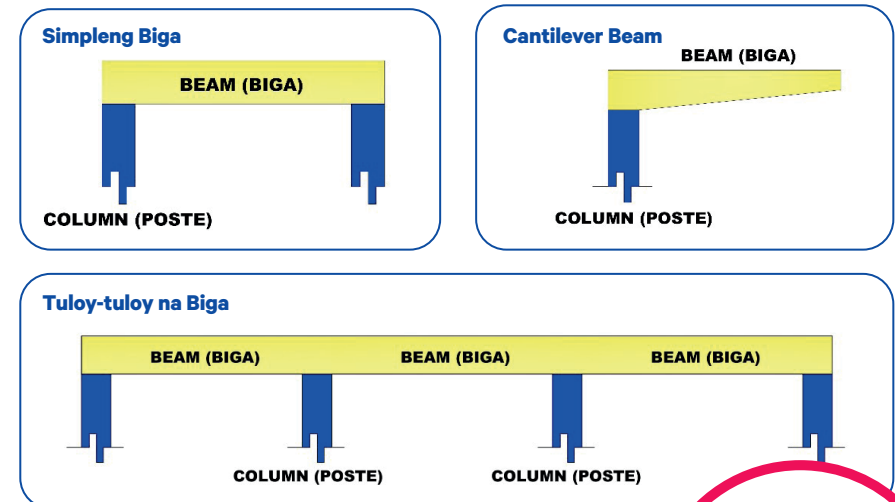
Ang tuktok na takip ng isang gusali na nagsisilbing proteksiyon mula sa lagay ng panahon.

B. BIGA

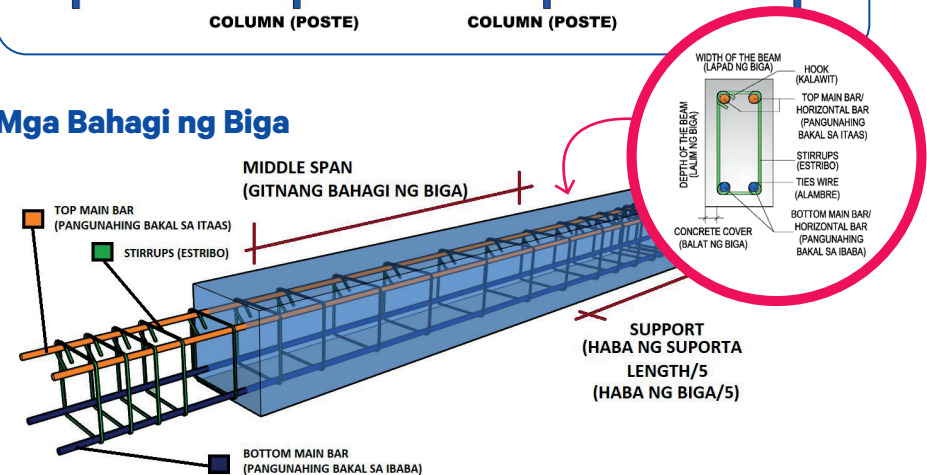
Isang miyembro ng istruktura na sumusuporta sa pahalang na bigat o puwersa.

MGA URI NG BIGA		
BIGA PARA SA PUNDASYON	PANGUNAHING BIGA	BIGA PARA SA BUBONG

Ang mga Biga ay inuri bilang



Mga Bahagi ng Biga



C. POSTE

Isang patayong istruktura na ginamit upang suportahan ang gusali.

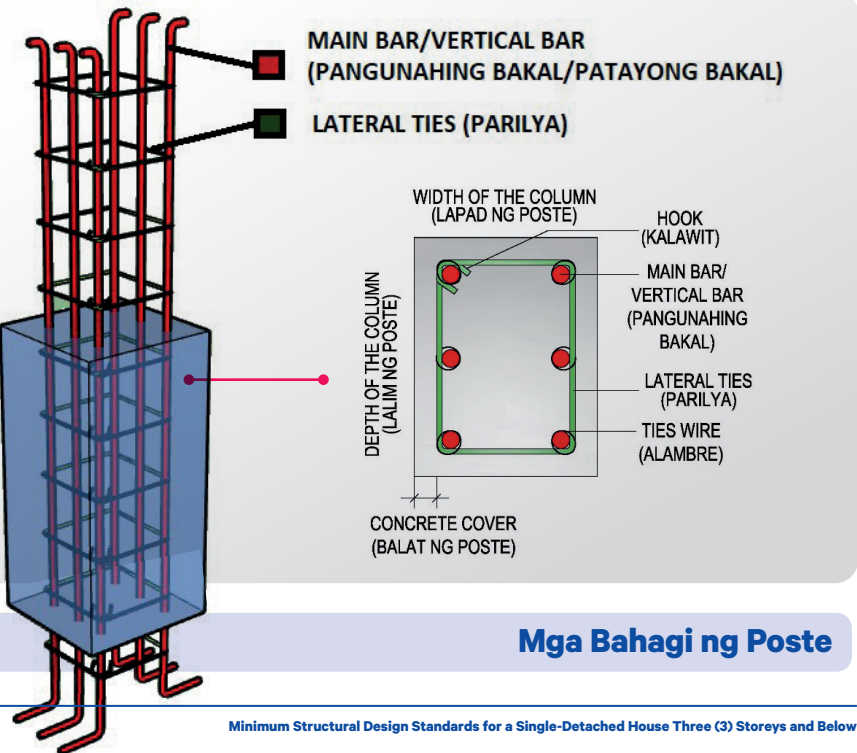
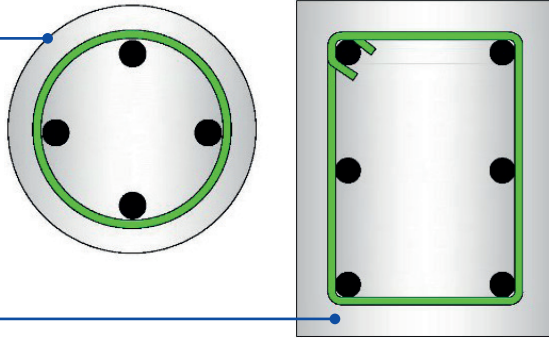
Kalimitang ginagamit na Poste para sa Istrukturang ng Bahay

SPIRAL COLUMN

Pabilog na hugis ng poste.

TIED COLUMN

Parihaba o parisukat na hugis ng poste.



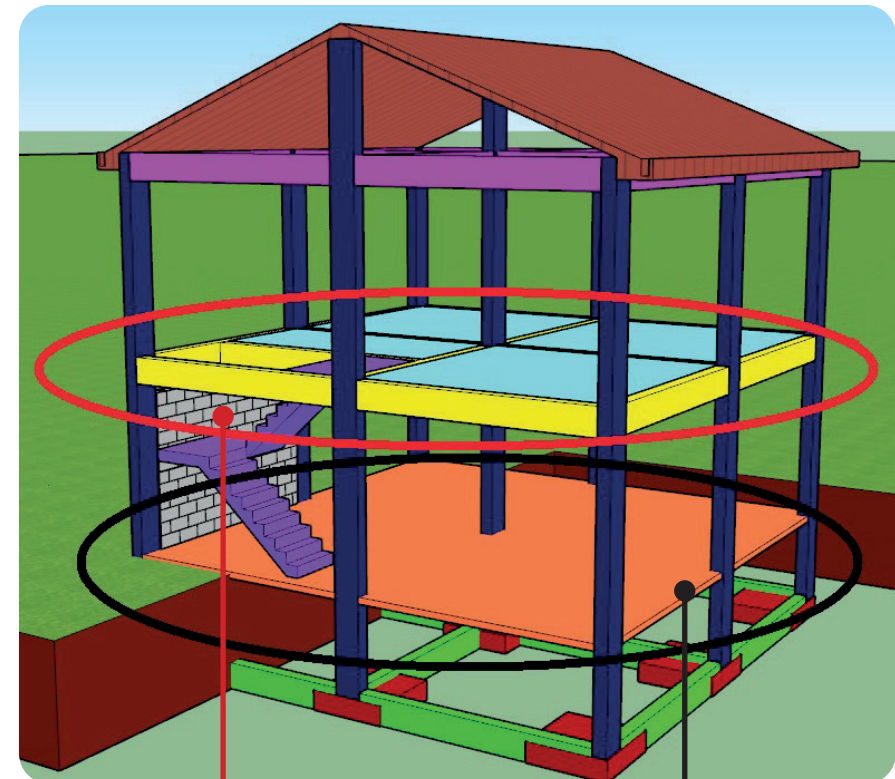
D. SAHIG

Isang miyembro ng istruktura na ginamit upang magbigay ng mga patag na ibabaw (sahig) sa mga gusali.

SUMUSUPORTA SA SAHIG

Ang konkretong sahig ay maaaring suportado ng mga sumusunod:

BIGA	HALIGI/POSTE	LUPA
------	--------------	------



SLAB SUPPORTED BY COLUMNS AND BEAMS

(Sahig na suportado ng Poste/ Haligi at Biga)

SLAB SUPPORTED BY THE GROUND

(Sahig na suportado ng lupa)

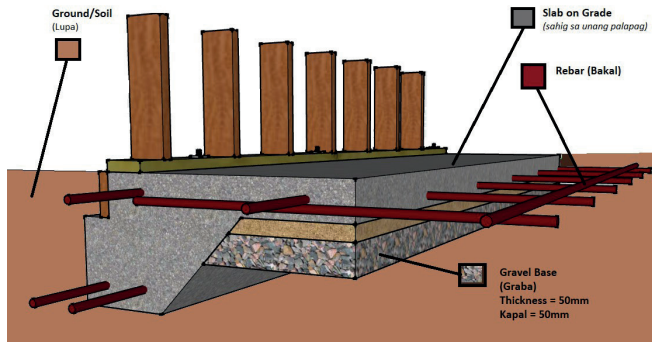
Iba't Ibang Disenyo ng Sahig

1. SAHIG SA UNANG PALAPAG

Sahig na suportado ng Lupa.

2. SAHIG SA PANGALAWA O HIGIT PANG PALAPAG

Sahig na suportado ng Haligi/Poste at Biga.



MGA URI NG SAHIG

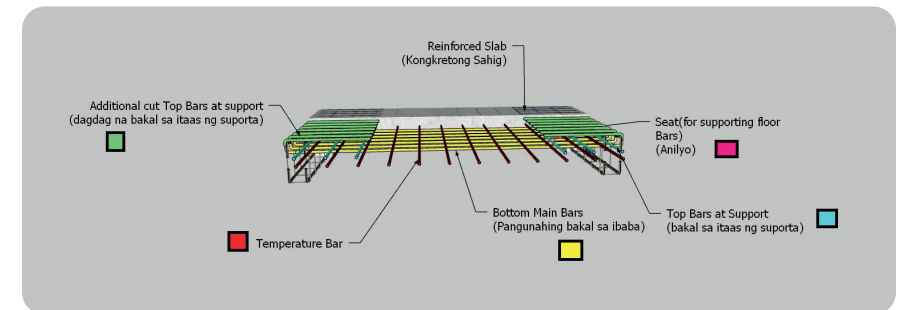
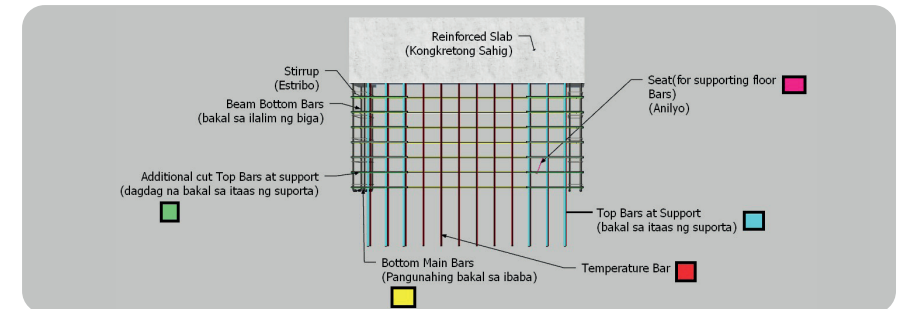
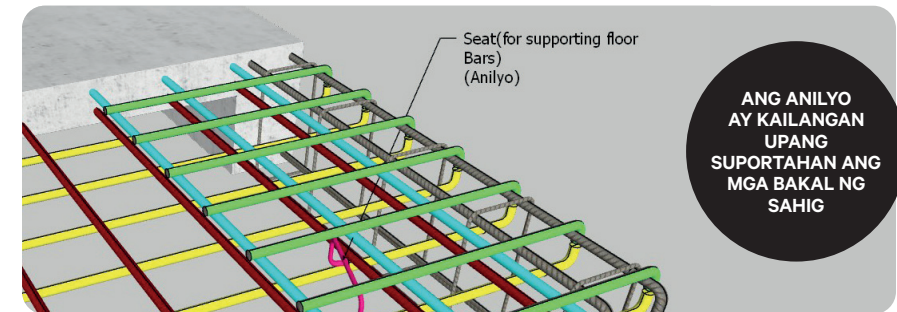
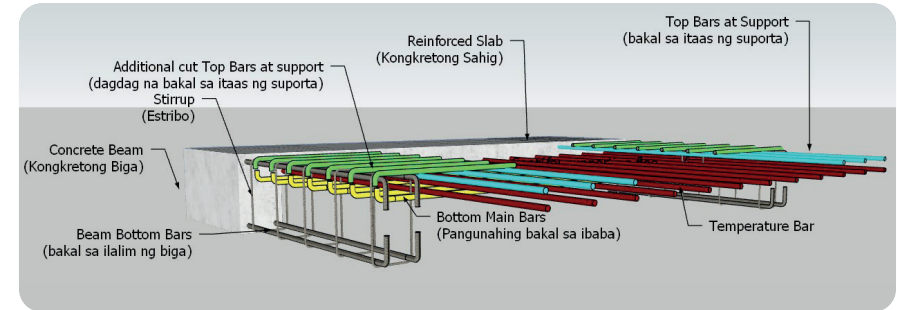
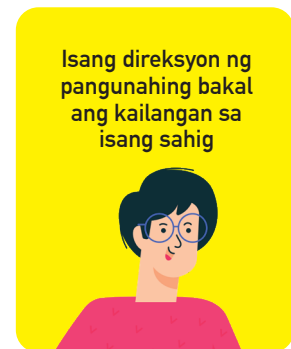
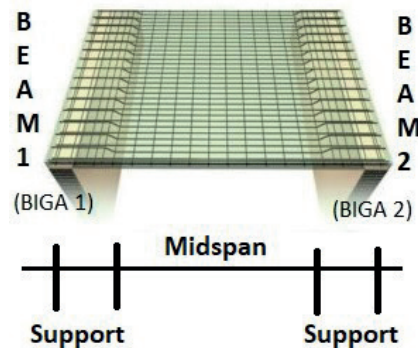
1. Sahig na suportado ng dalawang magkahilang biga

WIDTH
(Lapad ng Sahig)

LENGTH / WIDTH ≥ 2
(Ang haba ng sahig ay hatiin sa lapad ng sahig, dapat ang katumbas nito ay dalawa o higit pa)



HABA NG SAHIG



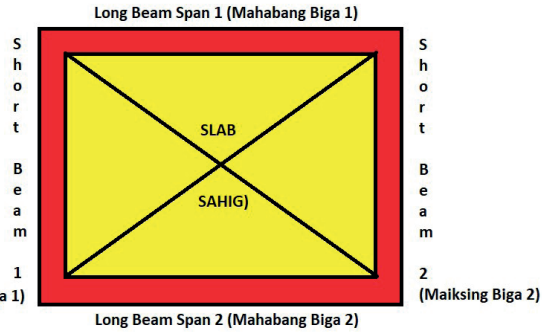
2. Sahig na suportado ng apat na gilid ng Biga

LONG SPAN
(Mahabang Bahagi)

SHORT SPAN
(Maikling Bahagi)

<2

(Maikling Biga 1)



Biga 3

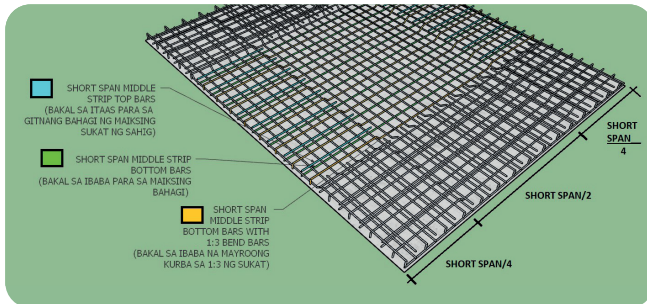
Biga 2

Biga 4

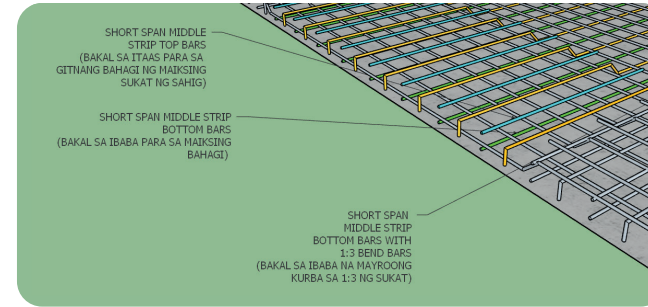
Biga 1



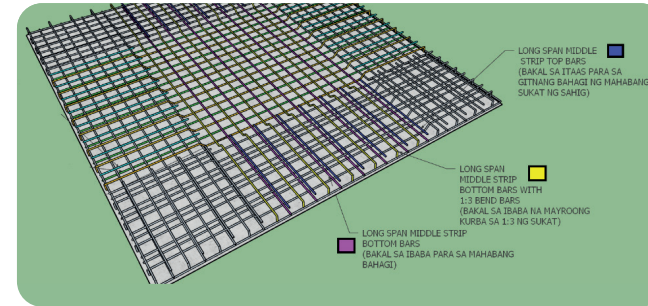
Ang pangunahing bakal ng sahig ay nasa dalawang direction dahil sa bigat na dinadala nito at halos di nagkakakalayo ang mga haba ng bawat biga.



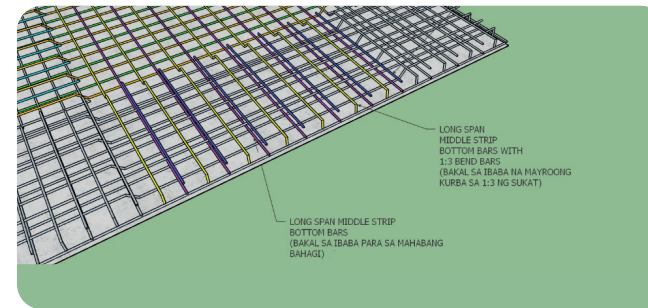
1
BAKAL PARA SA MAIKSING GITNANG BAHAGI NG SAHIG



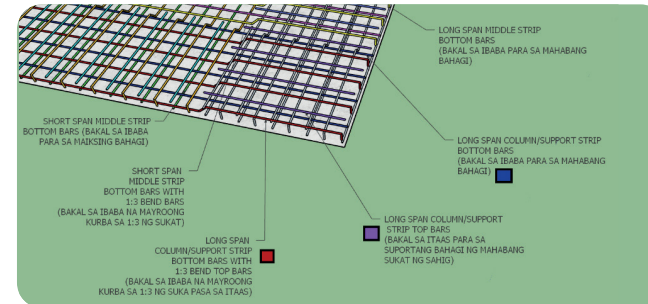
2
BAKAL PARA SA MAIKSING GITNANG BAHAGI NG SAHIG



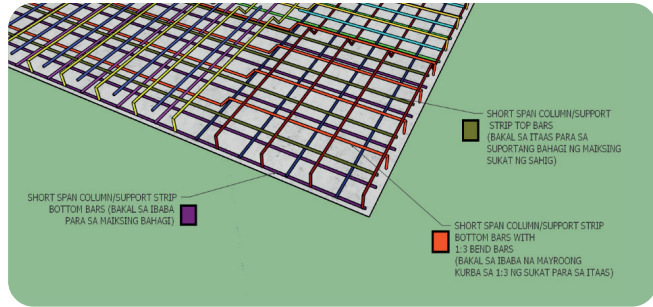
3
BAKAL PARA SA MAHABANG GITNANG BAHAGI NG SAHIG



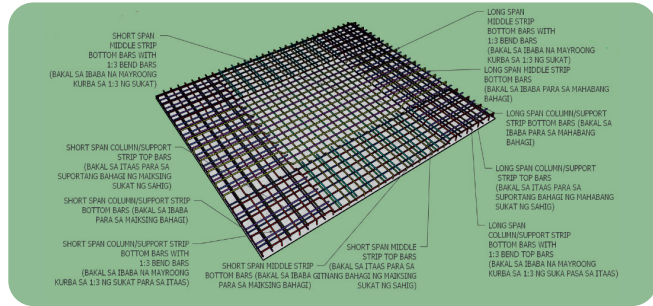
4
BAKAL PARA SA MAHABANG GITNANG BAHAGI NG SAHIG



5
BAKAL PARA SA MAHABANG SUPTANTANG BAHAGI NG SAHIG

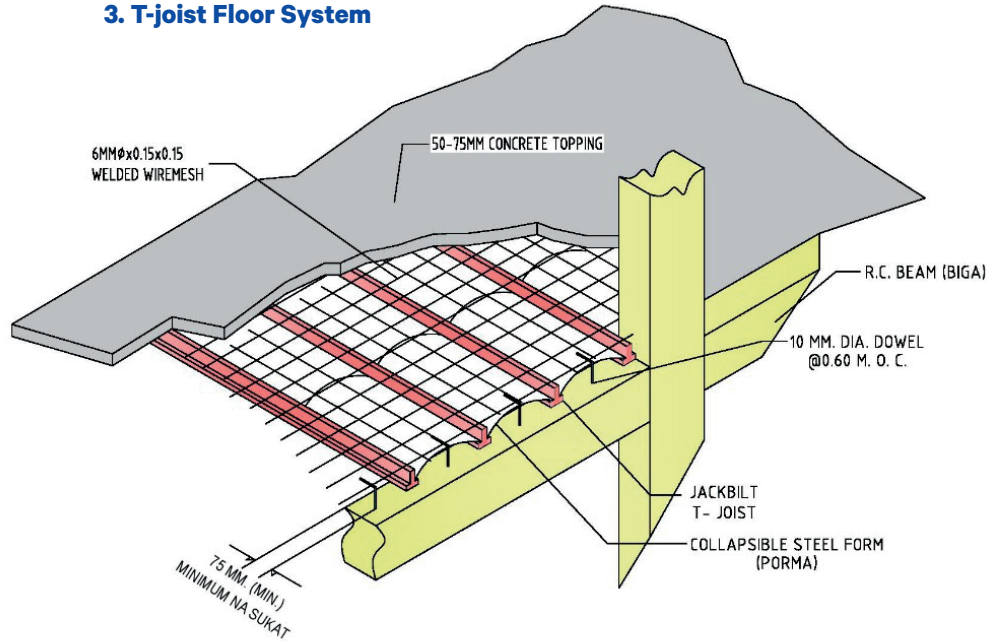


6
BAKAL PARA SA MAIKSING SUPORTANG BAHAGI NG SAHIG



7
BAKAL PARA SA DALAWANG DIREKSYON NA SAHIG

3. T-joint Floor System

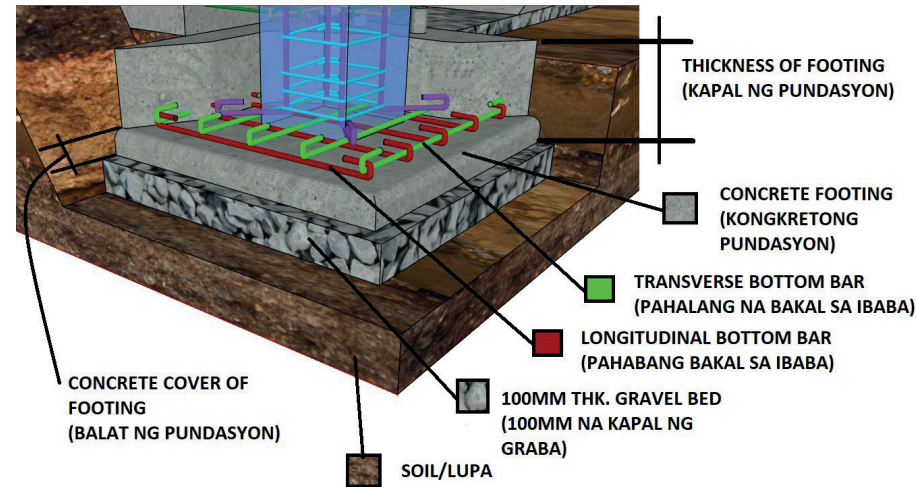
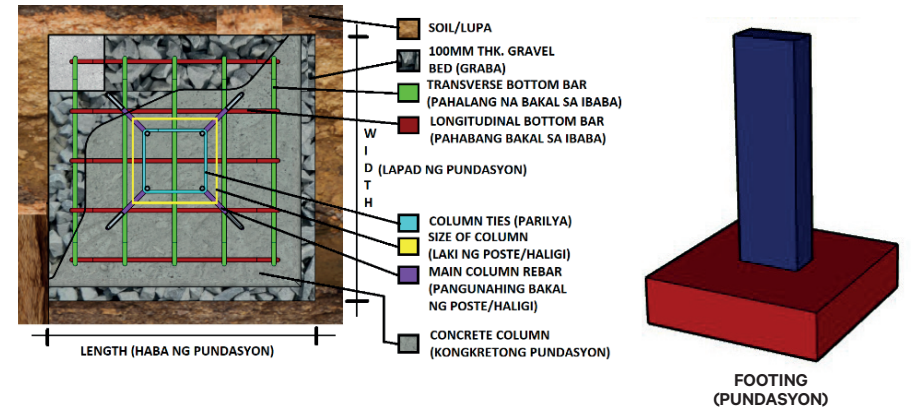


E. PUNDASYON

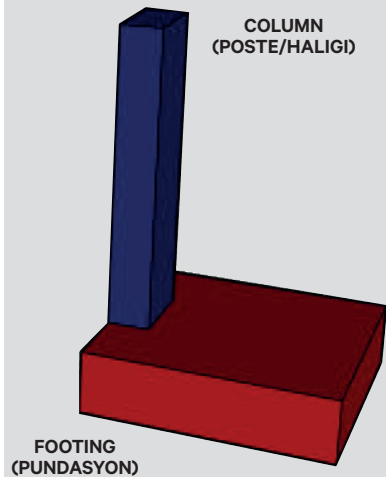
Ang elemento ng istruktura na sumusuporta sa buong gusali na ang bigat ay direktang sinasalo ng lupa.

KALIMITANG GINAGAMIT NA PUNDASYON PARA SA ISTRUCTURA NG BAHAY

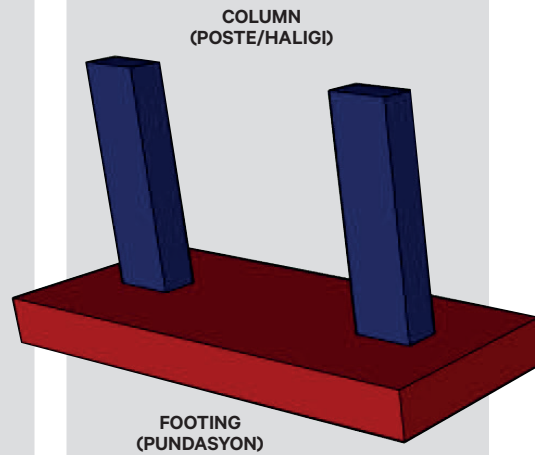
1. INDEPENDENT NA PUNDASYON



2. CANTILEVER NA PUNDASYON

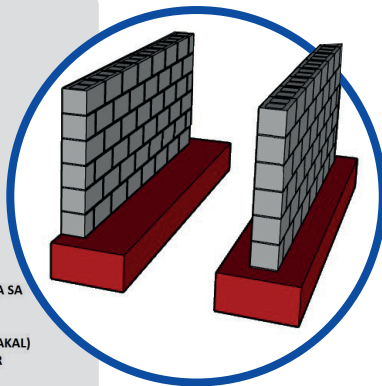
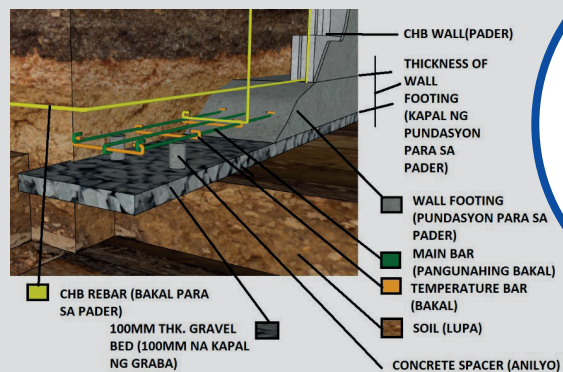


3. PINAGSAMANG PUNDASYON



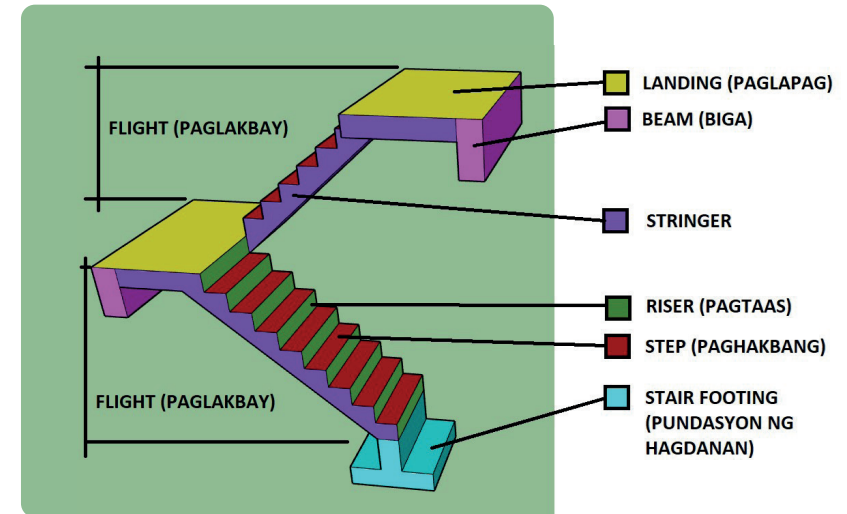
Ang Cantilever at Isolated na pundasyon ay halos pareho sa mga tuntunin ng mga bahagi, ang naiiba lamang ay ang posisyon ng haligi.

4. PUNDASYON PARA SA PADER



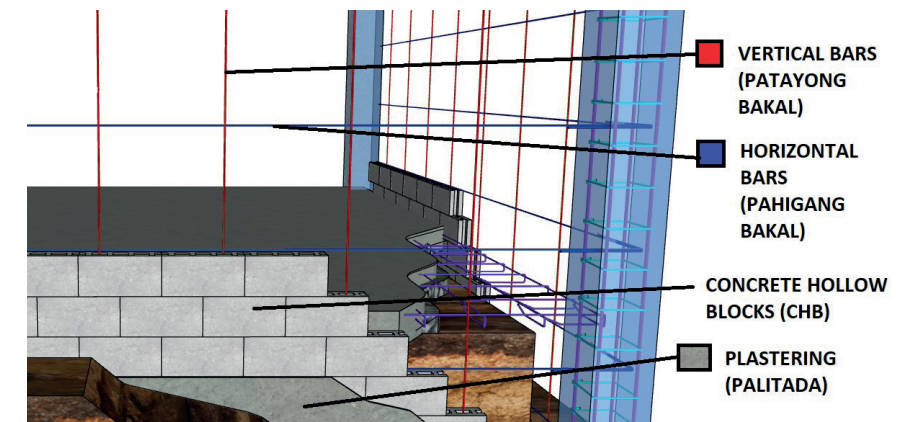
F. HAGDANAN

Isang buong hanay ng mga hagdan, ang hagdanan ay isang term na ginamit sa isang kumpletong paglakbay ng mga hakbang sa pagitan ng dalawang palapag.



G. PADER (Concrete Hollow Blocks)

Ang isang pader o dingding ng pagkahati ay ginagamit upang paghiwalayin o hatiin ang isang silid at karaniwang wala itong bigat na dinadala.



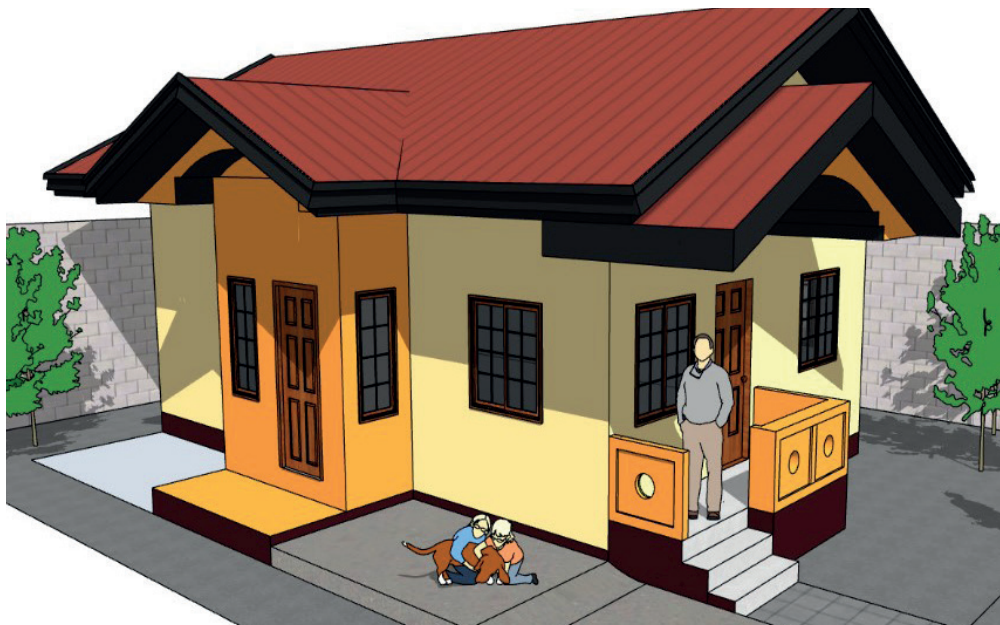
IKAAPAT NA HAKBANG

Anong uri ng istruktura ang balak mong gawin?

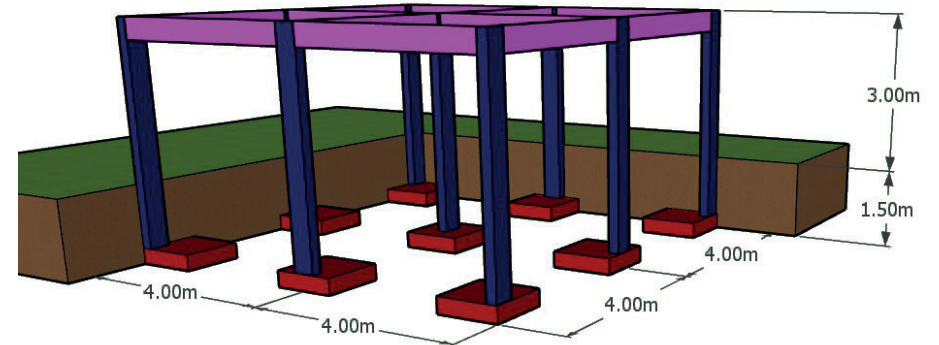


Ang handbook na ito ay mayroong anim (6) na uri ng pagdidissenyo at pagbuo ng tahanan na may hangang tatlong palapag.

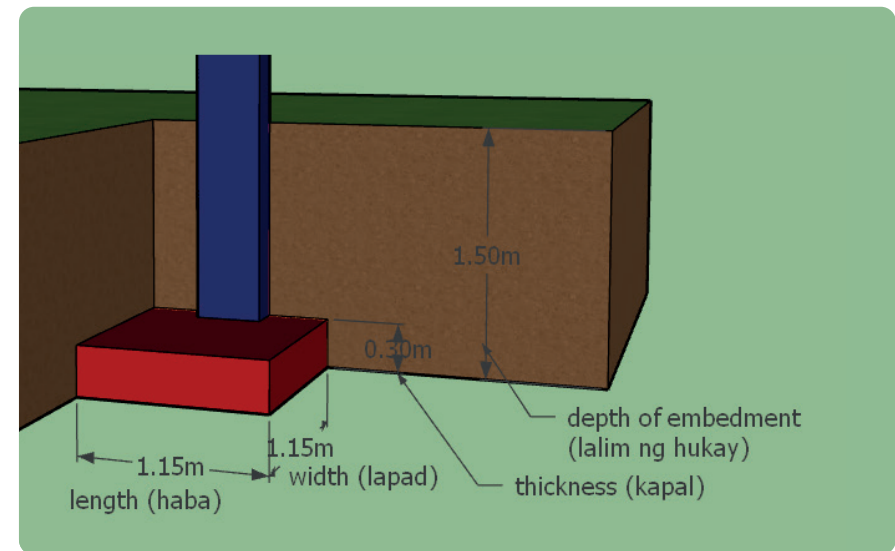
1. BUNGALOW

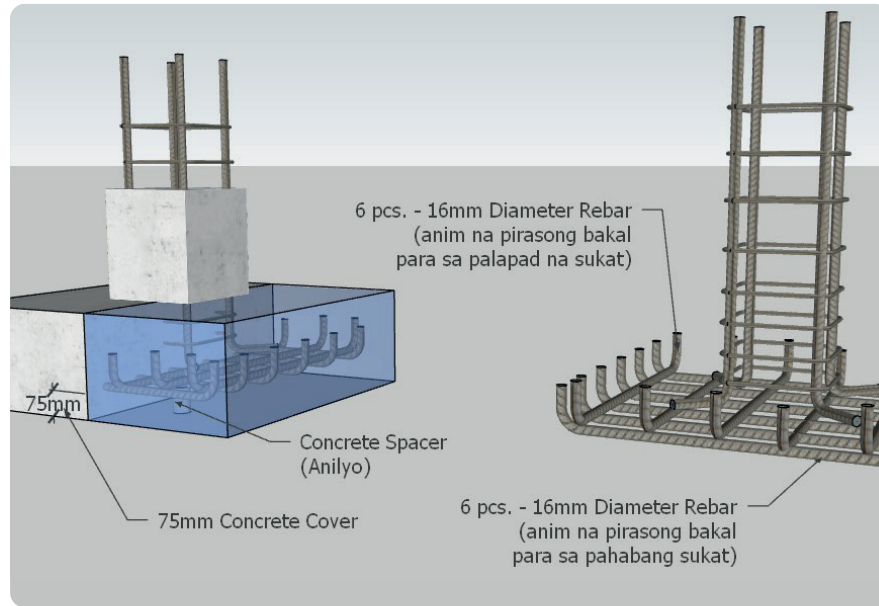


KUNG ANG DISENYO NG IYONG ISTRUKTURA AY ANG MGA SUMUSUNOD:		
Hindi pagsaalang-alang sa pagdating ng lindol	Na may maximum na haba ng apat (4) na metro	Ang taas ng bawat palapag ay tatlong (3) metro



1.A DISENYO PARA SA PUNDASYON





Sukat ng Pundasyon

Haba ng Pundasyon	1.15 m (metro)
Lapad ng Pundasyon	1.15 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Anim (6) na piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Anim (6) na piraso na 16mm na sukat ng bakal

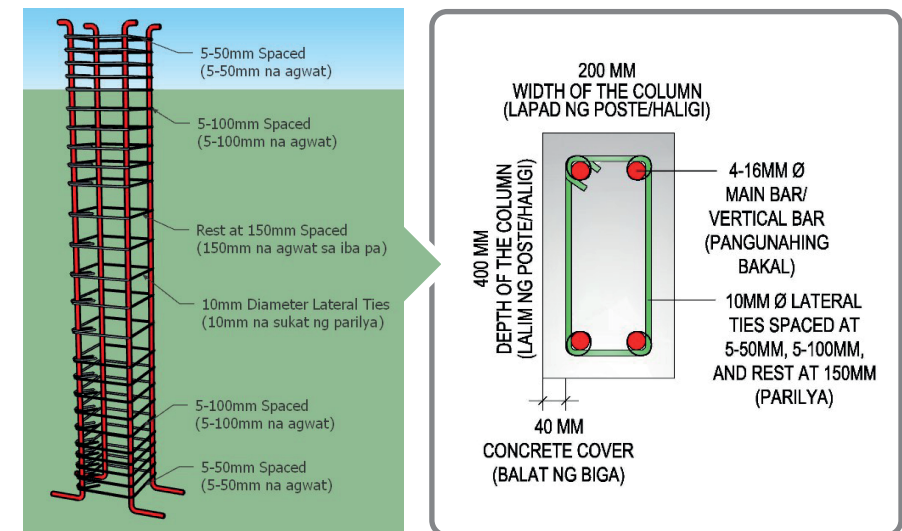
1.B DISENYO PARA SA POSTE/HALIGI

Sukat ng Poste/Haligi

Lapad ng poste/haligi	200mm (milimetro)
Lalim ng poste/haligi	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Apat (4) na piraso na 16mm na sukat ng bakal
Parilya	10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



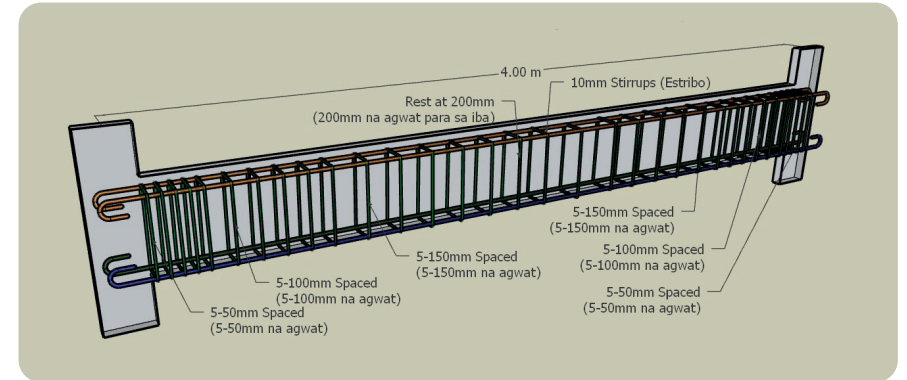
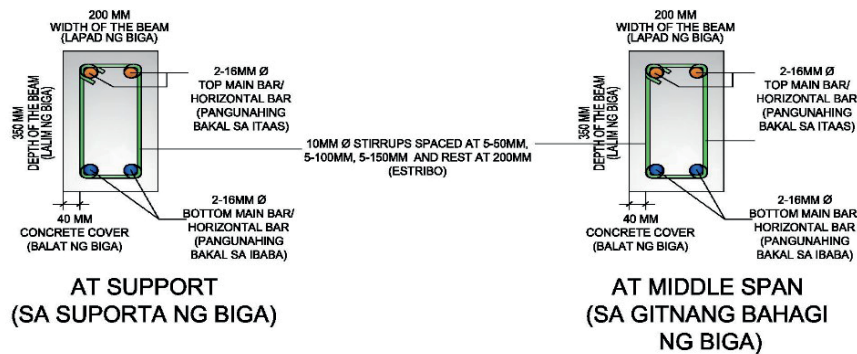
1.C DISENYO PARA SA BIGA

Sukat ng Biga

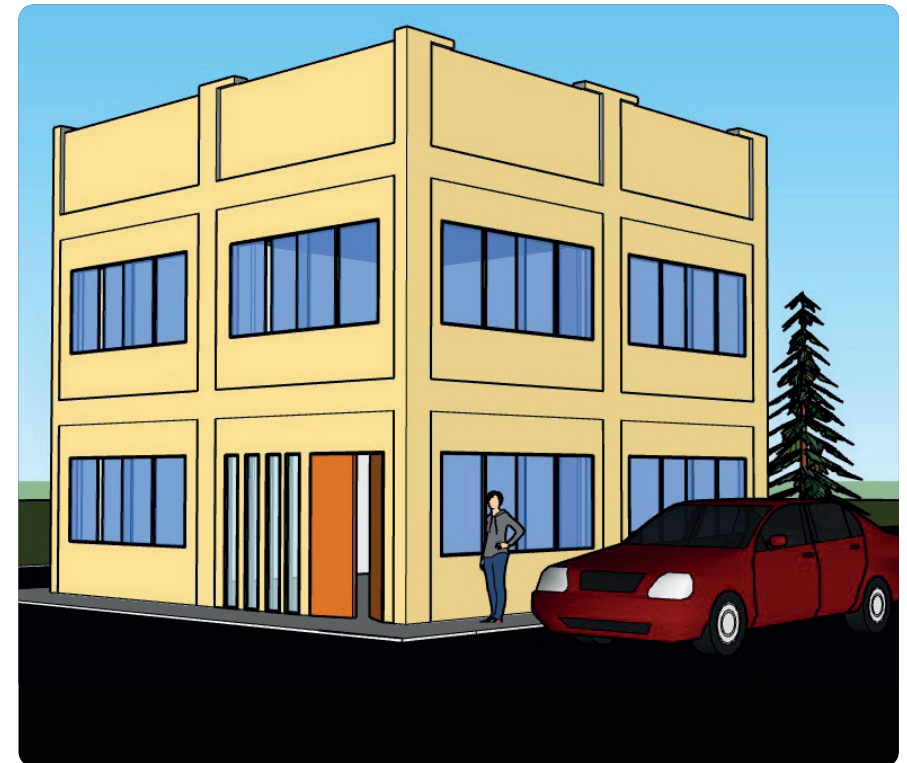
Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba

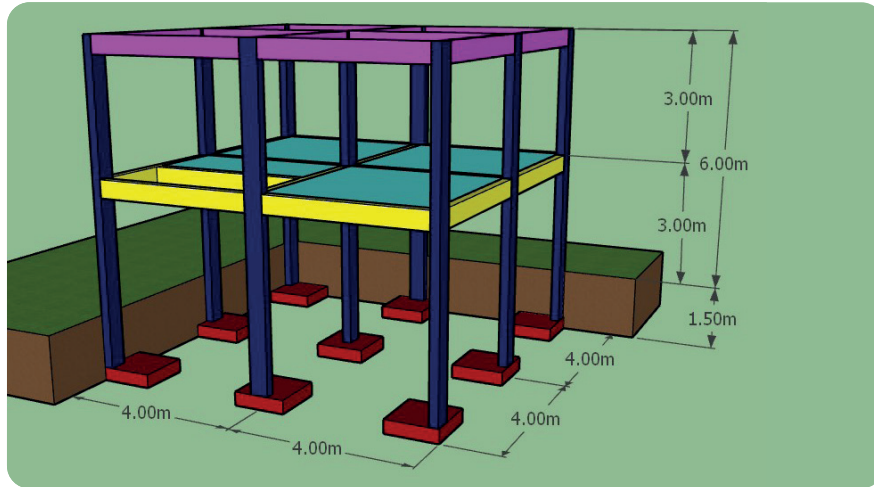


2 - 4. DALAWANG PALAPAG NA BAHAY NA MAYROONG ROOFDECK O BUBONG

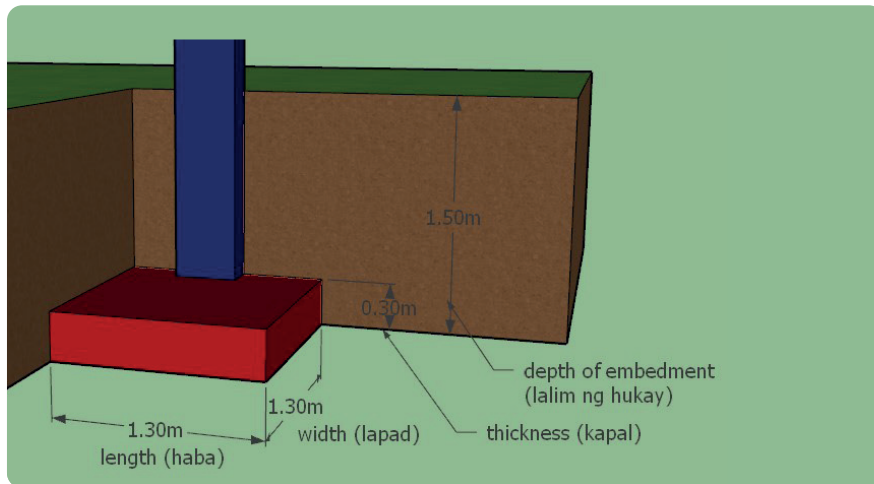


**2. KUNG ANG DISENYO NG IYONG
ISTRUKTURA AY ANG MGA SUMUSUNOD:**

Hindi pagsaalang- alang sa pagdating ng lindol	Na may maximum na haba ng apat (4) na metro	Ang taas ng bawat palapag ay tatlong (3) metro
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2.A DISENYO PARA SA PUNDASYON

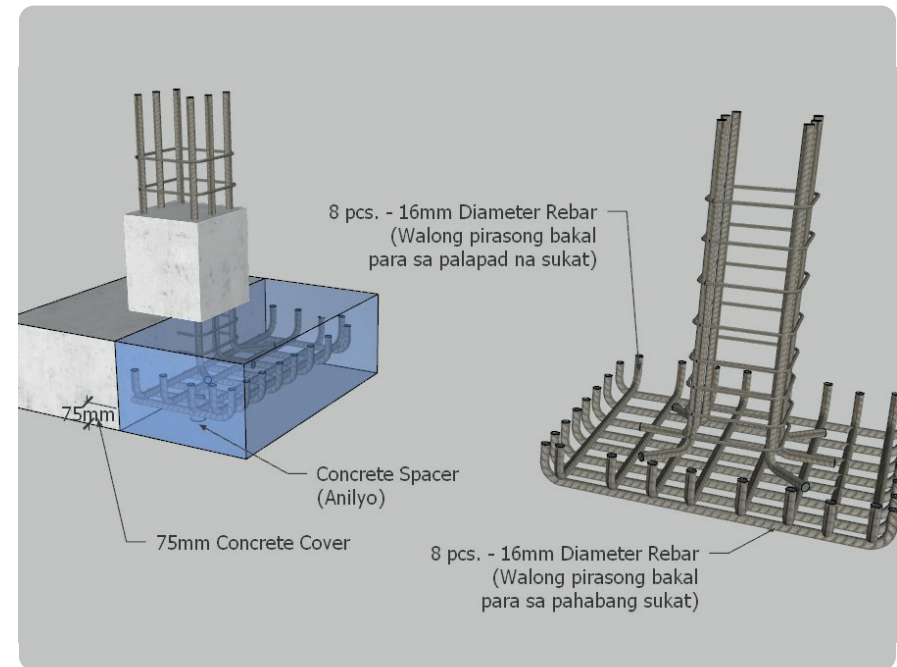


Sukat ng Pundasyon

Haba ng Pundasyon	1.30 m (metro)
Lapad ng Pundasyon	1.30 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Walong (8) piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Walong (8) piraso na 16mm na sukat ng bakal



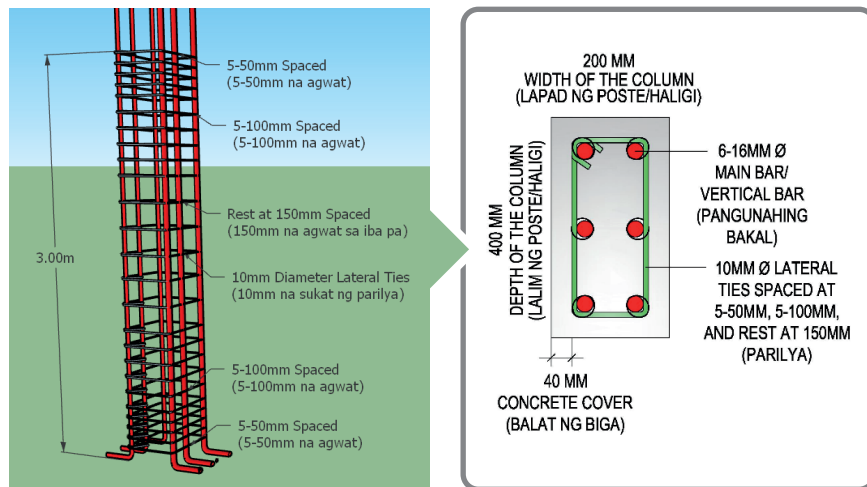
2.B DISENYO PARA SA POSTE/HALIGI

Sukat ng Poste/Haligi

Lapad ng poste/haligi	200mm (milimetro)
Lalim ng poste/haligi	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Anim (6) na piraso na 16mm na sukat ng bakal
Parilya	10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



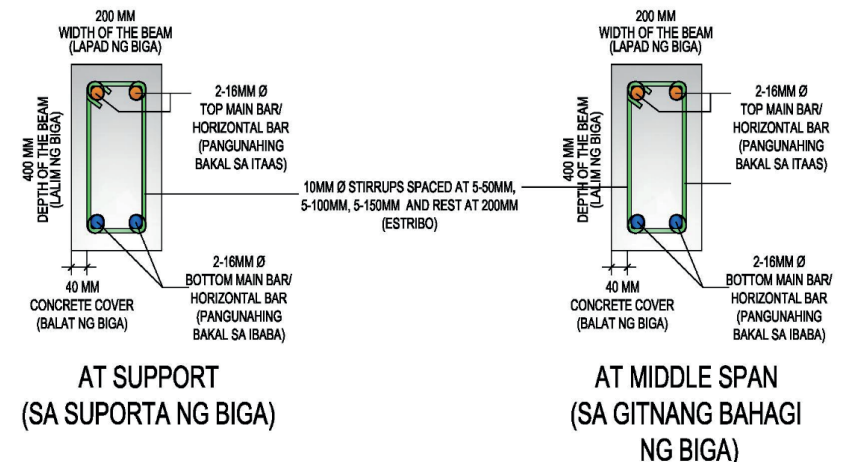
2.C DISENYO PARA SA BIGA

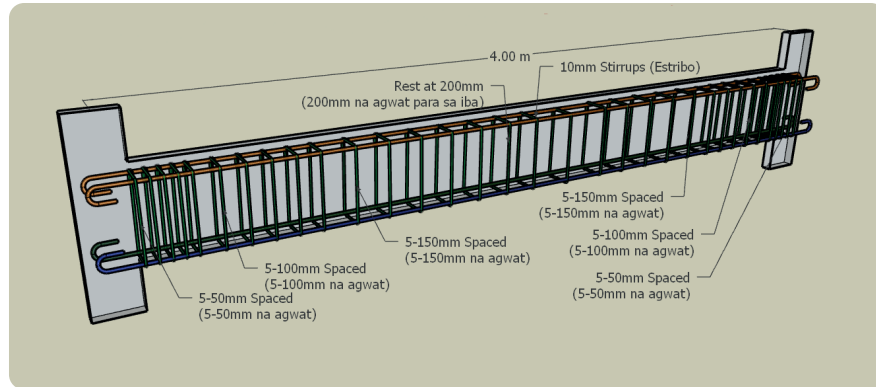
Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Biga

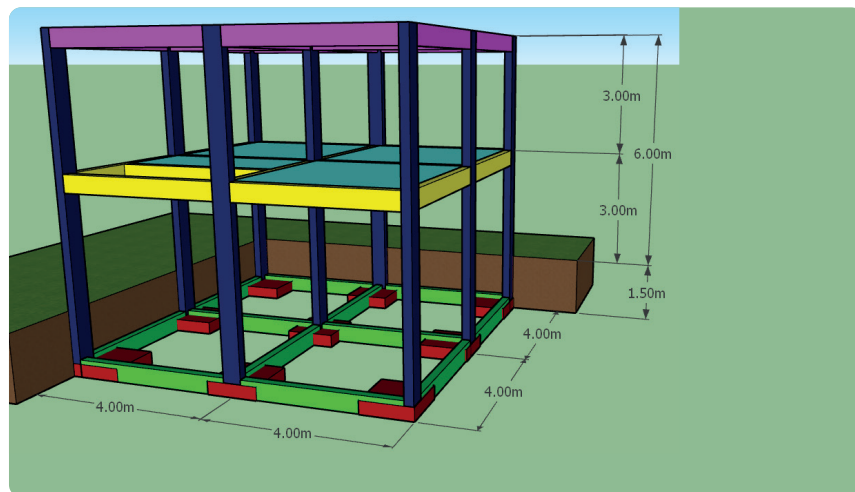
Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



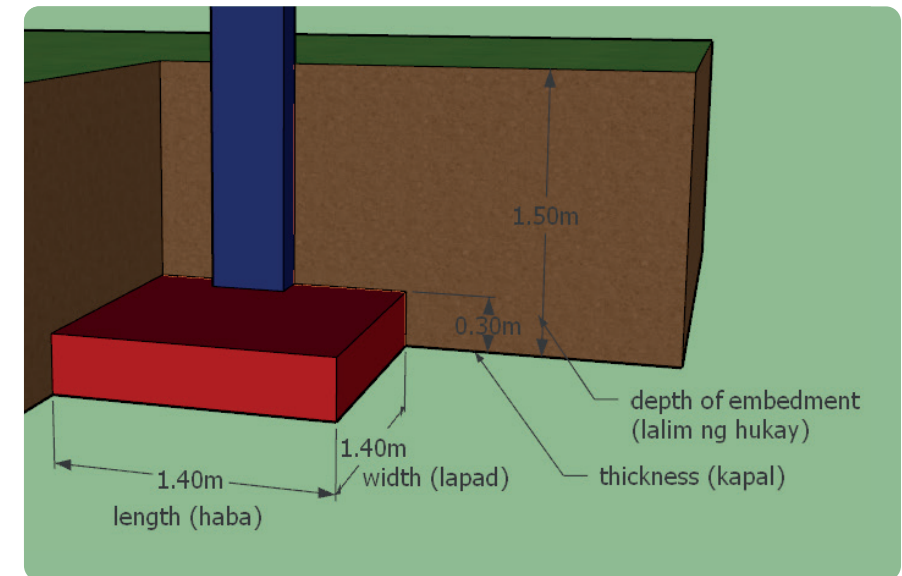


3. KUNG ANG DISENYO NG IYONG ISTRUKTURA AY ANG MGA SUMUSUNOD:

Pagsaalang-alang sa pagdating ng lindol	Na may maximum na haba ng apat (4) na metro	Ang taas ng bawat palapag ay tatlong (3) metro
Mayroong Earthquake Hazard Assessment galing sa Phivolcs na may 5km malapit na distansya sa kilalang pinagmulan ng lindol.		Biga sa pundasyon ay kailangan.



3.A DISENYO PARA SA PUNDASYON

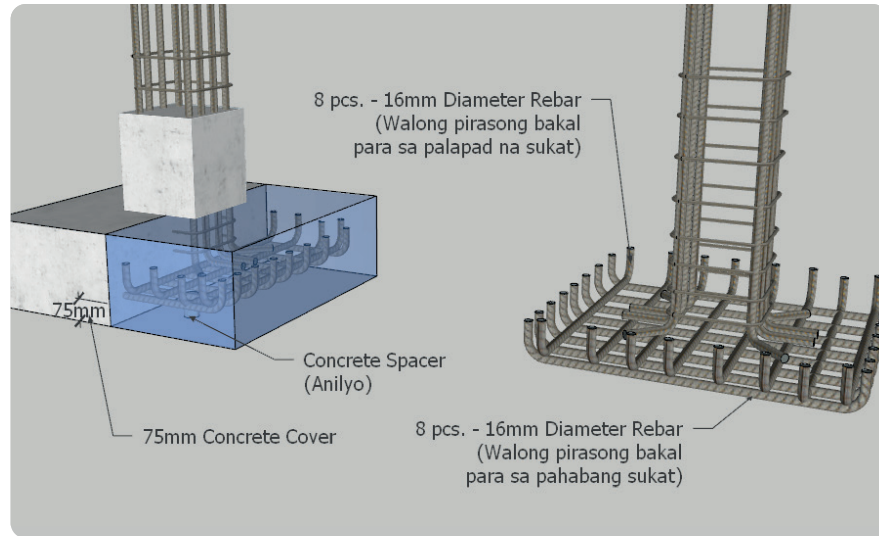


Sukat ng Pundasyon

Haba ng Pundasyon	1.40 m (metro)
Lapad ng Pundasyon	1.40 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Walong (8) piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Walong (8) piraso na 16mm na sukat ng bakal



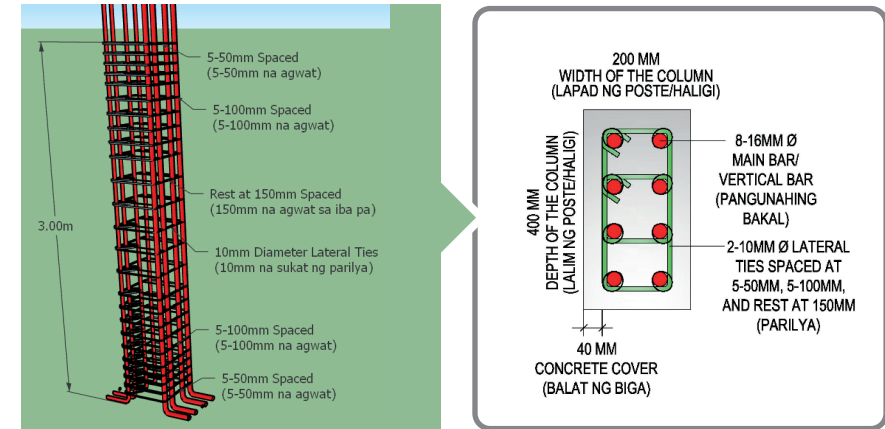
3.B DISENYO PARA SA POSTE/HALIGI

Sukat ng Poste/Haligi

Lapad ng poste/haligi	200mm (milimetro)
Lalim ng poste/haligi	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Walong (8) piraso na 16mm na sukat ng bakal
Parilya	2-10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



3.C DISENYO PARA SA BIGA

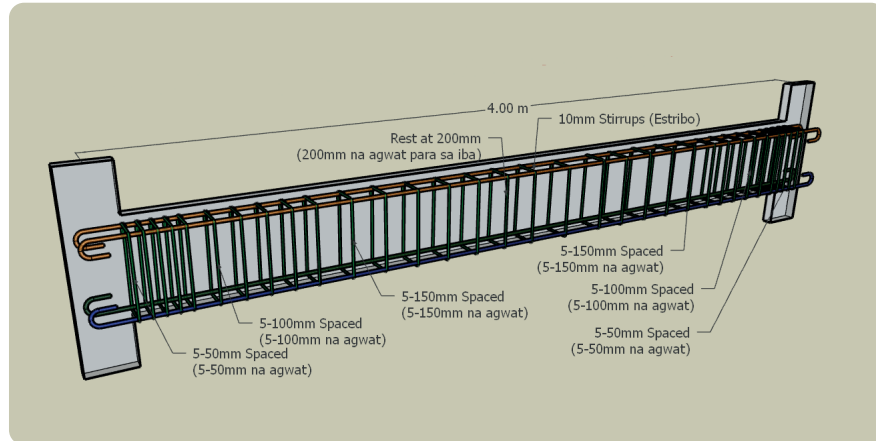
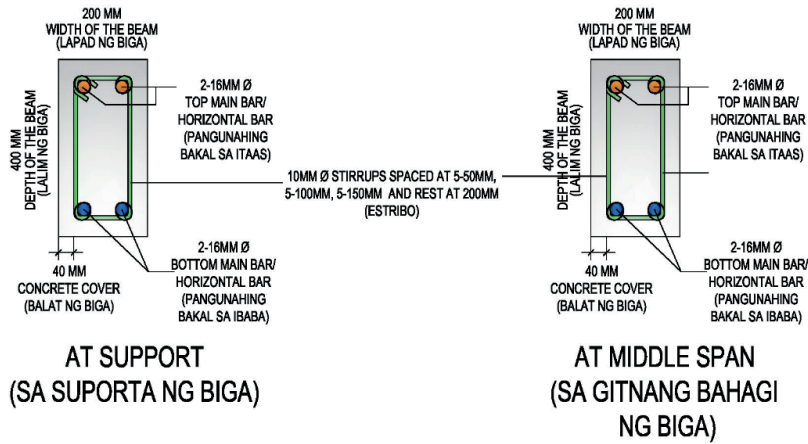
3.C.1 Biga para sa Pundasyon at Biga para sa Bubong/Deck

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



3.C.2 Biga para sa Pangalawang Palapag

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas

Tatlong (3) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas

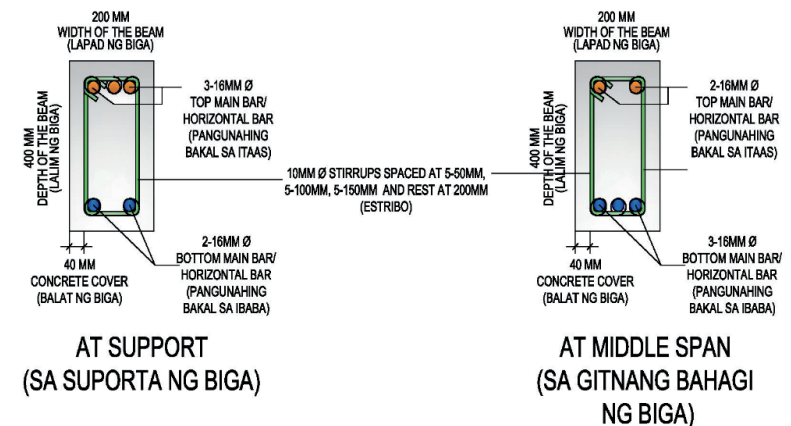
Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Estribo

10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba

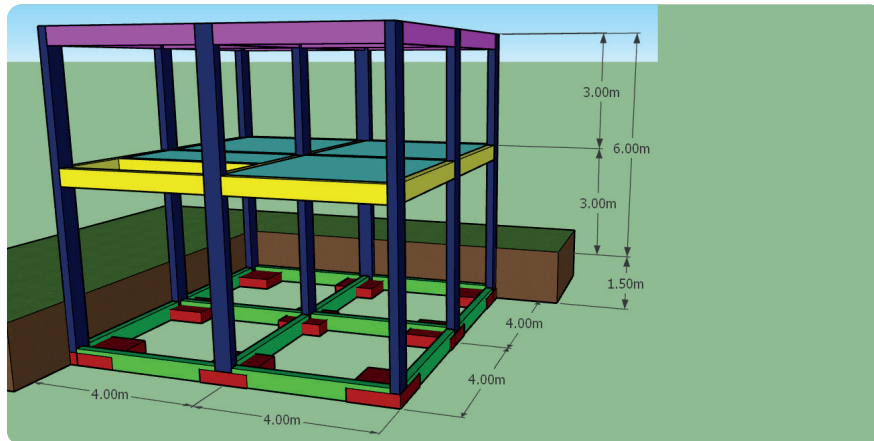


4. KUNG ANG DISENYO NG IYONG ISTRUKTURA AY ANG MGA SUMUSUNOD:

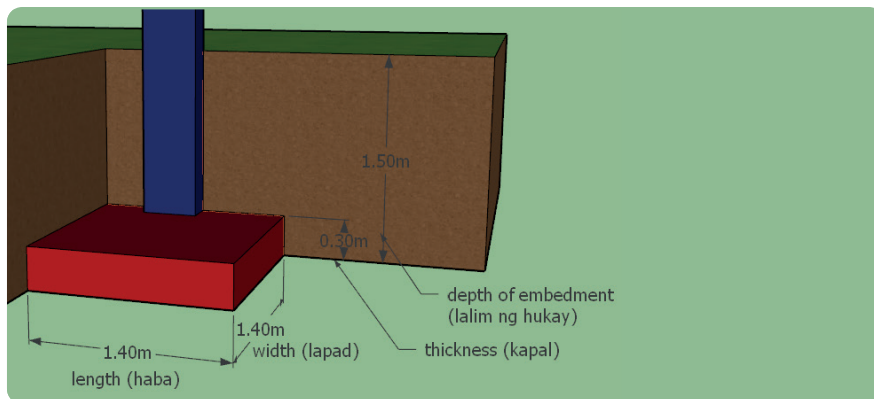
Pagsaalang-alang sa pagdating ng lindol	Na may maximum na haba ng apat (4) na metro	Ang taas ng bawat palapag ay tatlong (3) metro
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Mayroong Earthquake Hazard Assessment galing sa Phivolcs na may 2km malapit na distansya sa kilalang pinagmulan ng lindol.

Biga sa pundasyon ay kailangan.



4.A DISENYO PARA SA PUNDASYON

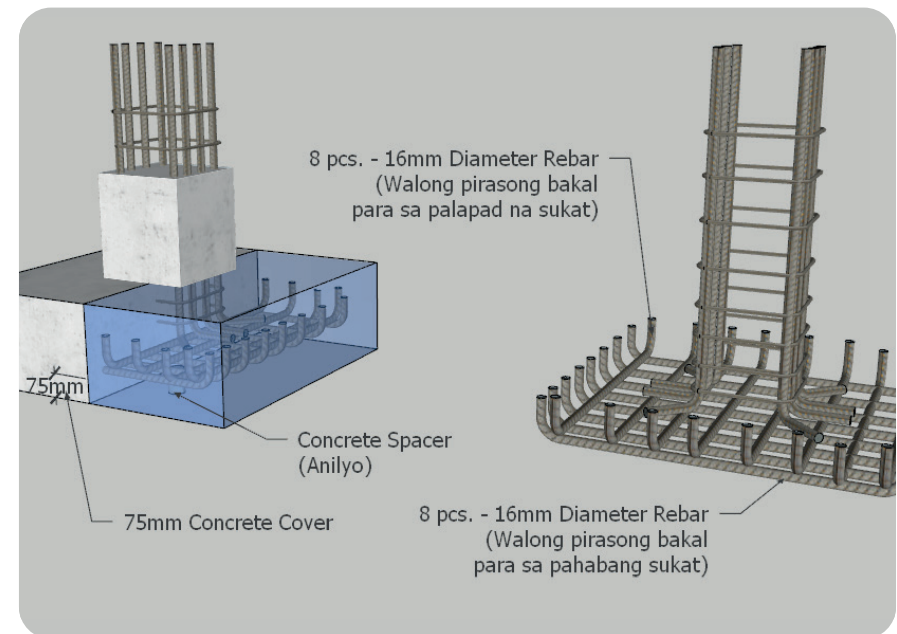


Sukat ng Pundasyon

Haba ng Pundasyon	1.40 m (metro)
Lapad ng Pundasyon	1.40 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Walong (8) piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Walong (8) piraso na 16mm na sukat ng bakal



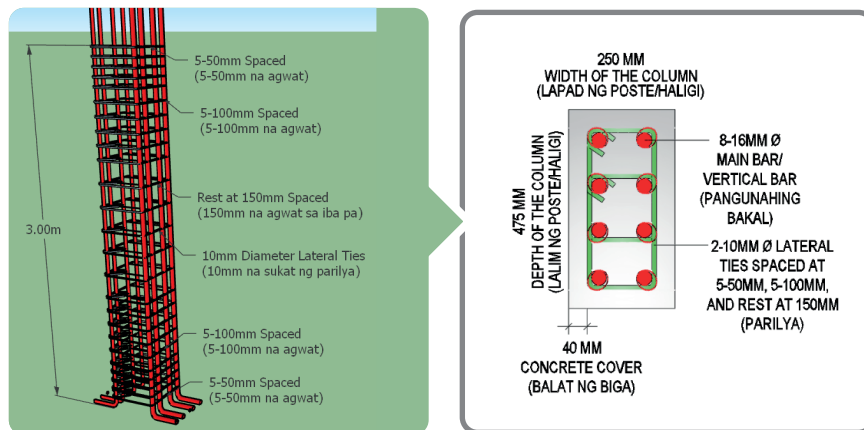
4.B DISENYO PARA SA POSTE/HALIGI

Sukat ng Poste/Haligi

Lapad ng poste/haligi	250mm (milimetro)
Lalim ng poste/haligi	475mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Walong (8) piraso na 16mm na sukat ng bakal
Parilya	2-10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



4.C DISENYO PARA SA BIGA

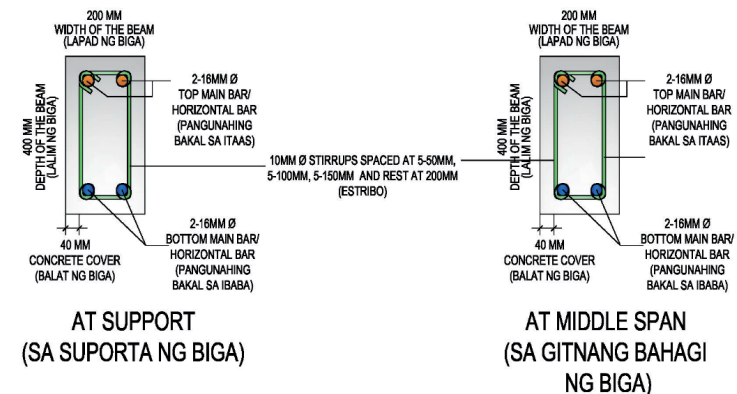
4.C.1 Biga para sa Pundasyon at Biga para sa Bubong o Deck

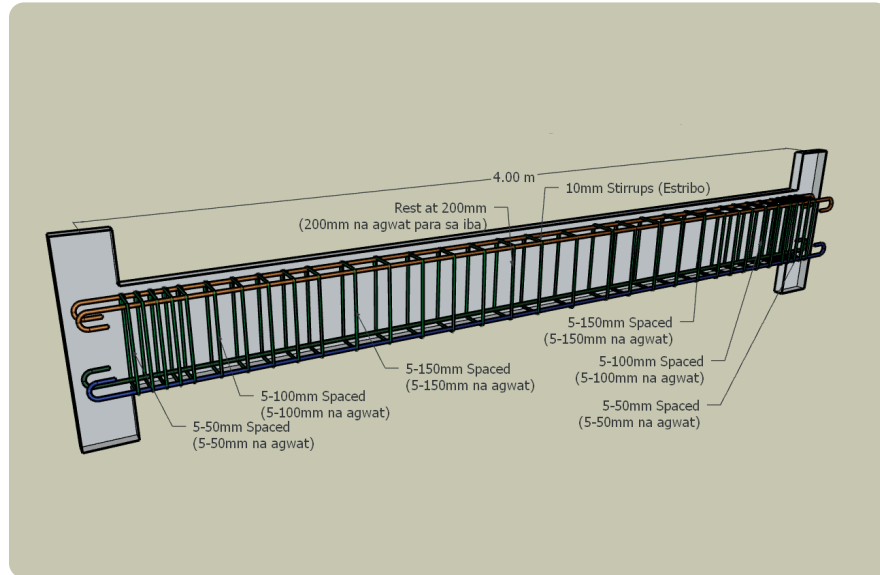
Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba





BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas

Tatlong (3) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas

Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Estribo

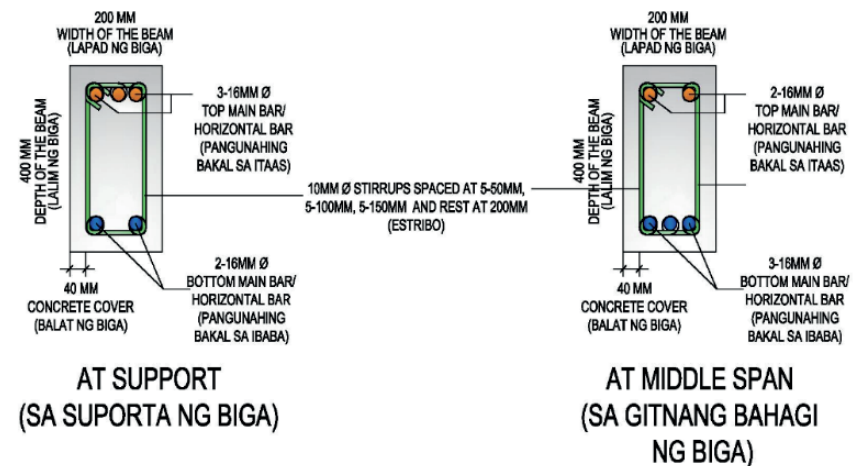
10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba

4.C.2 Biga para sa Pangalawang Palapag

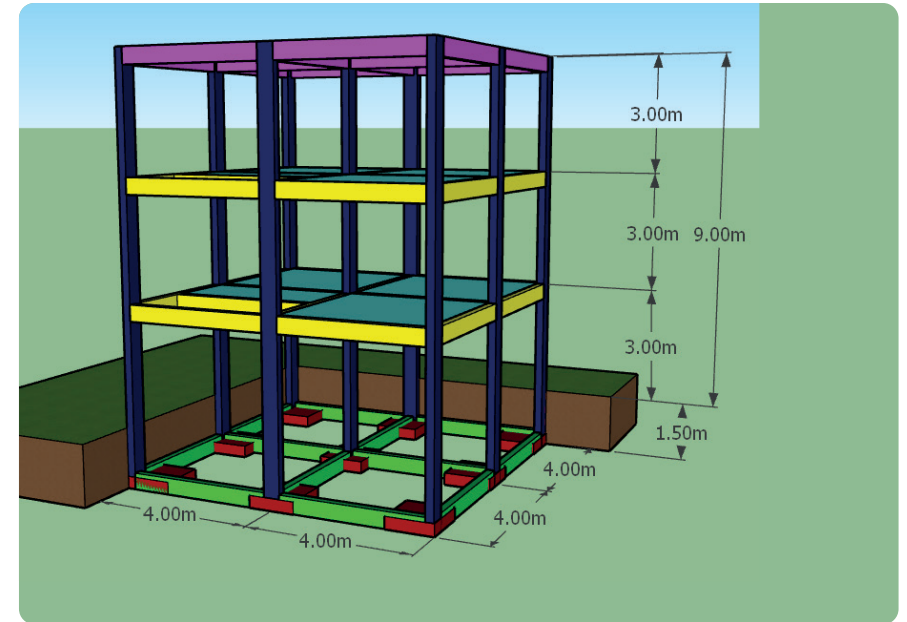
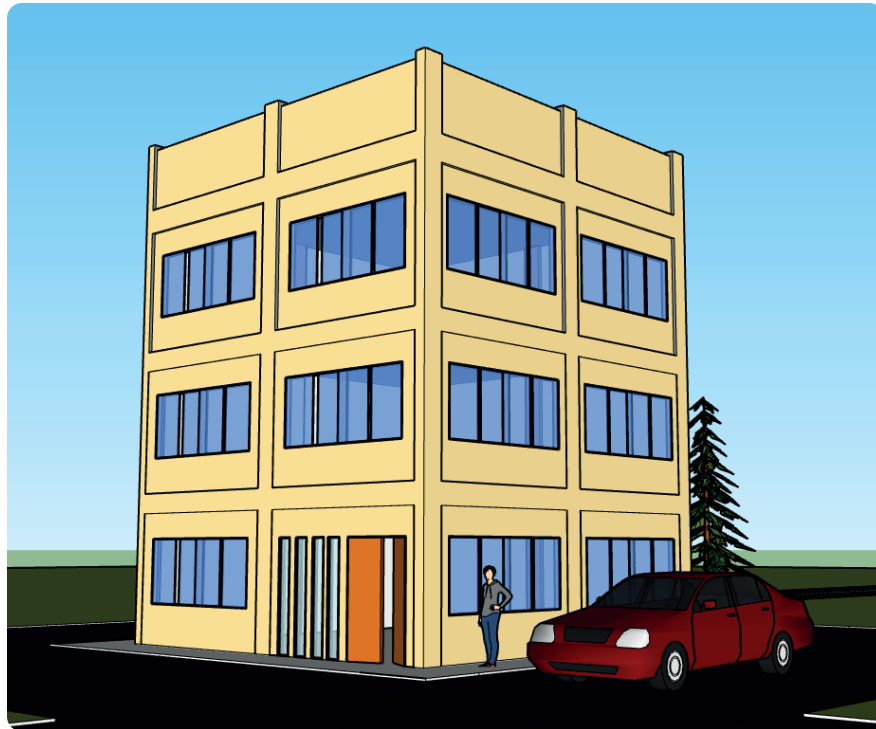
Sukat ng Biga

Lapad ng biga
Lalim ng biga
Concrete Cover
Lalim ng Anilyo

200mm (milimetro)
400mm (milimetro)
40mm (milimetro)
40mm (milimetro)

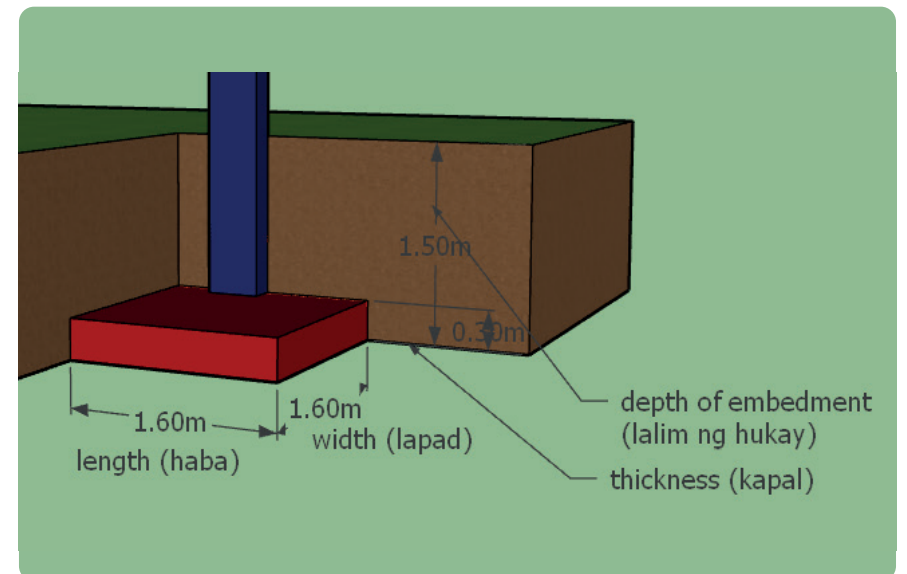


5-6. TATLONG PALAPAG NA BAHAY NA MAYROONG ROOFDECK O BUBONG



5.A DISENYO PARA SA PUNDASYON

5. KUNG ANG DISENYO NG IYONG ISTRUKTURA AY ANG MGA SUMUSUNOD:	
Pagsaalang-alang sa pagdating ng lindol na may 5km malapit na distansya sa kilalang pinagmulan ng lindol.	Na may maximum na haba ng apat (4) na metro
Ang taas ng bawat palapag ay tatlong (3) metro	Biga sa pundasyon ay kailangan

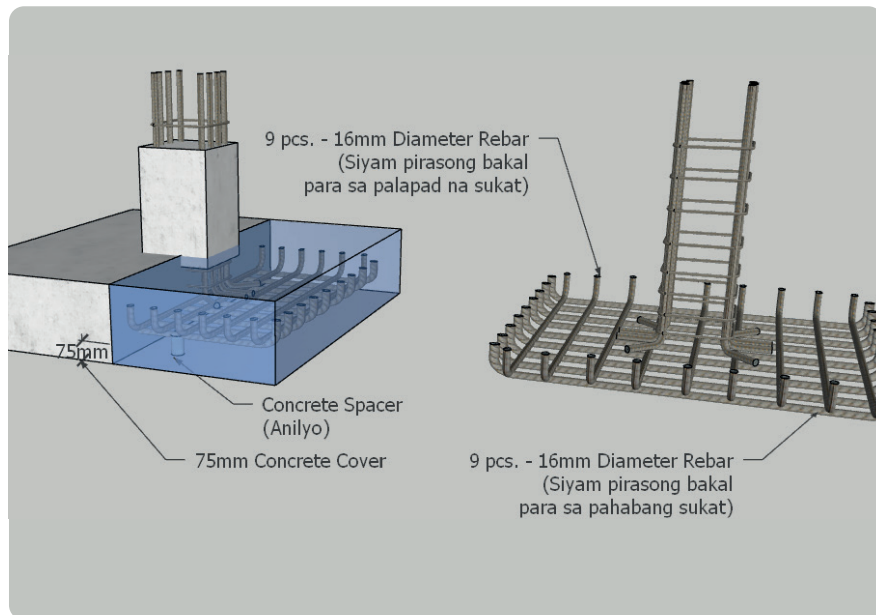


Sukat ng Pundasyon

Haba ng Pundasyon	1.60 m (metro)
Lapad ng Pundasyon	1.60 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Siyam (9) na piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Siyam (9) na piraso na 16mm na sukat ng bakal



5.B DISENYO PARA SA POSTE/HALIGI

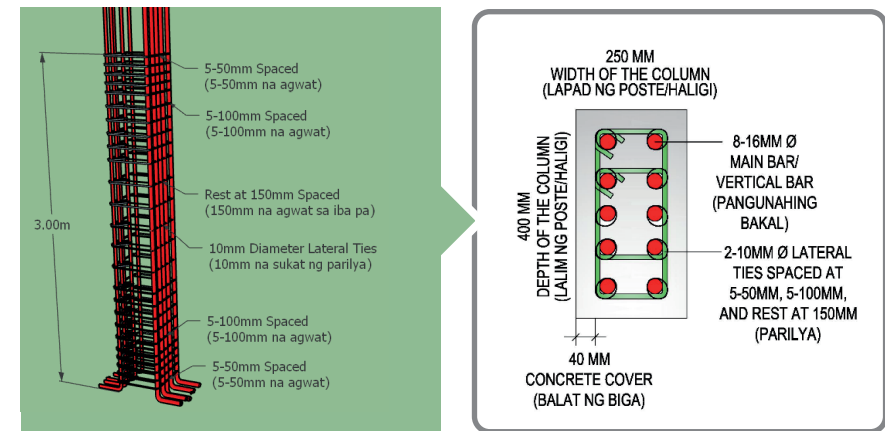
5.B.1 Poste/Haligi para sa Unang hanggang Pangalawang Palapag

Sukat ng Poste/Haligi

Lapad ng poste/haligi	250mm (milimetro)
Lalim ng poste/haligi	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Sampung (10) piraso na 16mm na sukat ng bakal
Parilya	2-10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



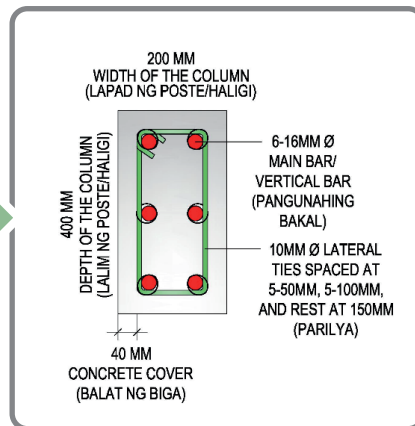
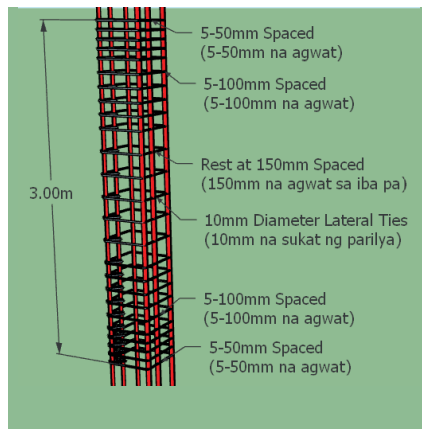
5.B.2 Poste/Haligi para sa Pangalawang Palapag hanggang sa Bubong

Sukat ng Poste/Haligi

Lapad ng poste/haligi	200mm (milimetro)
Lalim ng poste/haligi	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Anim (6) na piraso na 16mm na sukat ng bakal
Parilya	10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



5.C DISENYO PARA SA BIGA

5.C.1 Biga para sa Pundasyon

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

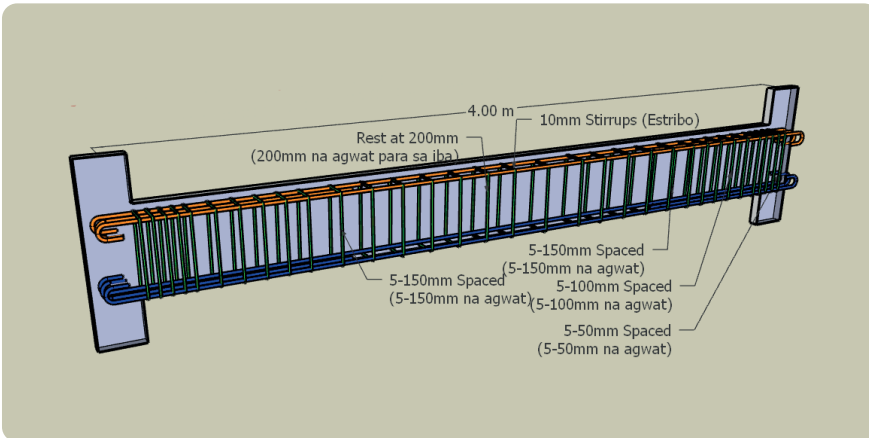
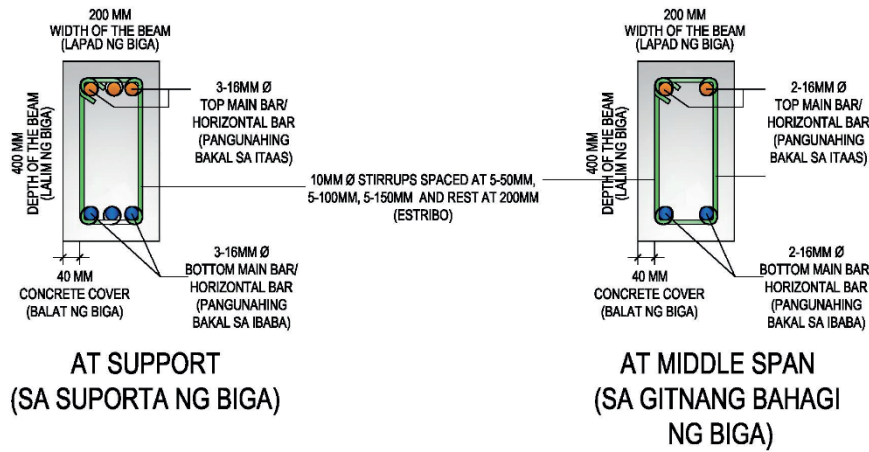
BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas	Tatlong (3) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



5.C.2 Biga para sa Pangalawa at Pangatlong Palapag

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas

Tatlong (3) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas

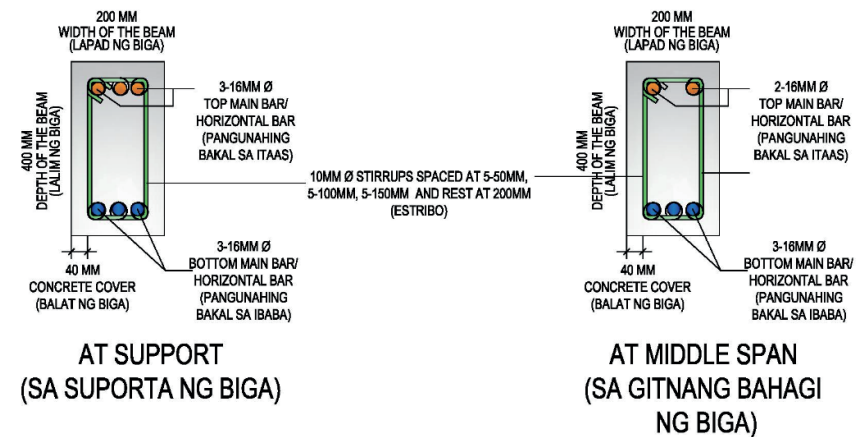
Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas

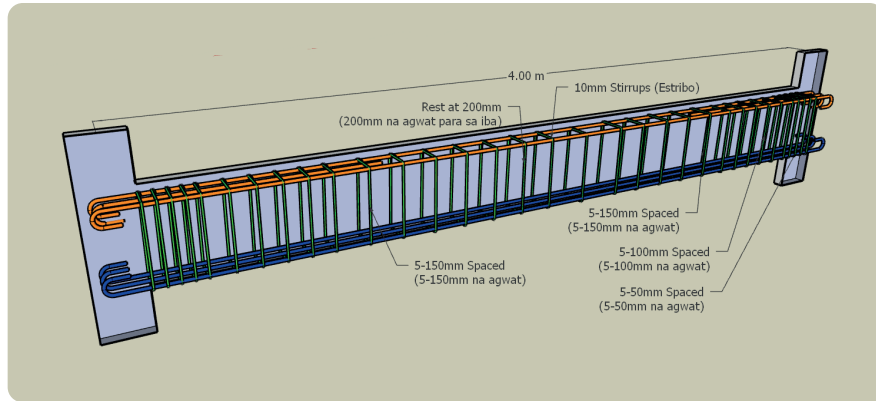
Pangunahing Bakal para sa ibaba

Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Estribo

10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba





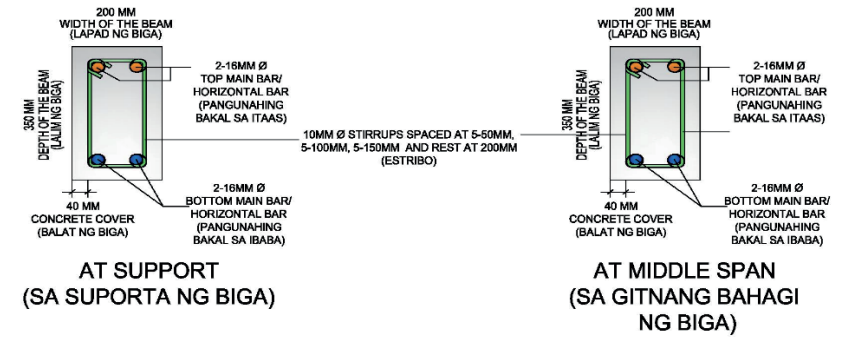
5.C.3 Biga para sa Pangalawa at Pangatlong Palapag

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim ng biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

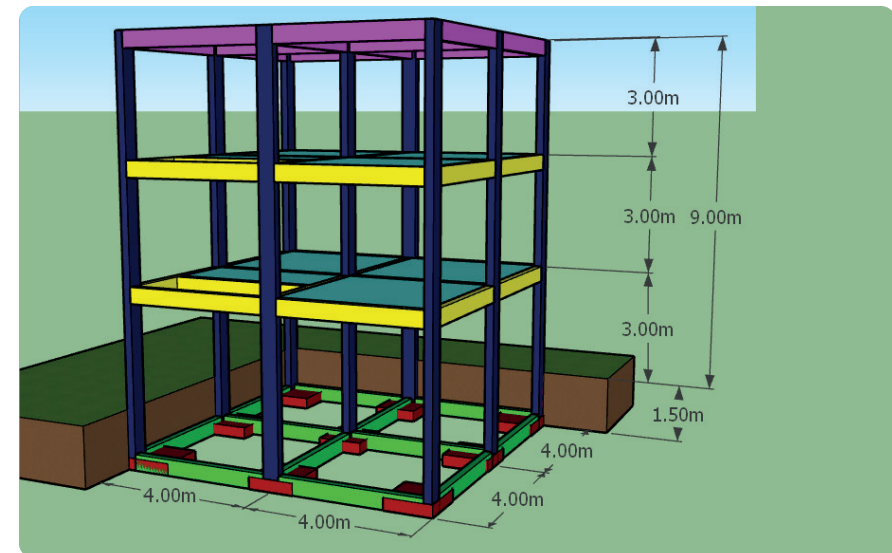
Bakal ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba

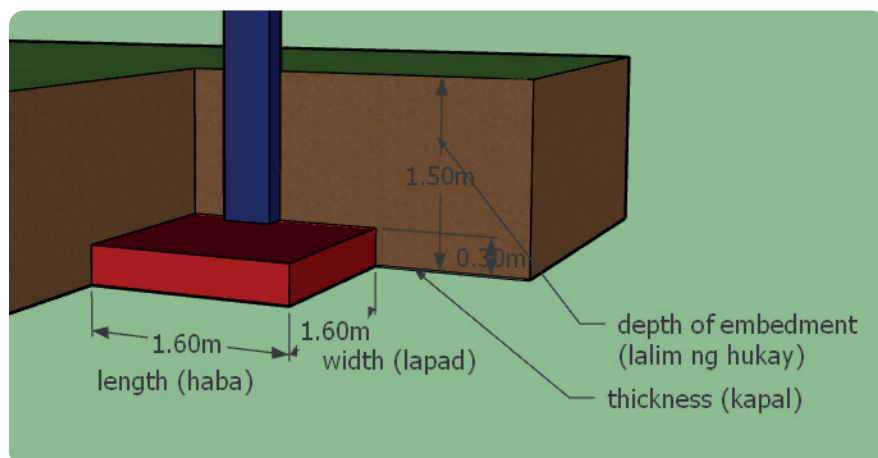


6. KUNG ANG DISENYO NG IYONG ISTRUKTURA AY ANG MGA SUMUSUNOD:

Pagsaalang-alang sa pagdating ng lindol na may 2km malapit na distansya sa kilalang pinagmulan ng lindol.	Na may maximum na haba ng apat (4) na metro
Ang taas ng bawat palapag ay tatlong (3) metro	Biga sa pundasyon ay kailangan



6.A DISENYO PARA SA PUNDASYON

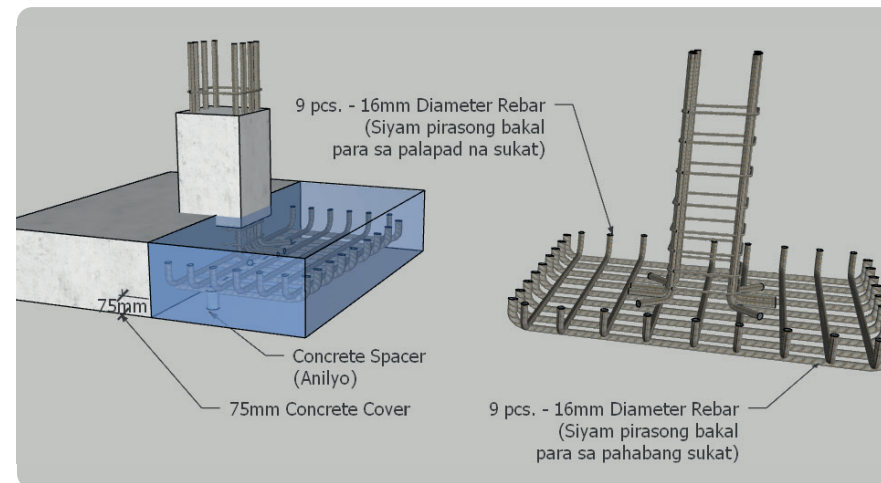


Sukat ng Pundasyon

Haba ng Pundasyon	1.60 m (metro)
Lapad ng Pundasyon	1.60 m (metro)
Kapal ng Pundasyon	300 mm (milimetro)
Lalim ng hukay ng pundasyon	1.50 m (metro)
Concrete Cover	75mm (milimetro)
Lalim ng Anilyo	75mm (milimetro)

Bakal ng Pundasyon

Bakal para sa pahabang sukat	Siyam (9) na piraso na 16mm na sukat ng bakal
Bakal para sa palapad na sukat	Siyam (9) na piraso na 16mm na sukat ng bakal



6.B DISENYO PARA SA POSTE/HALIGI

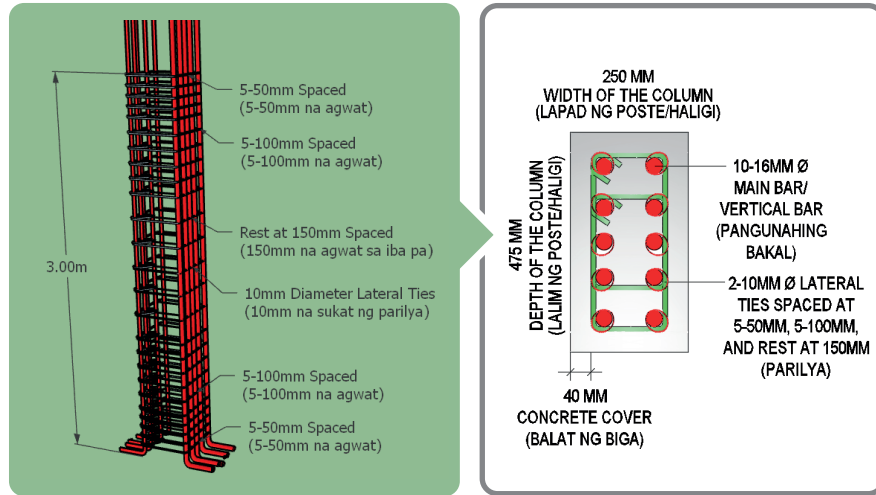
6.B.1 Poste/Haligi para sa Una hanggang Pangalawang Palapag

Sukat ng Poste/Haligi

Lapad ng poste/haligi	250mm (milimetro)
Lalim ng poste/haligi	475mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Sampung (10) piraso na 16mm na sukat ng bakal
Parilya	2-10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



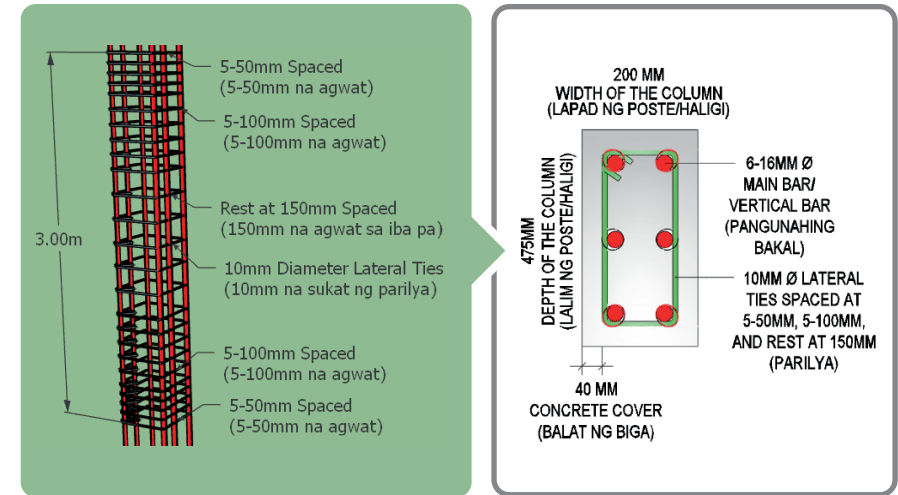
6.B.2 Poste/Haligi para sa Pangalawang Palapag Hanggang sa Bubong

Sukat ng Poste/Haligi

Lapad ng poste/haligi	200mm (milimetro)
Lalim ng poste/haligi	475mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

Bakal ng Poste/Haligi

Pangunahing Bakal	Anim (6) piraso na 16mm na sukat ng bakal
Parilya	10mm na sukat ng parilya na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm at 150mm para sa iba



6.C DISENYO PARA SA BIGA 6.C.1 Biga para sa Pundasyon

Sukat ng biga

Lapad ng biga	200mm (milimetro)
Lalim Ng Biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

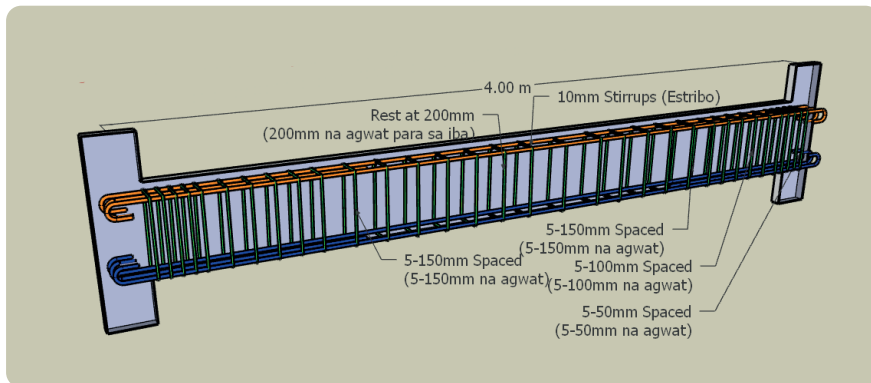
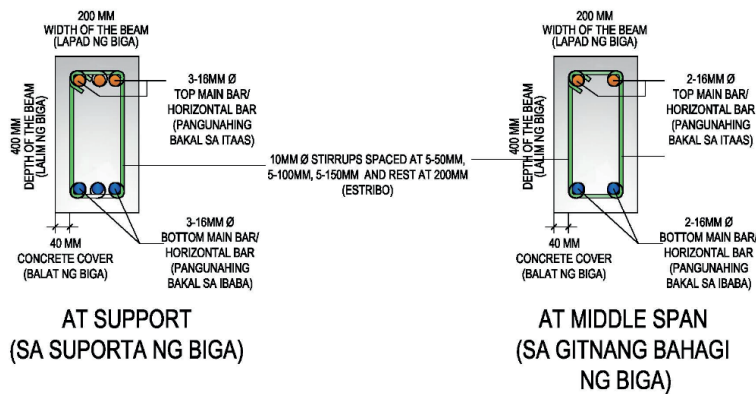
BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas	Tatlong (3) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



6.C.2 Biga para sa Pangalawa at Pangatlong Palapag

Sukat ng biga

Lapad ng biga	200mm (milimetro)
Lalim Ng Biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)

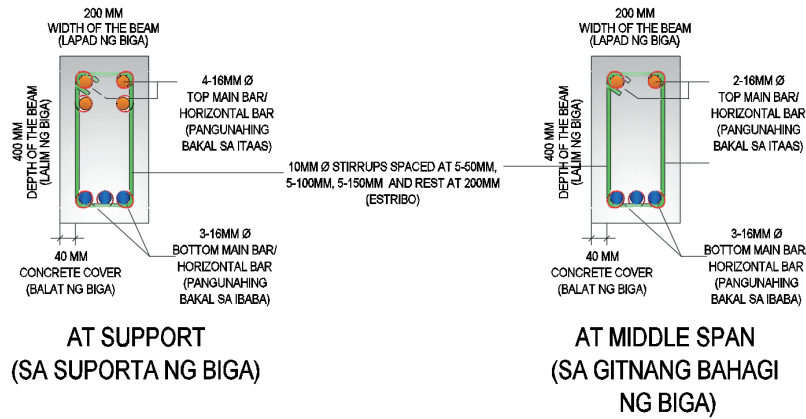
BAKAL NG BIGA

Para sa Suporta ng Biga

Pangunahing Bakal para sa itaas	Apat (4) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba

Para sa Gitnang Bahagi ng Biga

Pangunahing Bakal para sa itaas	Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas
Pangunahing Bakal para sa ibaba	Tatlong (3) piraso na 16mm na sukat ng bakal para sa ibaba
Estribo	10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



Bakal ng Biga

Pangunahing Bakal para sa itaas

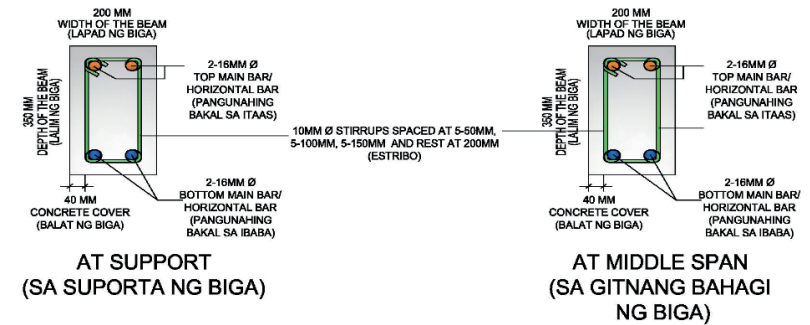
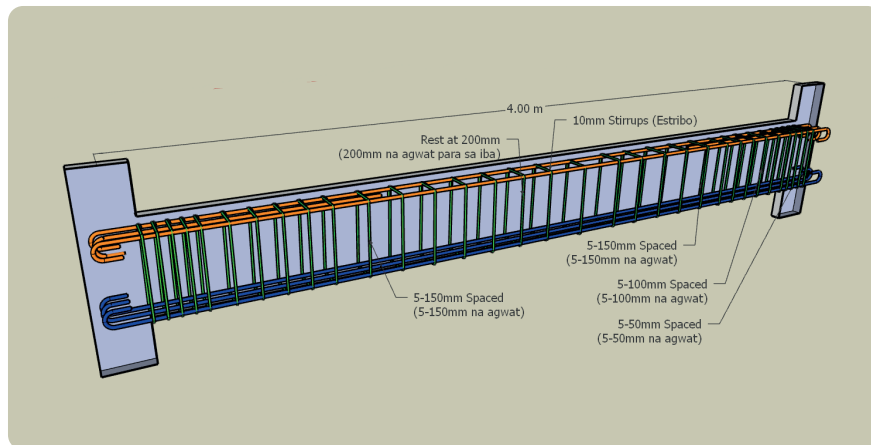
Dalawang (2) piraso na 16mm na sukat ng bakal para sa itaas

Pangunahing Bakal para sa ibaba

Dalawang (2) piraso na 16mm na sukat ng bakal para sa ibaba

Estribo

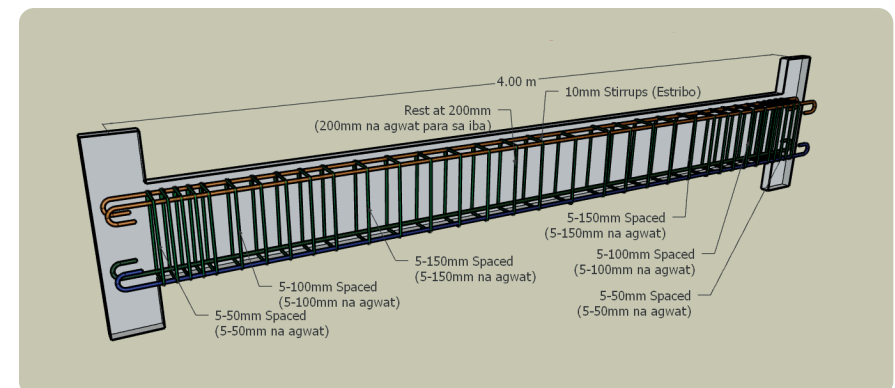
10mm na sukat ng estribo na mayroong agwat ang bawat isa na 5- 50mm, 5-100mm, 5-150mm at 200mm para sa iba



6.C.3 Biga para sa Bubong o Deck

Sukat ng Biga

Lapad ng biga	200mm (milimetro)
Lalim Ng Biga	400mm (milimetro)
Concrete Cover	40mm (milimetro)
Lalim ng Anilyo	40mm (milimetro)



BUOD NG DISENYO

I. DISENYO NG POSTE


PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW								
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck			For Three (3) Storey Residential			
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration		-with Seismic Loads/Consideration	
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.		-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters		-with max. span of four (4) meters	
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters		-with storey height of three (3) meters	
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)		-with Footing Tie Beam (FTB)	
I. Column					For Ground to 2nd Floor	For 2nd Floor to Roof	For Ground to 2nd Floor	For 2nd Floor to Roof
I.1 Size								
Depth (H) =	400 mm	400 mm	400 mm	475 mm	400 mm	400 mm	475 mm	475 mm
Width (W) =	200 mm	200 mm	200 mm	250 mm	250 mm	200 mm	250 mm	200 mm
I.2 Reinforcement Bar								
n =	4 pcs	6 pcs	8 pcs	8 pcs	10 pcs	6 pcs	10 pcs	6 pcs
Φ =	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm
Pattern =	2-2	2-3	2-4	2-4	2-5	2-3	2-5	2-3

II. DISENYO NG BIGA

PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW												
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck				For Three (3) Storey Residential						
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration		-with Seismic Loads/Consideration					
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.		-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.					
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters		-with max. span of four (4) meters					
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters		-with storey height of three (3) meters					
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)		-with Footing Tie Beam (FTB)					
II. Beam			For FTB and Roof/Roof Deck Beam	For 2nd Floor Beam	For FTB	For 2nd Floor Beam and Roof/Roof Deck Beam	For FTB	For 2nd and 3rd Floor Beam	For Roof Beam	For FTB	For 2nd and 3rd Floor Beam	For Roof Beam
II.1 Size												
Depth (H) =	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Width (W) =	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm
II.2 Reinforcement Bar												
Support												
Top =	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm	3-16mm	3-16mm	3-16mm	2-16mm	3-16mm	4-16mm	2-16mm
Bottom =	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	3-16mm	3-16mm	2-16mm	3-16mm	3-16mm	2-16mm
Mid-span												
Top =	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm
Bottom =	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm	3-16mm	2-16mm	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm

III. DISENYO NG PUNDASYON

PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW						
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck			For Three (3) Storey Residential	
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	
III. Footing						
III.1 Size						
Length (L) =	1.15 m	1.30 m	1.40 m	1.40 m	1.60 m	1.60 m
Width (B) =	1.15 m	1.30 m	1.40 m	1.40 m	1.60 m	1.60 m
Thickness (t) =	300 mm	300 mm	300 mm	300 mm	300 mm	300 mm
III.2 Soil Bearing Capacity						
Embedment Depth (D) =	1.50 m	1.50 m	1.50 m	1.50 m	1.50 m	1.50 m
SBC =	144 kPa	144 kPa	144 kPa	144 kPa	144 kPa	144 kPa
III.3 Reinforcement Bar						
ΦB =	16mm	16mm	16mm	16mm	16mm	16mm
NL =	6 pcs	8 pcs	8 pcs	8 pcs	9 pcs	9 pcs
NB =	6 pcs	8 pcs	8 pcs	8 pcs	9 pcs	9 pcs



Paano naman ang pagdidisenyo at pagbuo ng SAHIG, HAGDANAN, at PADER.

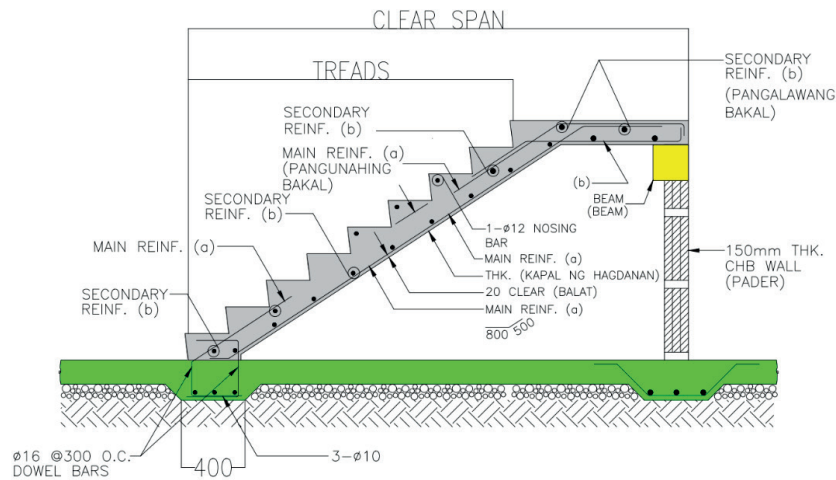
A. DISENYO PARA SA SAHIG

TIPIKAL NA DISENYO NG SAHIG				
Sukat ng Sahig	Kapal ng Sahig	Sukat ng Bakal	Puwang ng bakal para sa pahaba at maliit na direksyon	
			Suputang bahagi ng sahig	Gitnang bahagi ng sahig
4m x 4m	100mm	10mmØ	200mm	200mm
	100mm	12mmØ	300mm	300mm

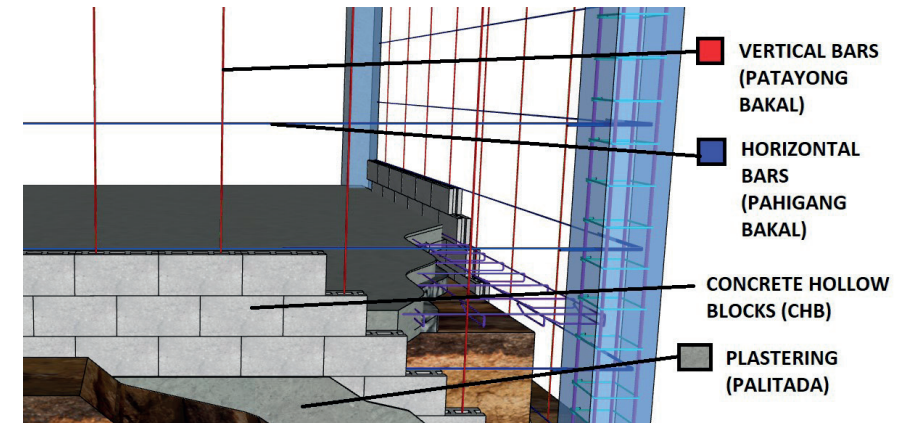
B. DISENYO PARA SA HAGDANAN

- Stair span is the distance between adjacent stair supports whether it is a beam, a column, or a wall.
- Without a stair support location, consult and seek approval of Structural Design Engineer.

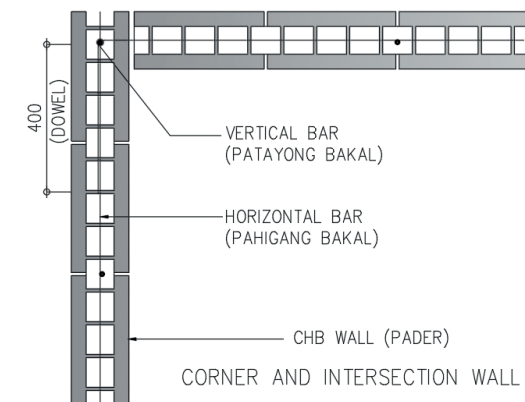
TIPIKAL NA DISENYO NG HAGDANAN			
Haba ng Hagdanan	Kapal ng Hagdanan	Sukat ng bakal at mga puwang nito	
		Pangunahing Bakal	Pangalawang Bakal
4.0m	150mm	16mmØ at 200mm	10mmØ at 250mm
5.0m	150mm	16mmØ at 125mm	10mmØ at 250mm
6.0m	175mm	16mmØ at 100mm	12mmØ at 350mm



C. DISENYO PARA SA PADER/CHB WALLS



TIPIKAL NA DISENYO NG HAGDANAN		
Kapal ng CHB	Pahigang Bakal at ang mga puwang nito	Patayong Bakal at ang mga puwang nito
100mm-125mm	10mmØ at 600mm	10mmØ at 600mm
150mm-200mm	10mmØ at 400mm	10mmØ at 400mm



IKALIMANG HAKBANG

Anu-anu ang mga dapat tandaan kapag ikaw ay nagpapatayo ng bahay?



May mga bagay na dapat tandaan at isaalang-alang sa bawat bahagi ng ginagawang tirahan o istruktura.

A. Ang slab on fill ay hindi dapat mailagay maliban kung ang pagpuno ay naayos ng mabuti.

B. Ang mga kontratista / manggagawa ay dapat na makipagtulungan sa pag-aayos ng arkitektura, kalinisan / pagtutubero at plano ng elektrisidad patungkol sa eksaktong sukat at lokasyon ng mga butas sa mga slab at pader sa sahig.

C. Kailangang makapagbigay ng sapat na shoring at bracing ng istruktura para sa lahat ng mga karga na maaaring ipinataw sa panahon ng konstruksyon.

D. Ang lahat ng mga nakalan-tad na miyembro ng bakal na istruktura ay dapat magkaroon ng hindi bababa sa dalawang coats ng pulang tingga o zinc chromate primer na pintura.

E. CHB minimum na haba ng lap ng splice ay 250mm.

F. Maglaan ng anggulong pampalakas sa mga sulok ng dingding ng CHB, 900mm ang haba.

G. Kung saan ang mga ding-ding ng CHB ay nagsasama ng mga haligi at poste, ang mga dowel na may parehong laki tulad ng patayo o pahalang na pampalakas ay dapat ibigay.



PATNUBAY SA KALINISAN NG KONSTRUKSYON SA PANAON NG COVID-19



PANATILIHIN ANG PHYSICAL DISTANCING

Ang bawa't isang nagtatrabaho sa site ay dapat magsanay ng physical distancing o maglayo-layo upang mabawasan ang kanilang pagkalantad o pagkahawa sa ibang tao. Dapat nilang gawin ang kanilang makakaya upang maiwasan ang malapit na pakikipag-ugnayan sa ibang tao.



KALINISAN SA MGA PASILIDAD

Ang paglalaan ng isang maayos na pasilidad para sa paghuhugas ng kamay ay makakatulong para mapigilan ang pagkalat ng sakit, o maiwasang makapitan ang mga manggagawa ng nakakalasang dumi at kemikal na madalas ay matatagpuan sa mga site ng konstruksyon. Dapat tiyakin ang ilang bagay kung

maaari:

- Magkaroon ng mainit at malamig na tubig.
- Magkaroon ng tuwalyang papel at basurahan o isang hand dryer.
- Sabon at tubig o sanitizer ng kamay.



REGULAR NA PAGHUHUGAS NG KAMAY

Ang paghuhugas ng kamay ay tumutulong sa pag-alis ng mga virus at nakakalasang materyales mula sa balat. Dapat hugasan ng mga manggagawa ang kanilang mga kamay pagkatapos gamitin ang banyo; bago at pagkatapos kumain, umiinom, humawak ng pagkain; pagkatapos ng pag-ubo; matapos humawak ng mga kemikal. Kung walang magagamit na sabon at tubig, mag-aplay ng alcohol-based hand sanitizer at punasan ito ng papel na tuwalya.

II
ENGLISH VERSION

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1. All design results obtained in this presentation are based only on the minimum structural design standard for single-detached houses, three (3) storey and below under the assumed parameters herein.

Any change exceeding the assumed parameters are not within the proposed prescriptions of this presentation.

2. The information contained in this handbook (drawings, formulas, factors and etc.) are for informational and general presentation purposes only. This handbook is intended for the general information of the Property Owners who are not Civil Engineers. This handbook should not be used for engineering design.

3. This handbook was designed to educate the public and to help them understand the basic Structural Design Parameters of a safe Residential Structure up to Three (3) Storey and below only.

4. It is still the sole responsibility of the

Structural Design Engineer hired by the Property Owner to ensure that his Structural Design and Plans are accurate and compliant with the provision of the National Building Code of the Philippines (NBCP PD 1096) , National Structural Code of the Philippines (NSCP 2015), and its referral codes.

Additionally, It is the sole responsibility of the Builder/Contractor/Full-time Project Engineer to construct the house in accordance with the Building Permit and its attached building plans, and ensure that the Construction Materials and Methodology, including the necessary testing of materials, are in accordance with the General Notes and Specification prescribed in the structural plans.

5. Assumed 144 kPa predominant soil or rock characteristics of the site as per Sec 304.2 of NSCP 2015 ED. Refer to Table 304-1 of NSCP for reference. Site Engineer should verify soil condition on site and report the soil condition to the Structural Designer on-record prior to construction.



How can I know if my house is within the minimum design standard?

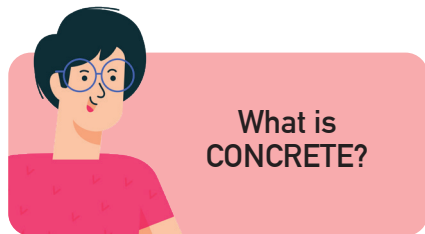


With the help of these guidelines you will get the answer!

STEP 1







What is the minimum material strength to be adopted in the structural analysis and design of buildings?

A. CONCRETE



What is CONCRETE?

CONCRETE is made by mixing cement, sand, gravel and water.

CONCRETE PROPORTION TABLE				
CLASS OF MIXTURE	USED FOR	CEMENT BAG (40KG)	SAND (40KG)	GRAVEL (40KG)
A	Footing, Column, Beam & Slab	1 Bag 	2 Bags 	4 Bags 
B	Wall footing & CHB Walls	1 Bag 	2.5 Bags 	5 Bags 

► **NOTE:** The amount of water required is not given in the table. The mix should contain enough water to achieve the required consistence. Consistence may be assessed by eye or measured by carrying out a slump test.

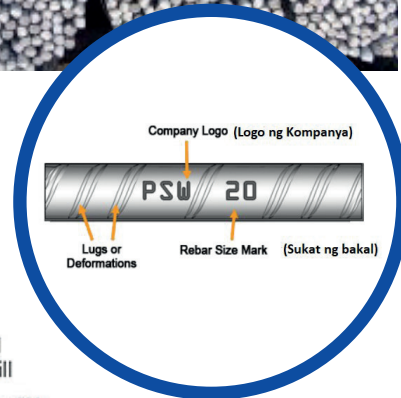
B. REINFORCEMENT STEELBARS



STEEL is the partner of concrete to strengthen the structure.



Sample identification of Steel Bars



NOTE: No Grade markings for Grade 40 below (Walang marka para sa Grade 40 pababa)

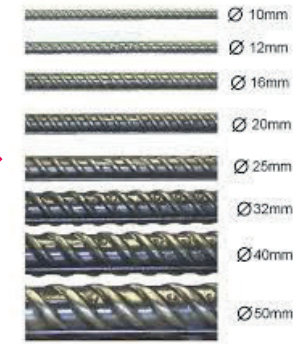
Typical Reinforcement Steel Bars for Residential Structure

GRADE 33

- $f_y = 228 \text{ MPa}$ (33,000 psi)
- For bars 12mm diameter and smaller

GRADE 40

- $f_y = 276 \text{ MPa}$ (40,000 psi)
- For bars 16mm diameter and larger



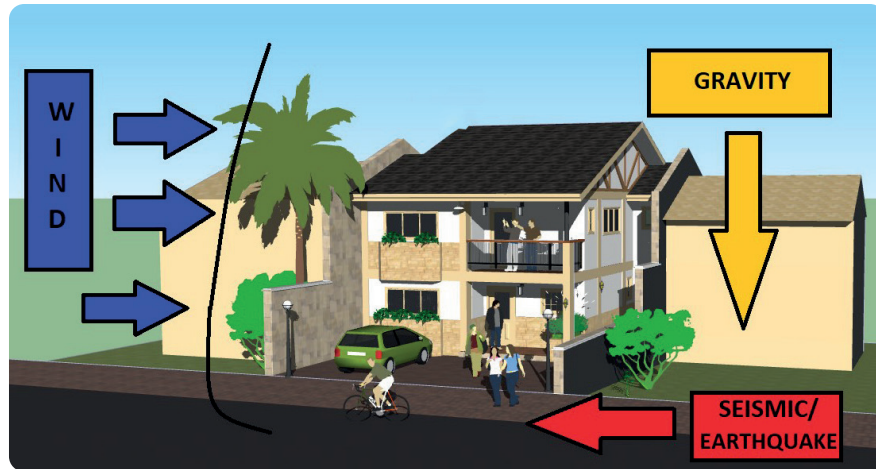
STANDARD SIZE OF STEEL BARS			
BAR NO.	INCHES	MILIMETER-MM	CROSS SECTIONAL AREA (MM ²)
3	1/4	10	78.54
4	3/8	12	113.10
5	1/2	16	201.10
6	5/8	20	314.20
7	3/4	22	280.13
8	1	25	490.87

STEP 2

What are the loads to be considered in the structure?



The **LOADS** considered in a structure is **GRAVITY, WIND** and **EARTHQUAKE**.



A. GRAVITY LOADS

- **DEAD LOAD**
Weight of building and permanent attachments and accessories.
- **LIVE LOAD**
Weight of occupants/people, furniture, rainfall and equipment.

B. WIND LOADS

The force on a structure arising from the impact of wind.

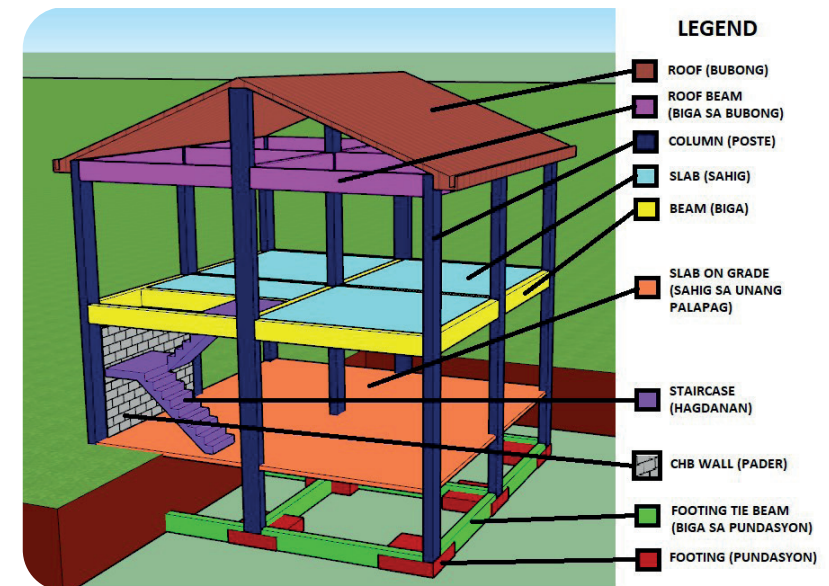
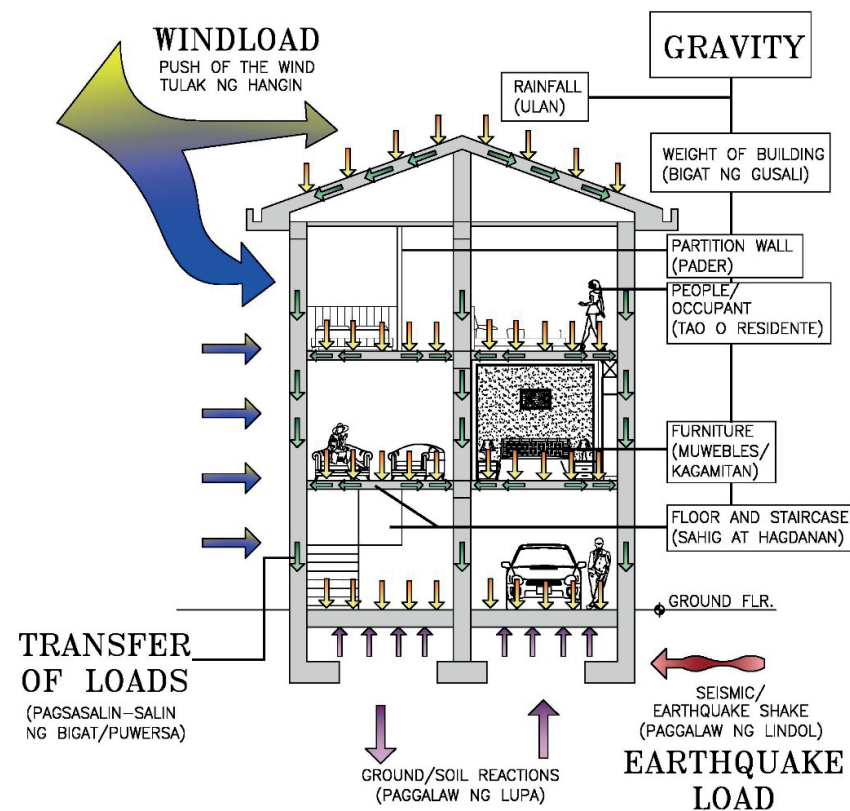
C. SEISMIC/EARTHQUAKE LOADS

The force caused by an earthquake.

STEP 3

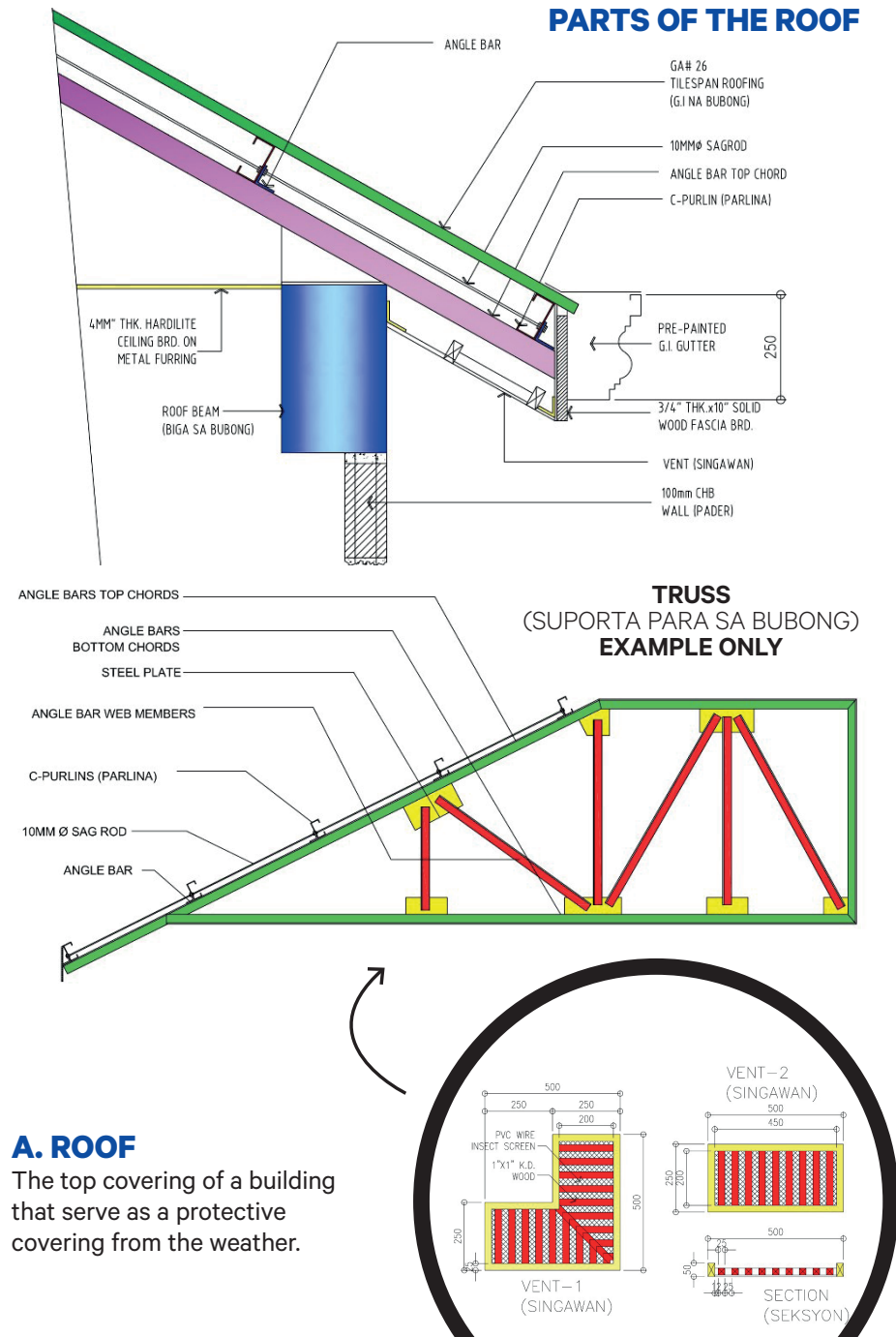
What are the parts of the structure?

The parts of the structure are **ROOF, BEAM, COLUMN, SLAB, FOOTING, STAIRCASE, and CHB WALL.**



A. ROOF

The top covering of a building that serve as a protective covering from the weather.

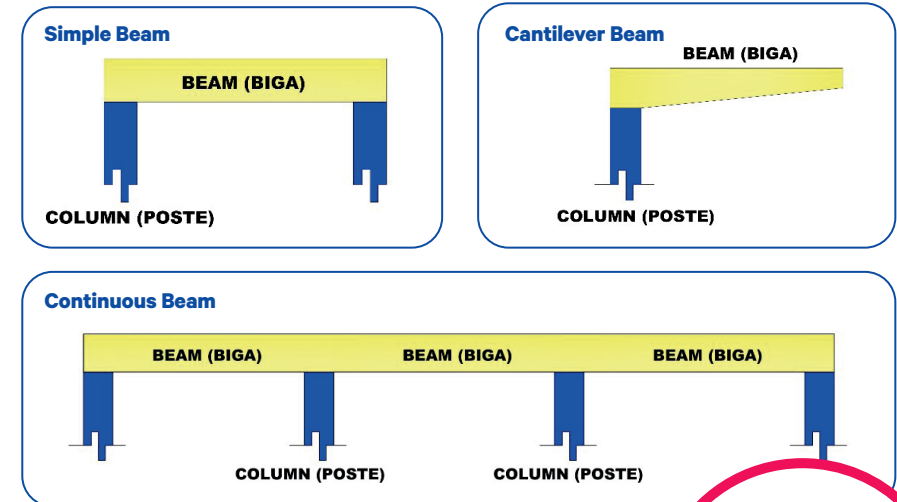


B. BEAM

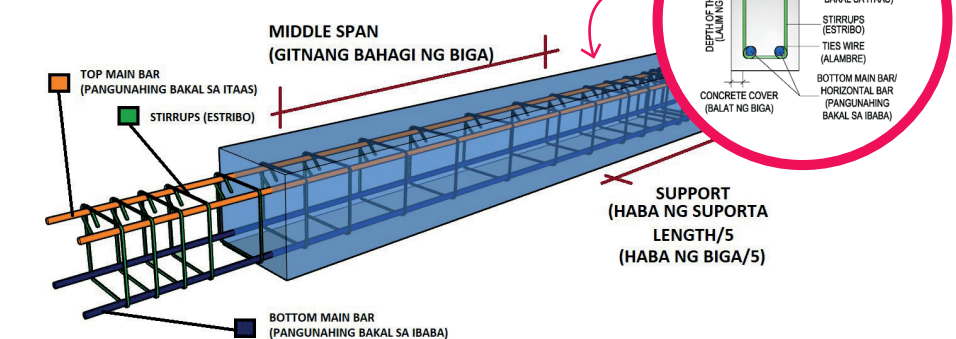
Structural member that supports the transverse load.

TYPES OF BEAM		
FOOTING TIE BEAM	PRIMARY BEAM	ROOF BEAM

Beams are clasified as

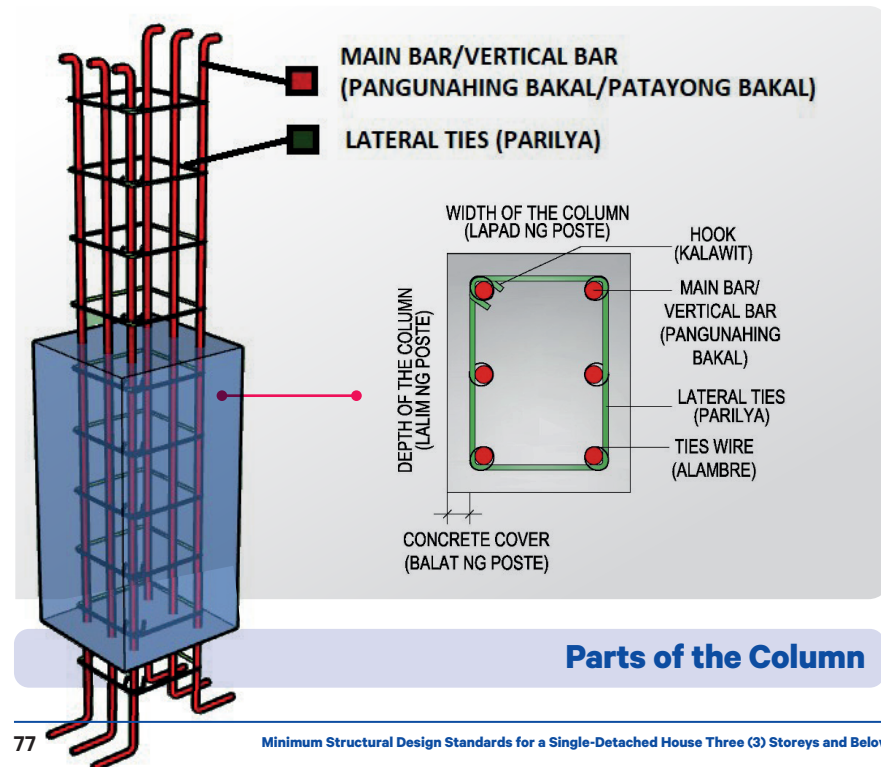
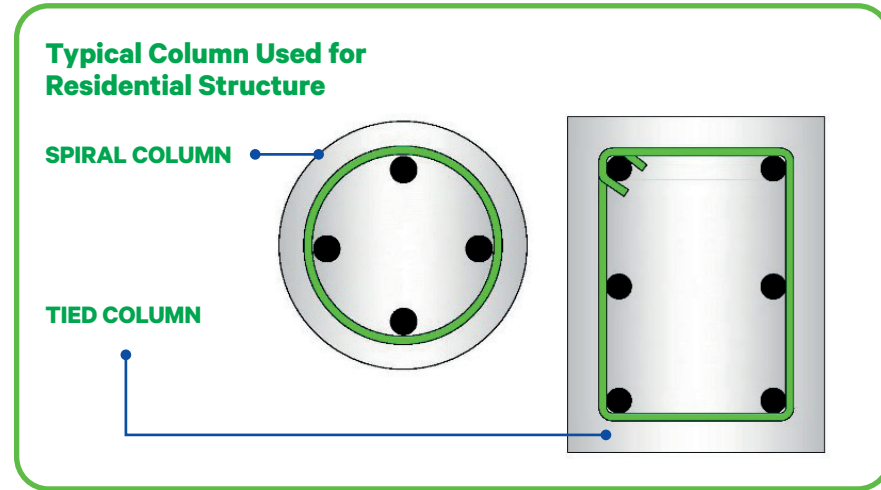


Parts of the Beam



C. COLUMN

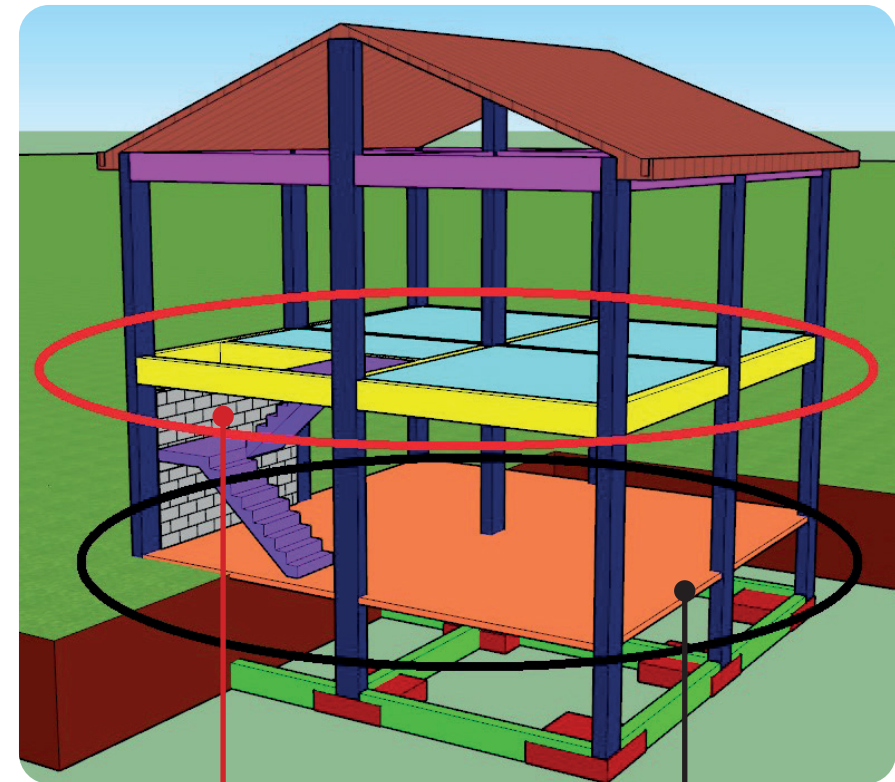
A vertical structure used to support the building.



D. SLAB

Structural member used to provide flat surfaces (floors) in buildings.

CONCRETE SLAB SUPPORT		
The concrete slab may be supported by:		
BEAMS	COLUMNS	THE GROUND



SLAB SUPPORTED BY COLUMNS AND BEAMS

SLAB SUPPORTED BY THE GROUND

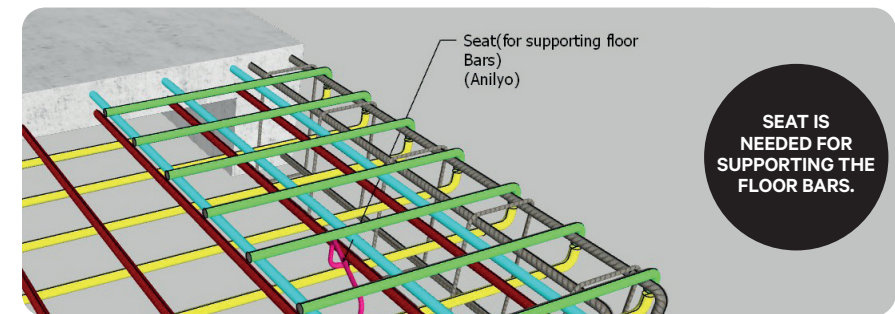
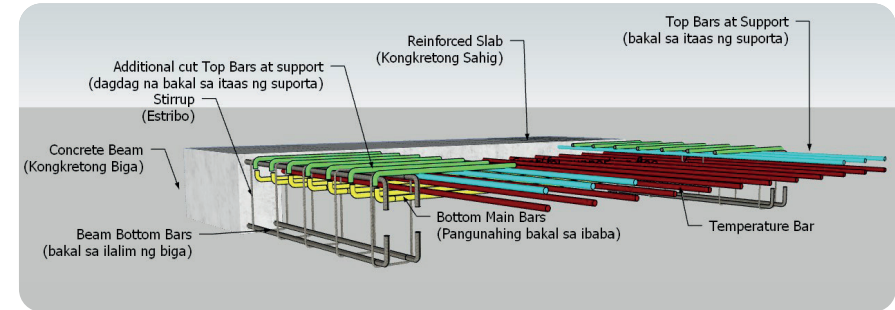
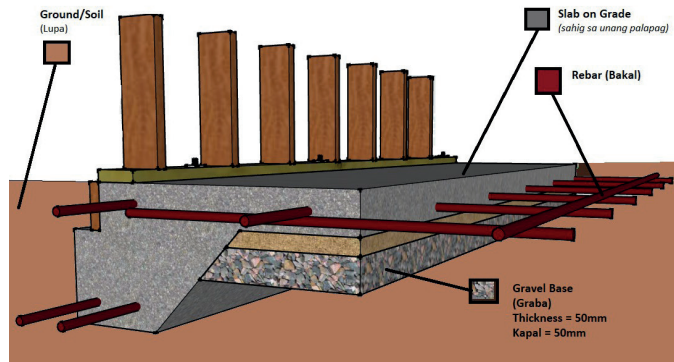
Different Design of Slab

1. SLAB-ON-GRADE

Slab supported by the ground.

2. SUSPENDED SLAB

Slab supported by column and Beam.



TYPES OF SUSPENDED SLAB

1. One-way Slab

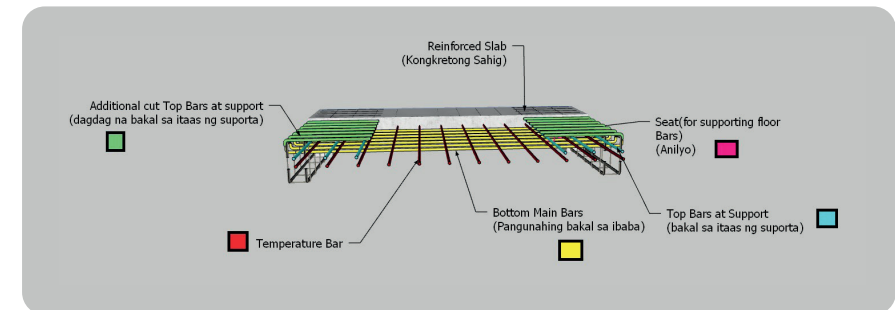
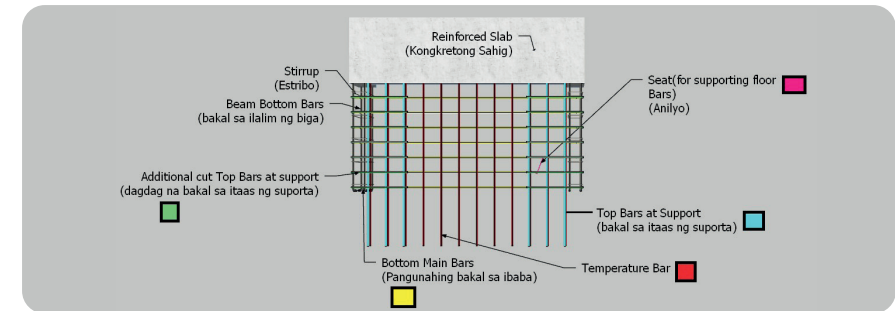
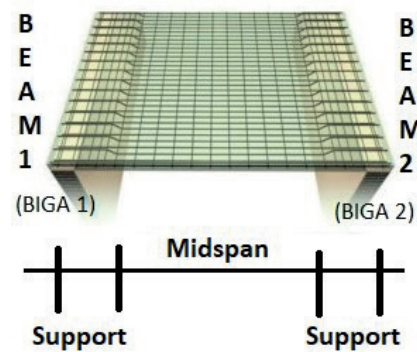
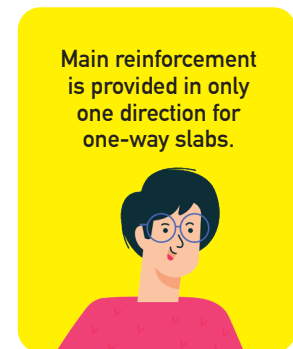
Slab supported by two parallel beams.

WIDTH

LENGTH / WIDTH ≥ 2



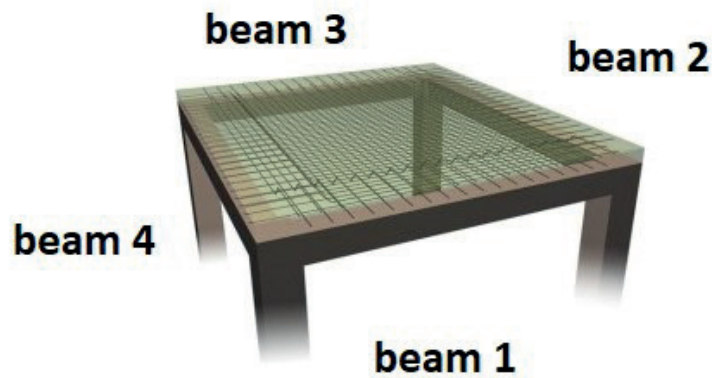
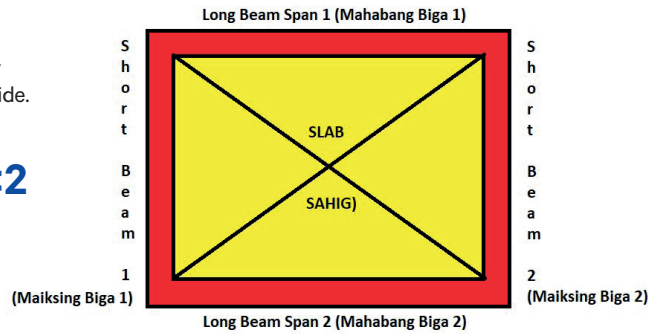
LENGTH



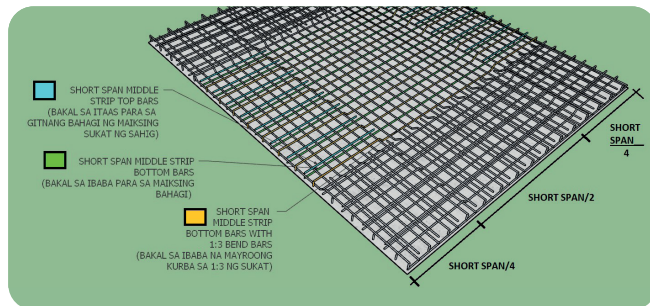
2. Two-way Slab

Slabs are supported by beams on all the four side.

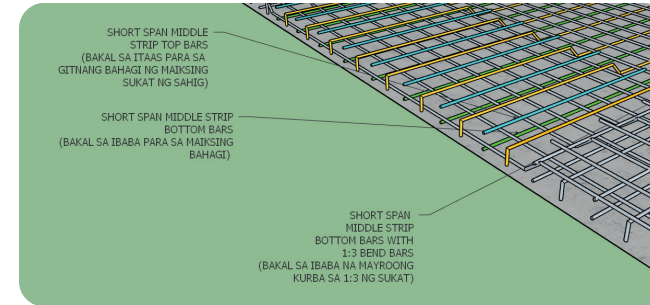
$$\frac{\text{LONG SPAN}}{\text{SHORT SPAN}} < 2$$



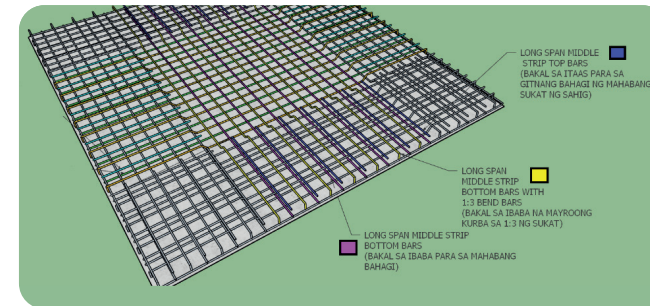
Main reinforcement is in the two directions due to the weight it carries and the length of each beam is nearly the same.



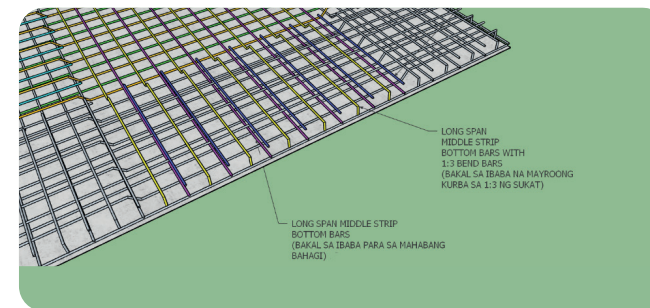
1 REINFORCEMENT BAR FOR SHORT SPAN MIDDLE STRIP



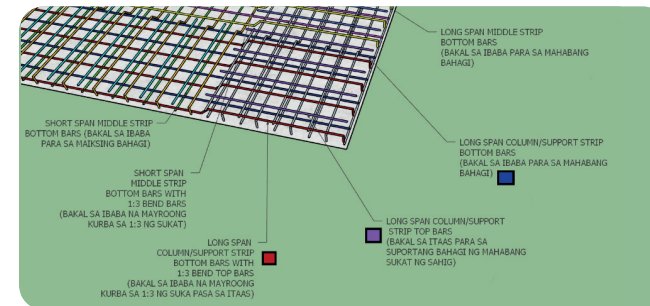
2 REINFORCEMENT BAR FOR SHORT SPAN MIDDLE STRIP



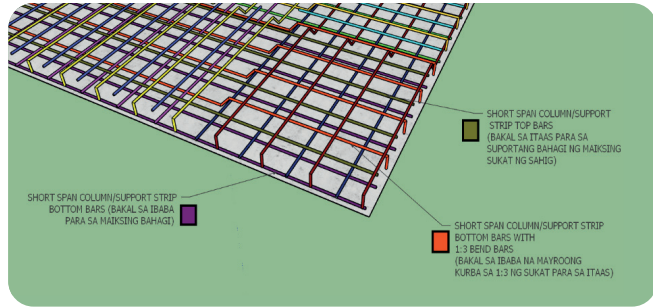
3 REINFORCEMENT BAR FOR LONG SPAN MIDDLE STRIP



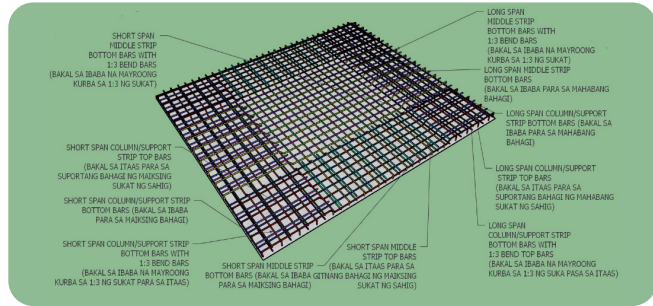
4 REINFORCEMENT BAR FOR LONG SPAN MIDDLE STRIP



5 REINFORCEMENT BAR FOR LONG SPAN SUPPORT STRIP

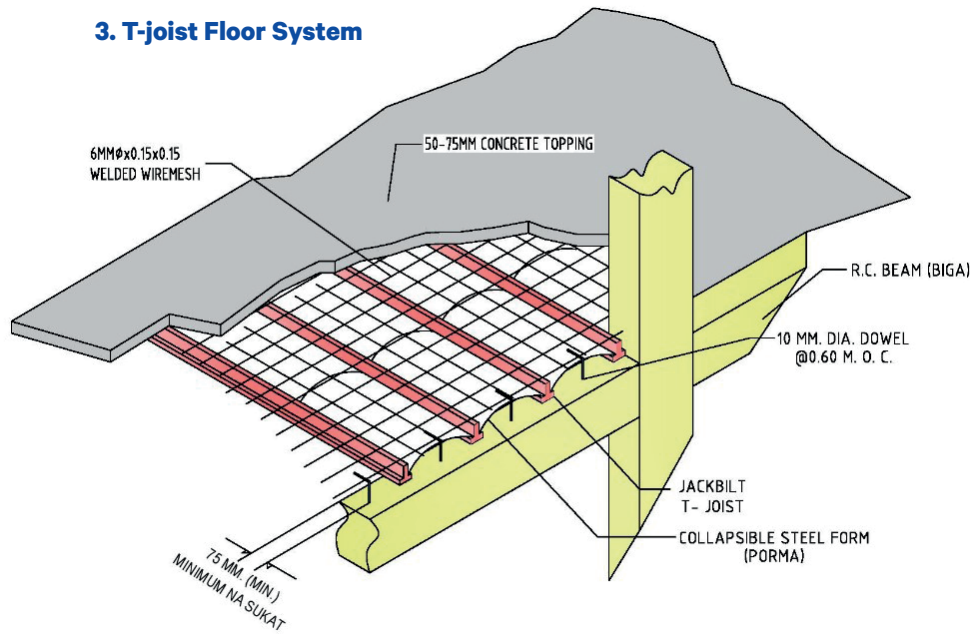


6
REINFORCEMENT BAR FOR SHORT SPAN SUPPORT STRIP



7
REINFORCEMENT BAR FOR TWO-WAY SLAB

3. T-joint Floor System

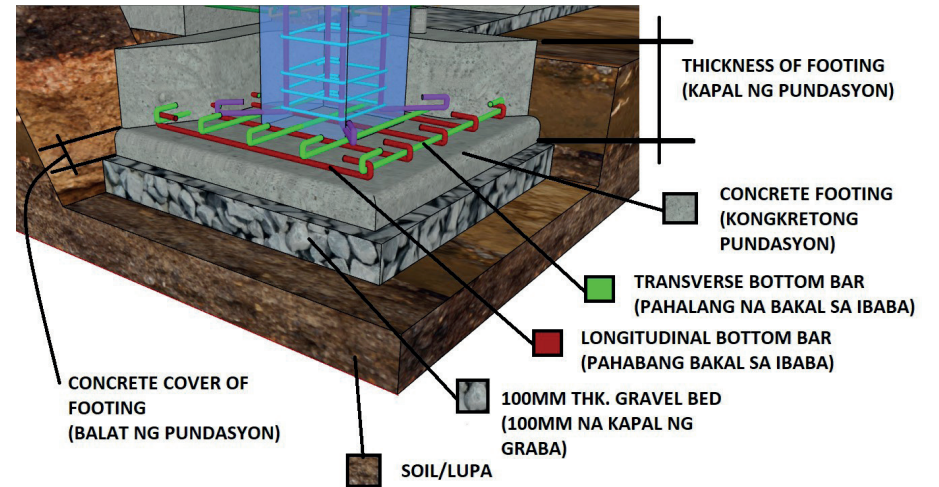
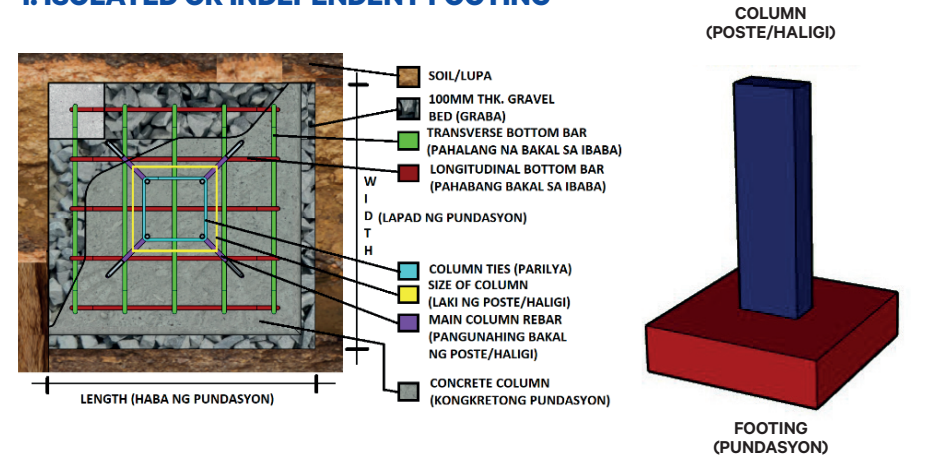


E. FOOTING

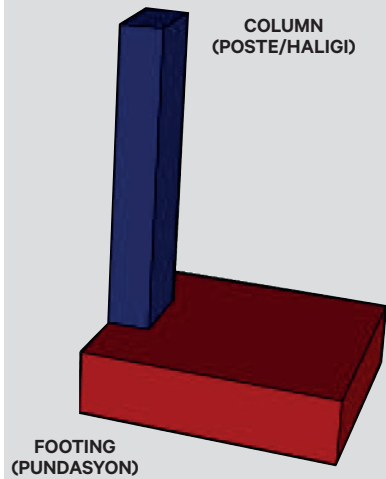
Structural element that supports the whole building, used to directly transmit the load to the underlying soil.

TYPICAL FOOTING USED FOR RESIDENTIAL STRUCTURE

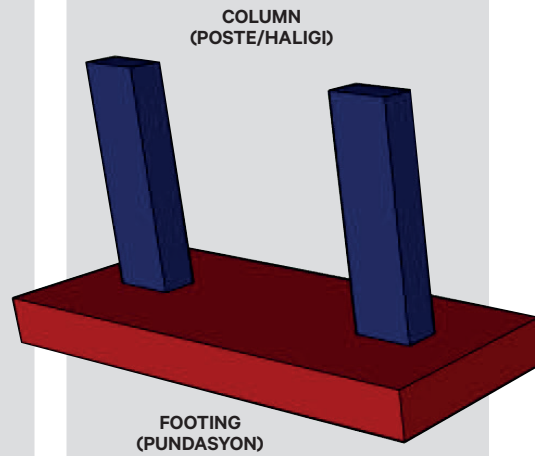
1. ISOLATED OR INDEPENDENT FOOTING



2. CANTILEVER FOOTING

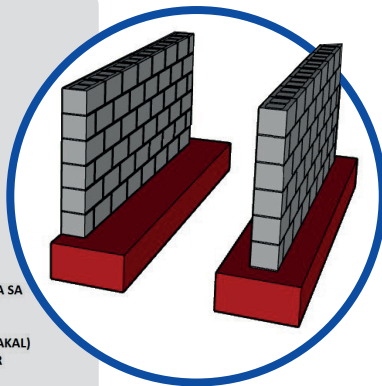
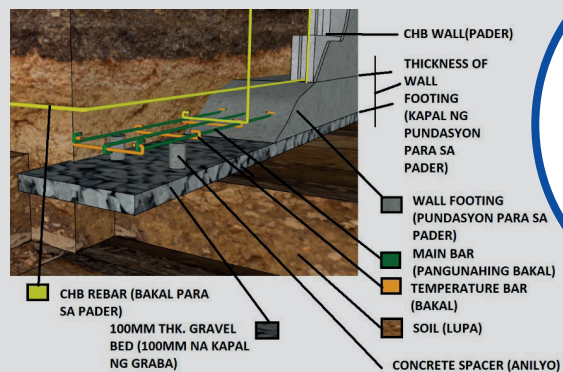


3. COMBINED FOOTING



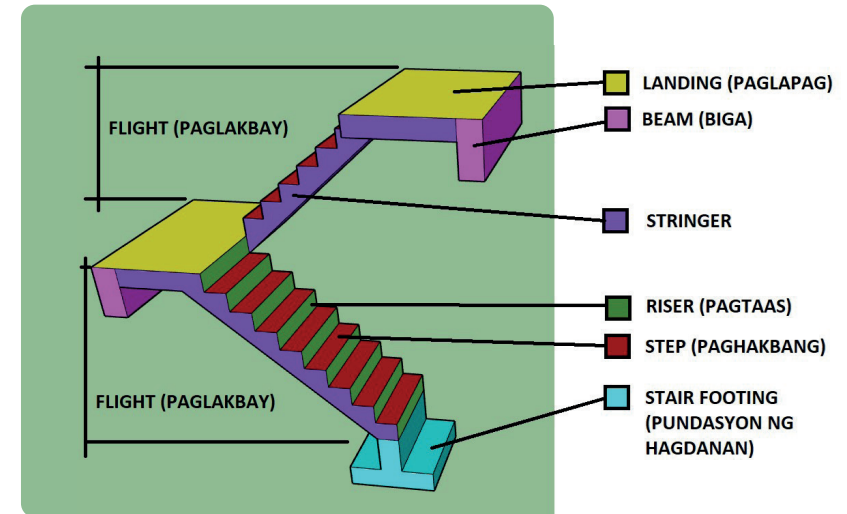
The Cantilever and Isolated footing are almost the same in terms of parts, the only difference is the position of the column.

4. WALL FOOTING



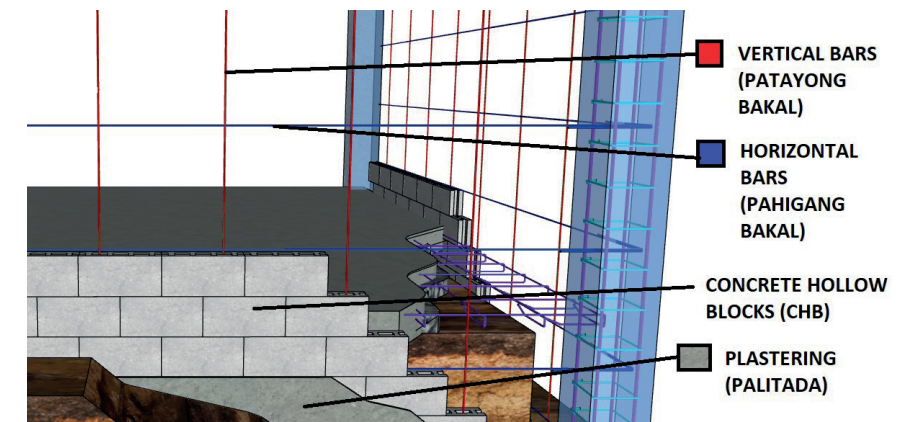
F. STAIRCASE

A whole set of stair. A stair is a term used to a complete the flight of steps between two floors.



G. Concrete Hollow Blocks (CHB) WALL

A partition wall is used to separate or divide a room and usually not load-bearing.



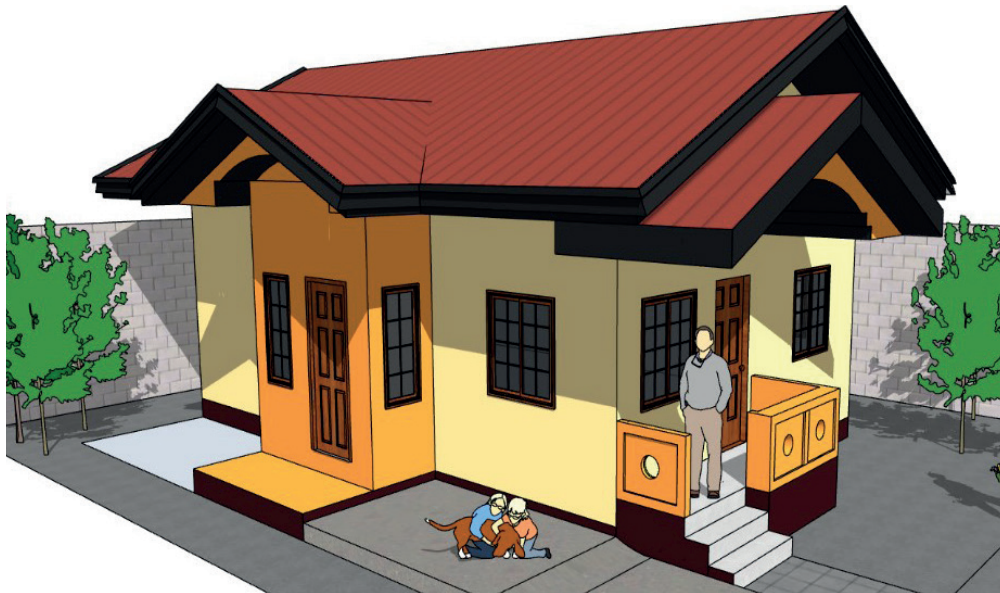
STEP 4

What kind of a structure do you intend to work on?

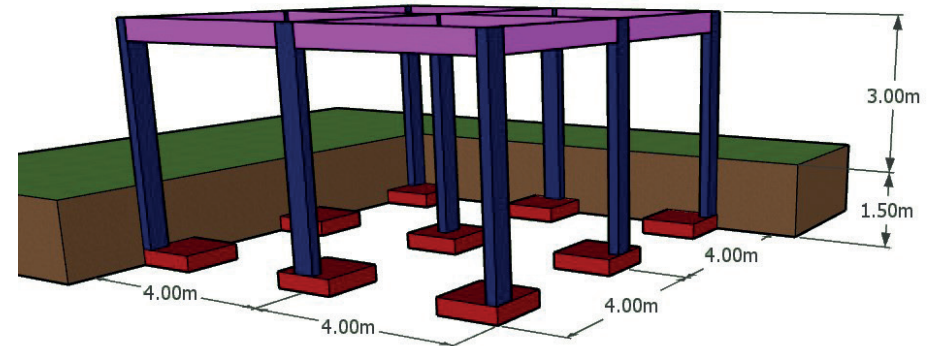


In this handbook there are six (6) kinds of minimum structural design standard for a Single Dwelling Residential Building Three (3) Storeys and Below

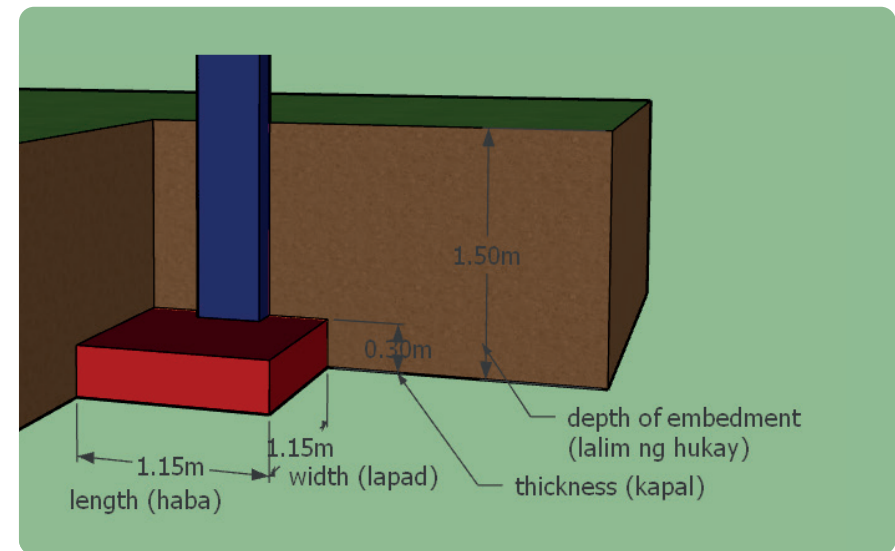
1. ONE (1) STOREY RESIDENTIAL BUILDING

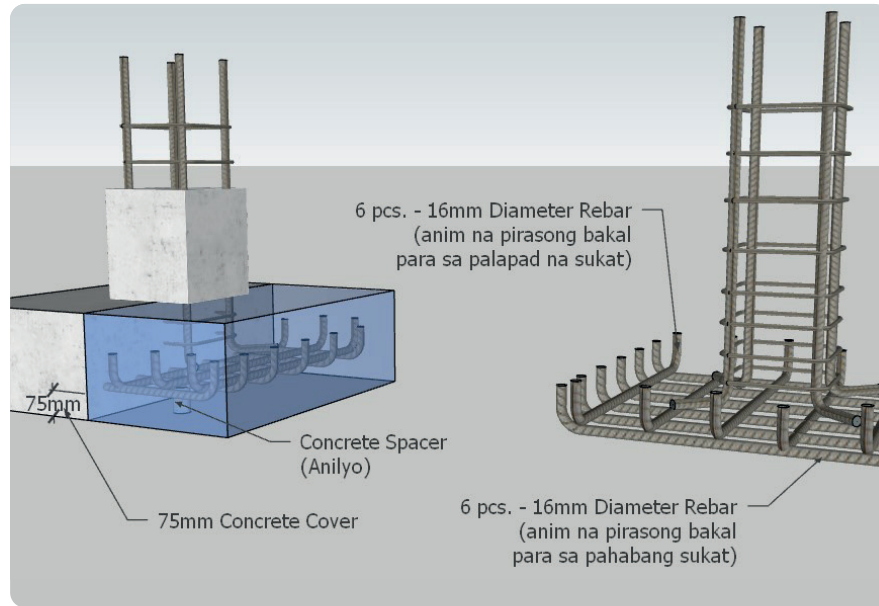


IF YOUR DESIGN STRUCTURE CONTAIN THE FOLLOWING:		
Without Seismic Loads/Consideration	With maximum span of four (4) meters	With Storey Height of three (3) meters



1.A FOOTING DESIGN





Footing Size

Length	1.15 m
Width	1.15 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75mm
Depth Of Concrete Spacer	75mm

Footing Rebar

Length Rebar Diameter and Pieces	6 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	6 pcs. - 16 mm Diameter Rebar

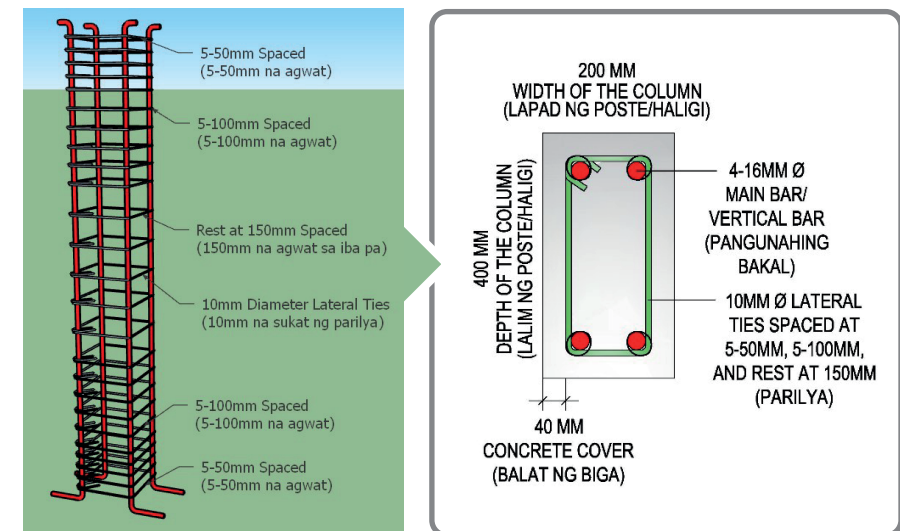
1.B COLUMN DESIGN

Column Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	4 pcs. - 16 mm Diameter Rebar
Lateral Ties	10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



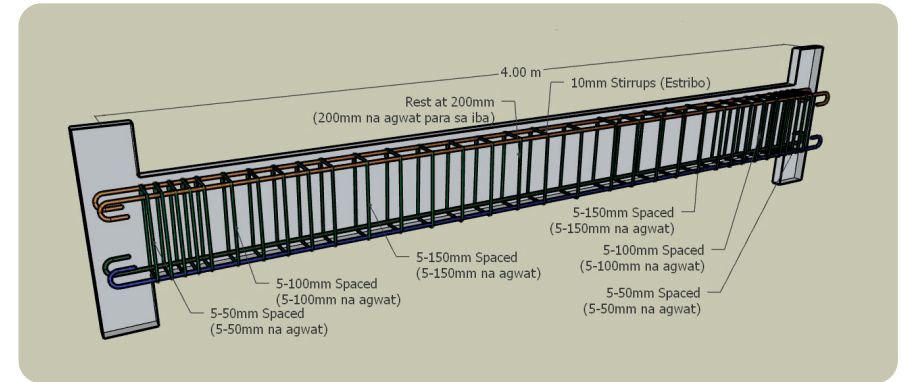
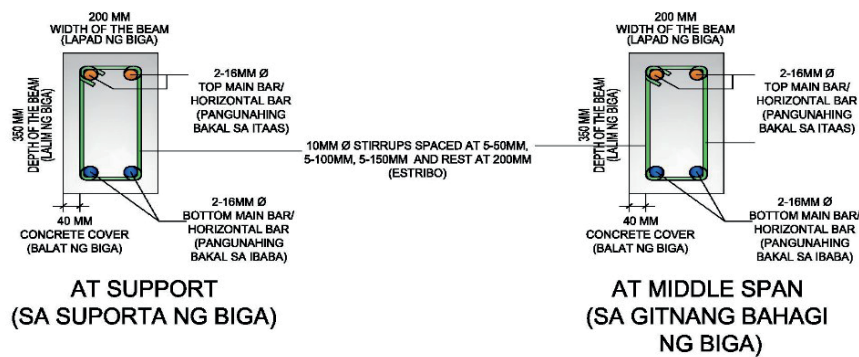
1.C BEAM DESIGN

Beam Size

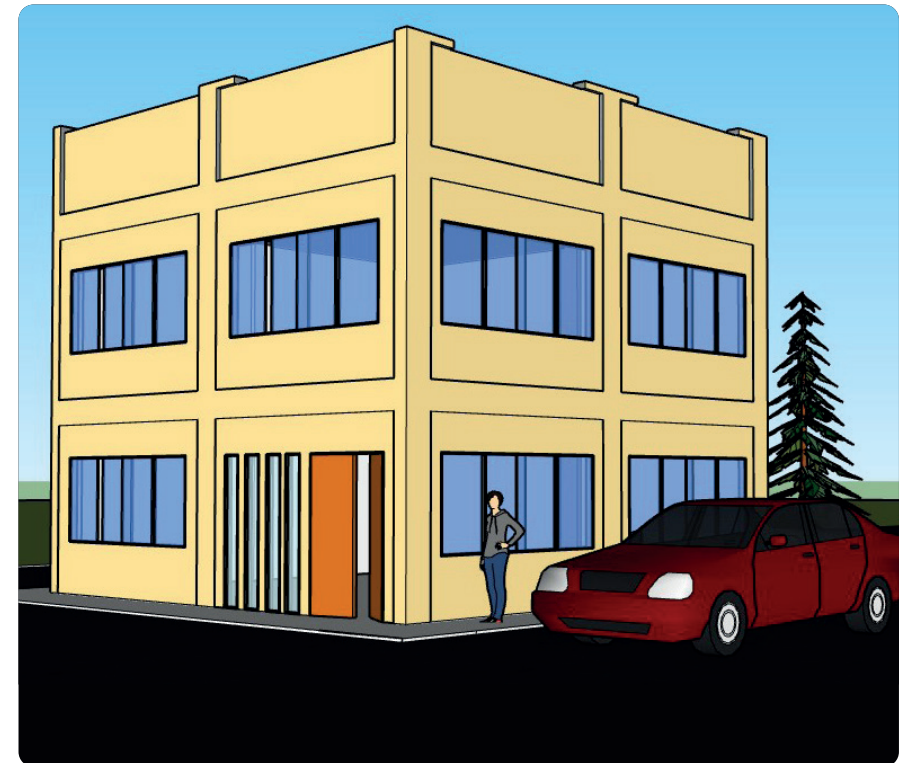
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Beam Rebar

Top Main Rebar/Horizontal Bar	2 pcs. -16mm Diameter Rebar
Bottom Main Rebar/Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm

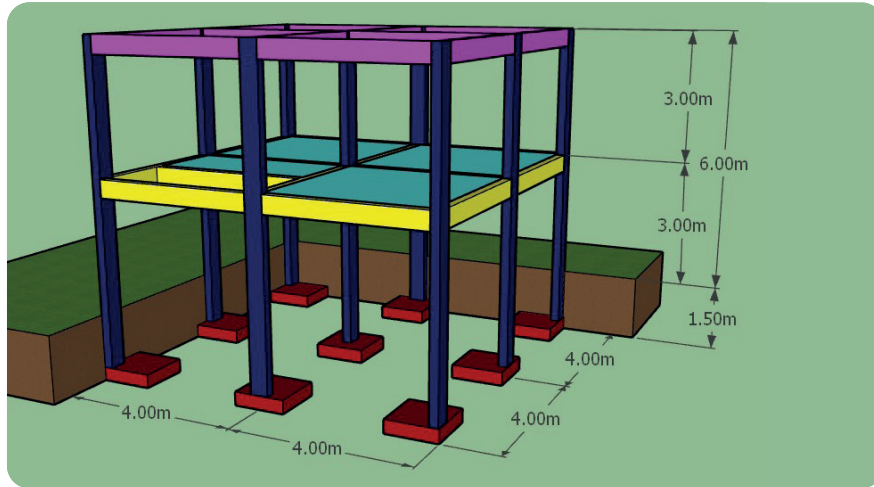


2 - 4. TWO (2) STOREY RESIDENTIAL BUILDING WITH/WITHOUT ROOFDECK



2. IF YOUR DESIGN STRUCTURE ARE THE FOLLOWING:

Without Seismic Loads/Consideration	With maximum span of four (4) meters	With Storey Height of three (3) meters
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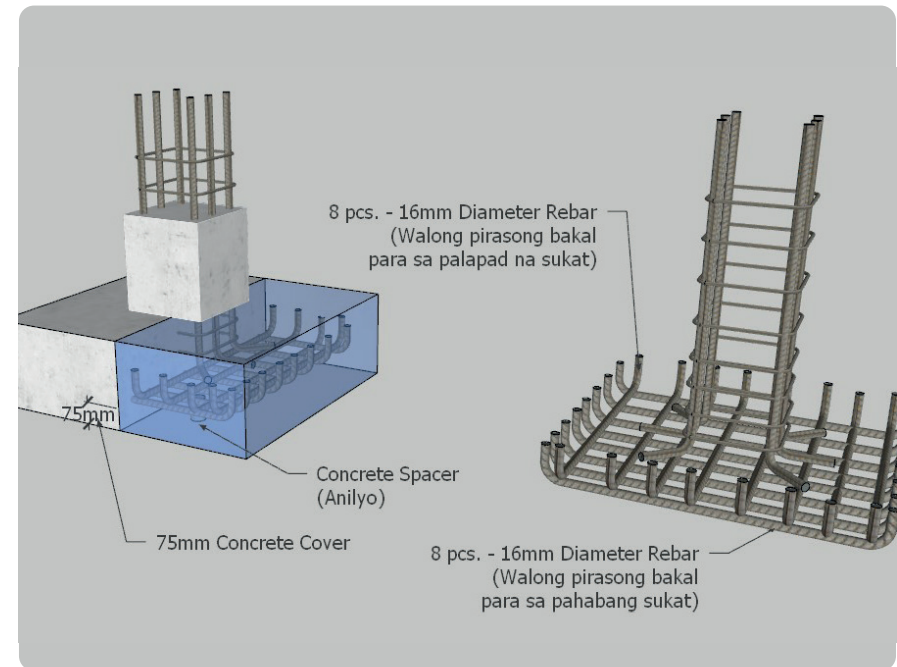
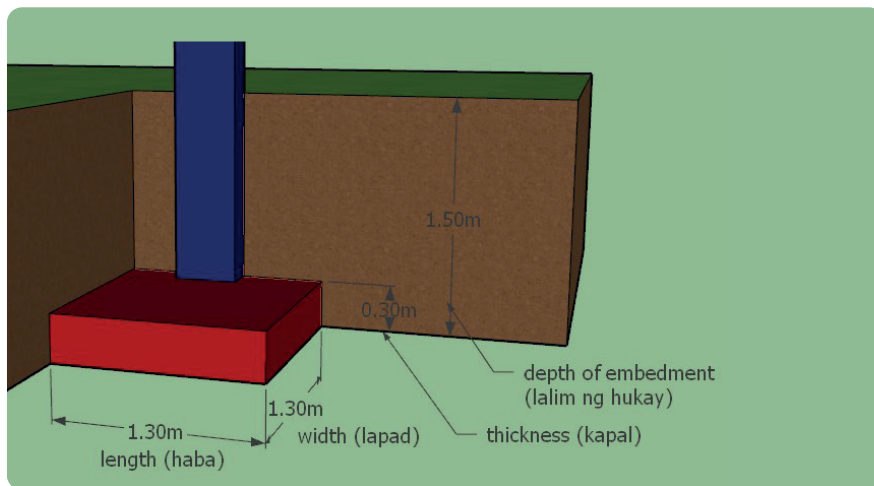
Footing Size

Length	1.30 m
Width	1.30 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75mm
Depth Of Concrete Spacer	75mm

Footing Rebar

Length Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar

2.A FOOTING DESIGN



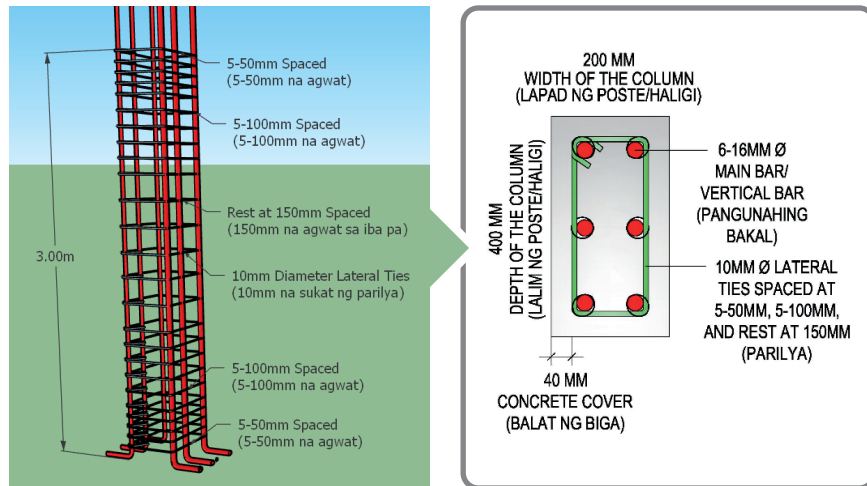
2.B COLUMN DESIGN

Column Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	6 pcs. - 16 mm Diameter Rebar
Lateral Ties	10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



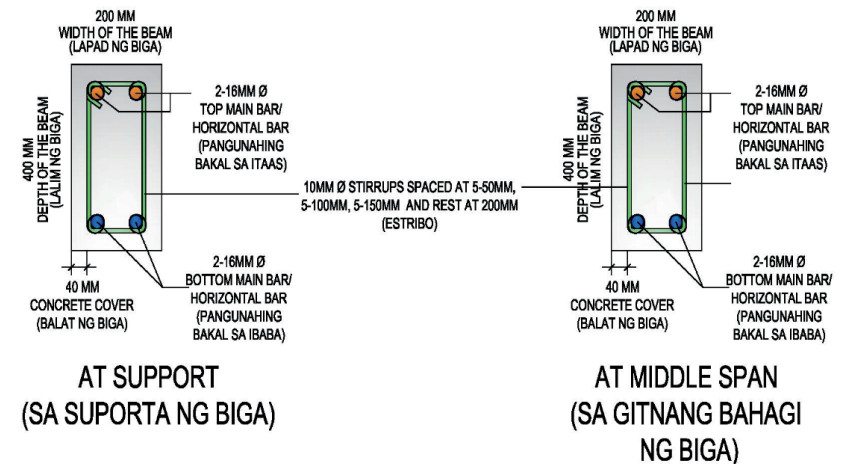
2.C BEAM DESIGN

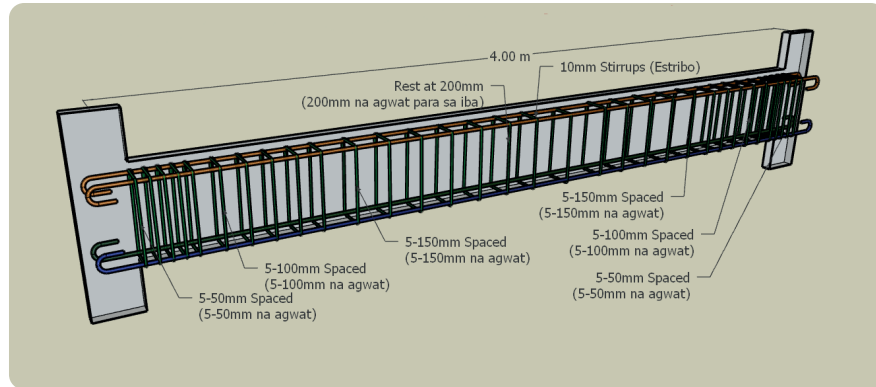
Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Beam Rebar

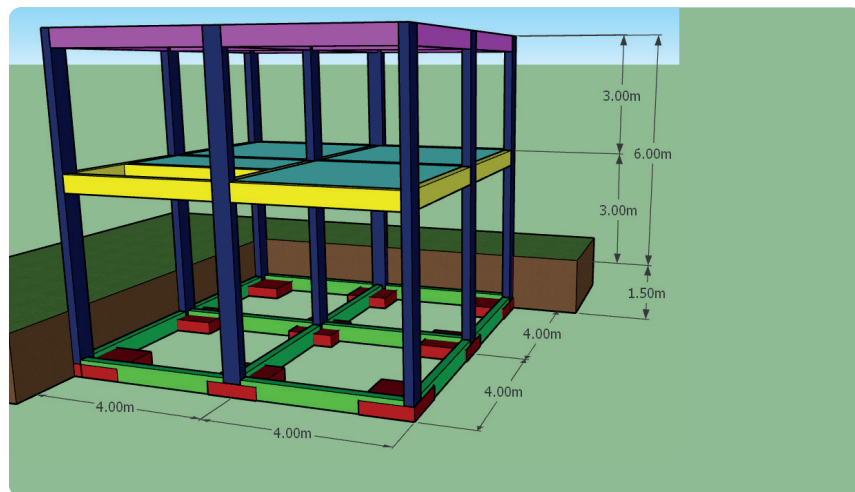
Top Main Rebar/ Horizontal Bar	2 pcs. -16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm



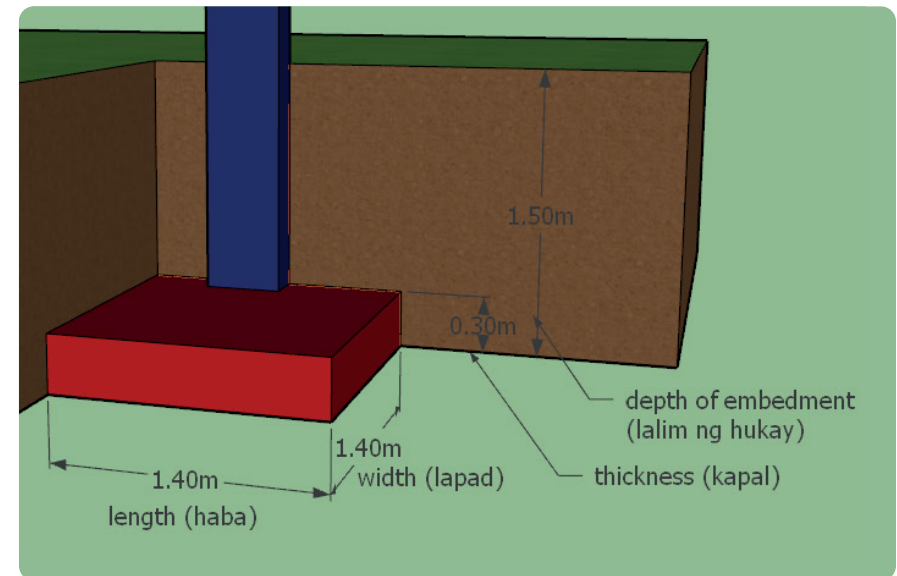


3. IF YOUR DESIGN STRUCTURE INCLUDE THE FOLLOWING:

With Seismic Loads/ Consideration	With Earthquake Hazard Assessment from Phivolcs for 5km Closest Distance to known Seismic Source	With maximum span of four (4) meters
With Storey Height of three (3) meters		Footing Tie Beam is required



3.A FOOTING DESIGN

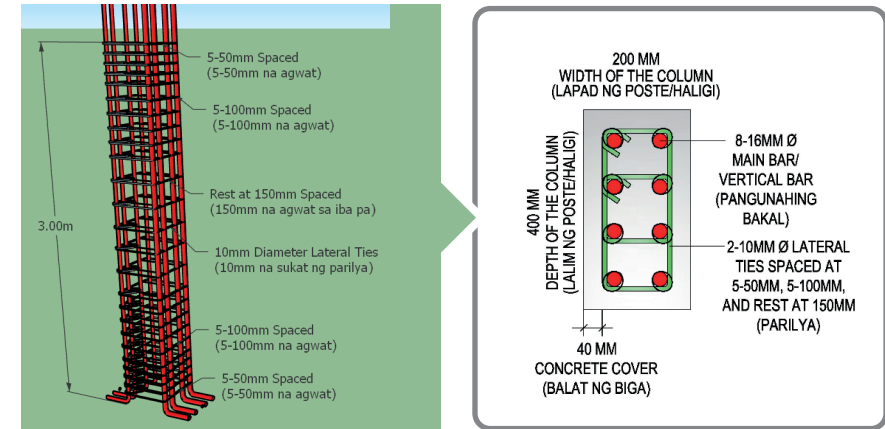
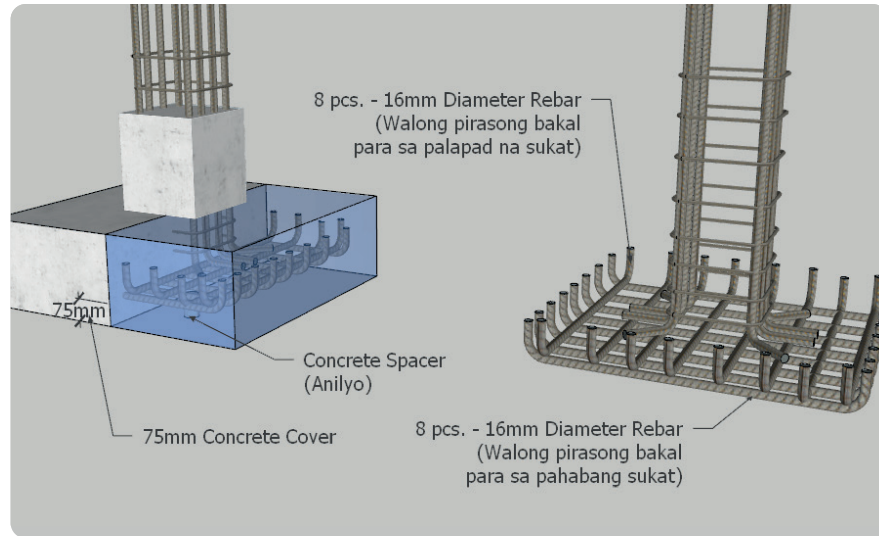


Footing Size

Length	1.40 m
Width	1.40 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75mm
Depth Of Concrete Spacer	75mm

Footing Rebar

Length Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar



3.B COLUMN DESIGN

Column Size	
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth of Concrete Spacer	40mm

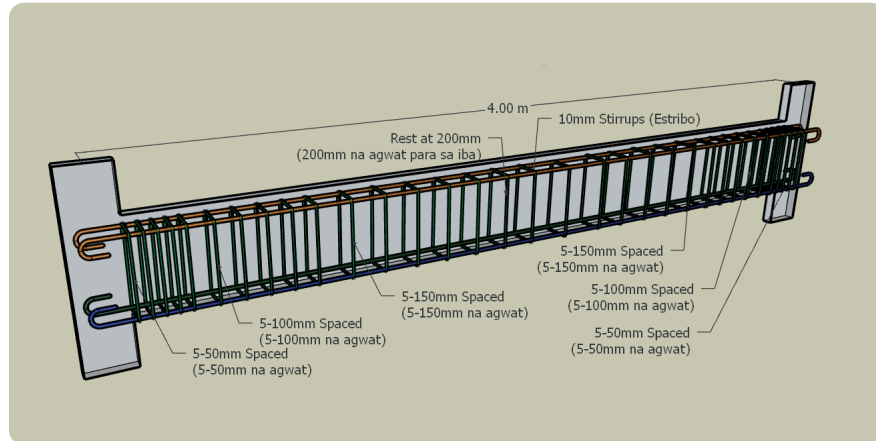
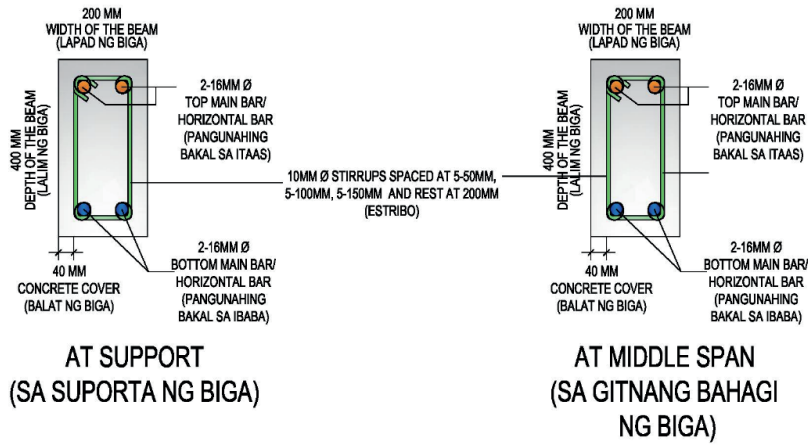
Column Rebar	
Main Rebar/Vertical Bar	8 pcs. - 16 mm Diameter Rebar
Lateral Ties	2- 10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest

3.C BEAM DESIGN

3.C.1 For Footing Tie Beam and Roof/Roof Deck Beam

Beam Size	
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Beam Rebar	
Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm



3.C.2 For Second (2nd) Floor Beam

Beam Size	
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

BEAM REBAR

At Support

**Top Main Rebar/
Horizontal Bar** 3 pcs. - 16mm Diameter Rebar

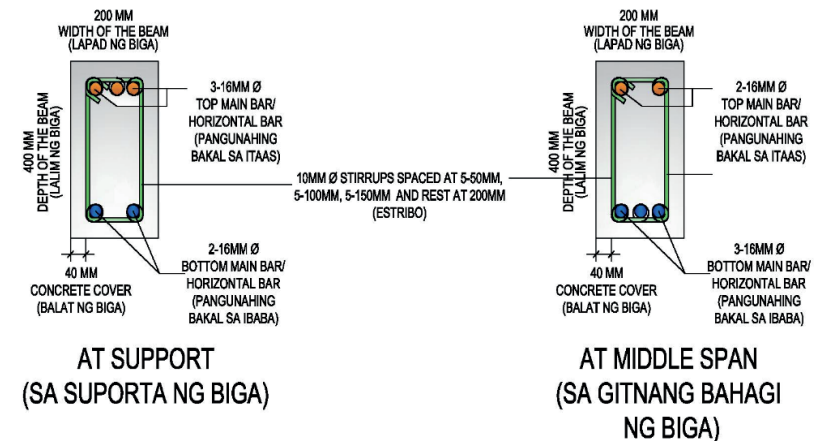
**Bottom Main Rebar/
Horizontal Bar** 2 pcs. -16mm Diameter Rebar

At Middle Span

**Top Main Rebar/
Horizontal Bar** 2 pcs. - 16mm Diameter Rebar

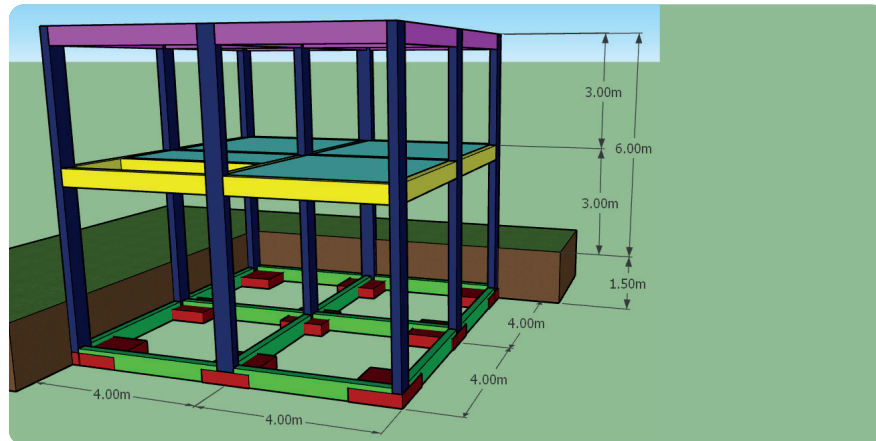
**Bottom Main Rebar/
Horizontal Bar** 3 pcs. - 16mm Diameter Rebar

Stirrups 10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm

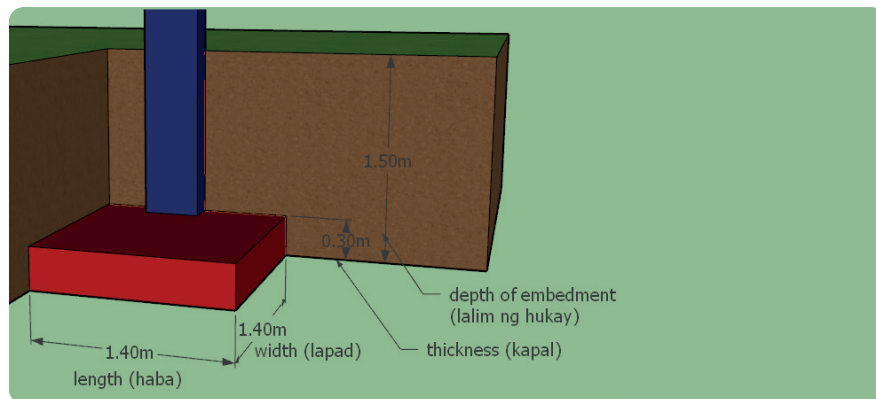


4. IF YOUR DESIGN STRUCTURE CONTAIN THE FOLLOWING:

With Seismic Load/ Consideration	With Earthquake Hazard Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	With maximum span of four (4) meters
With Storey Height of three (3) meters		Footing Tie Beam is required



4.A FOOTING DESIGN

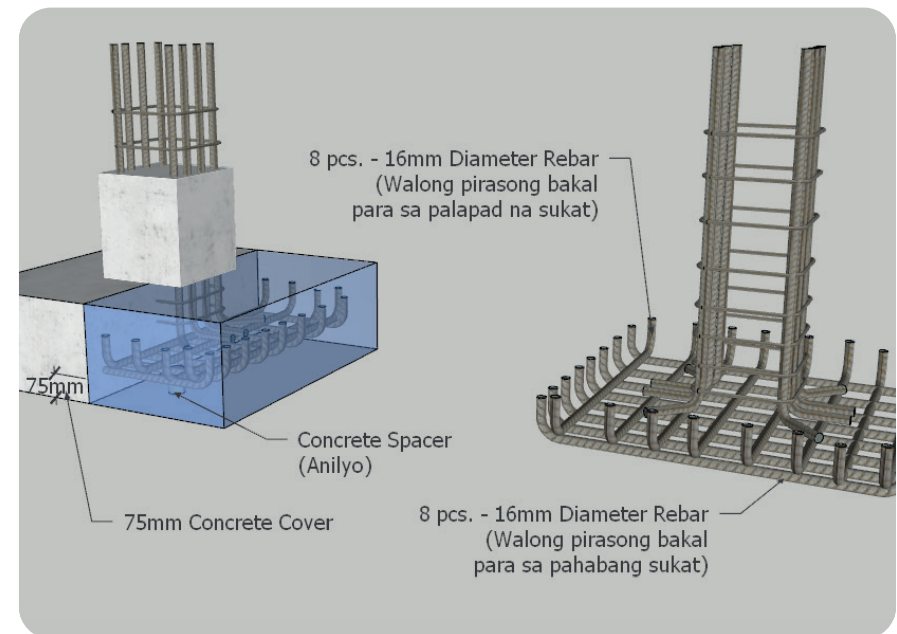


Footing Size

Length	1.40 m
Width	1.40 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75 mm
Depth Of Concrete Spacer	75 mm

Footing Rebar

Length Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	8 pcs. - 16 mm Diameter Rebar



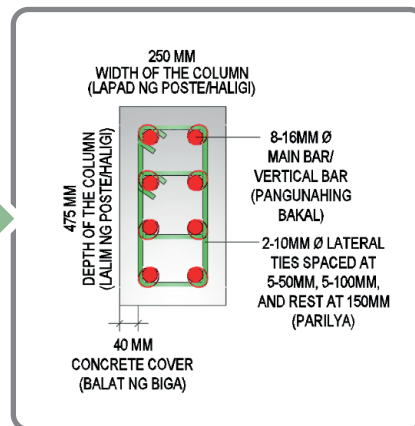
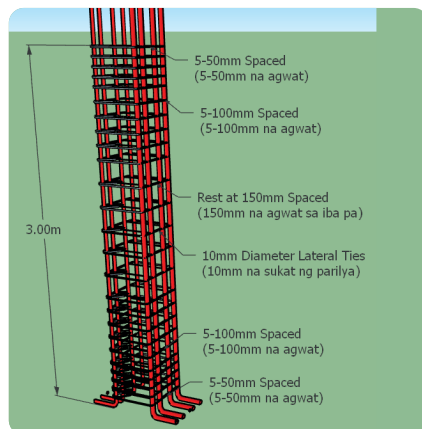
4.B COLUMN DESIGN

Column Size

Width	250mm
Depth	475mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	8 pcs. - 16 mm Diameter Rebar
Lateral Ties	2- 10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



4.C BEAM DESIGN

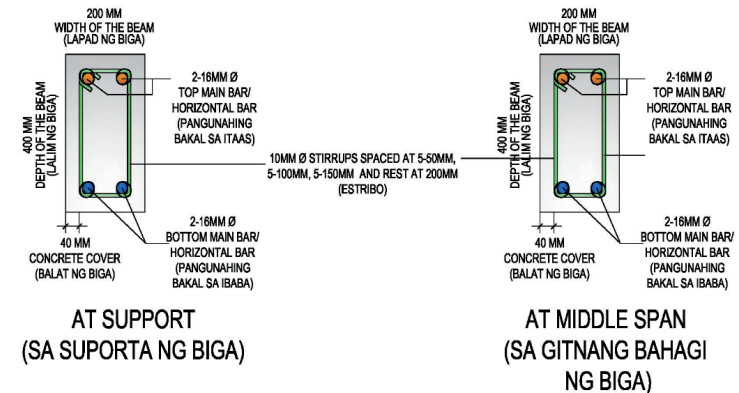
4.C.1 For Footing Tie Beam and Roof/Roof Deck Beam

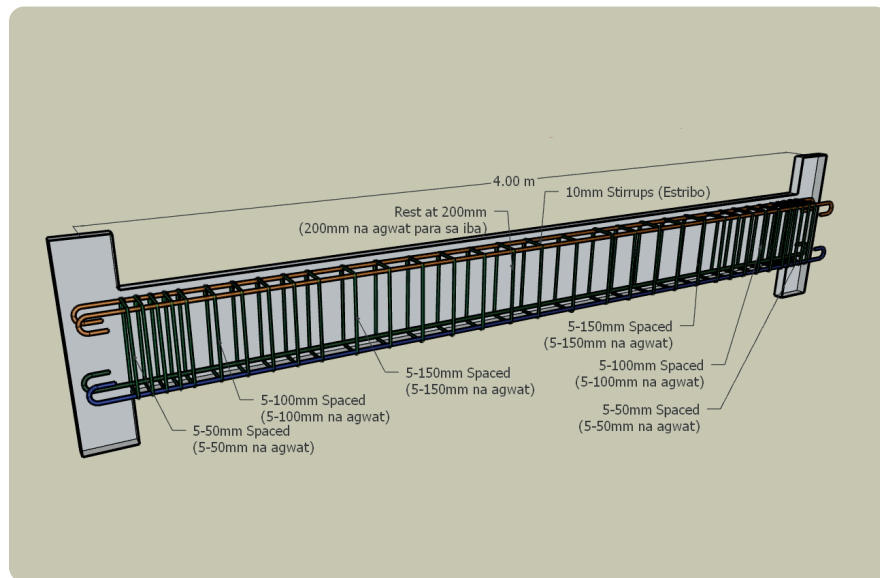
Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Beam Rebar

Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm





BEAM REBAR

At Support

**Top Main Rebar/
Horizontal Bar**

3 pcs. - 16mm Diameter Rebar

**Bottom Main Rebar/
Horizontal Bar**

2 pcs. - 16mm Diameter Rebar

At Middle Span

**Top Main Rebar/
Horizontal Bar**

2 pcs. - 16mm Diameter Rebar

**Bottom Main Rebar/
Horizontal Bar**

3 pcs. -16mm Diameter Rebar

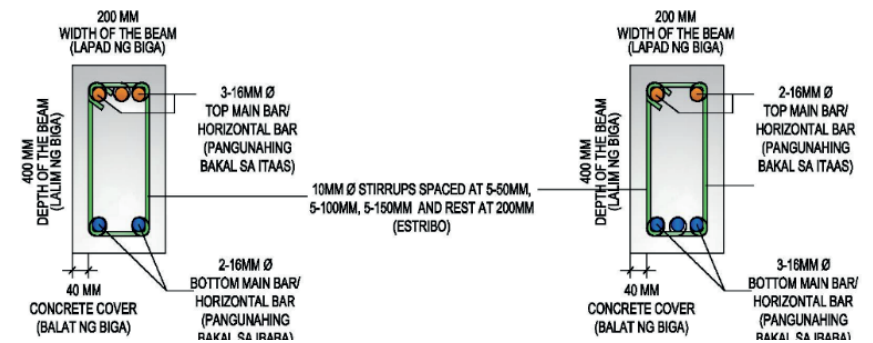
Stirrups

10mm Diameter Stirrups
Spaced at 5- 50mm, 5-100mm,
150mm and rest at 200mm

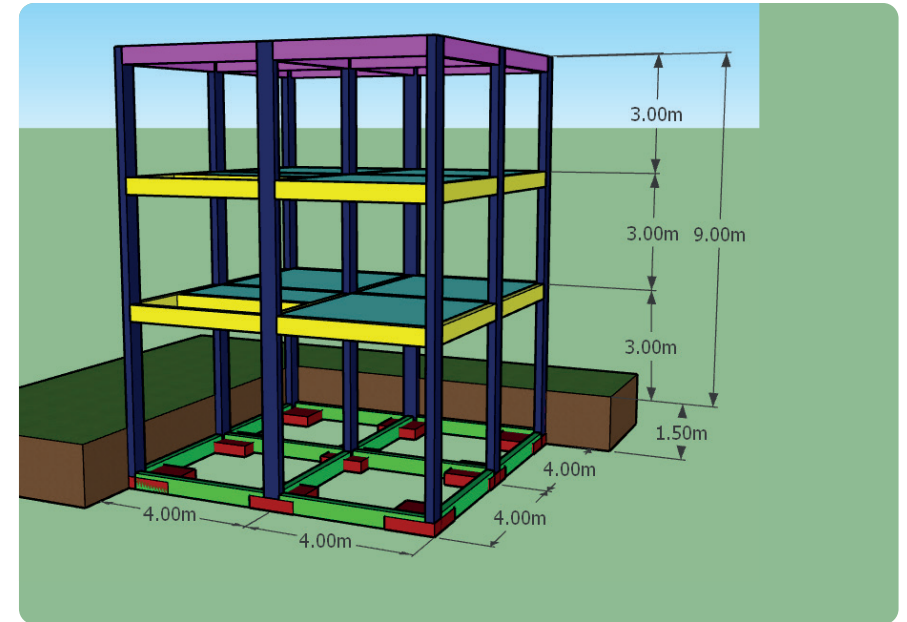
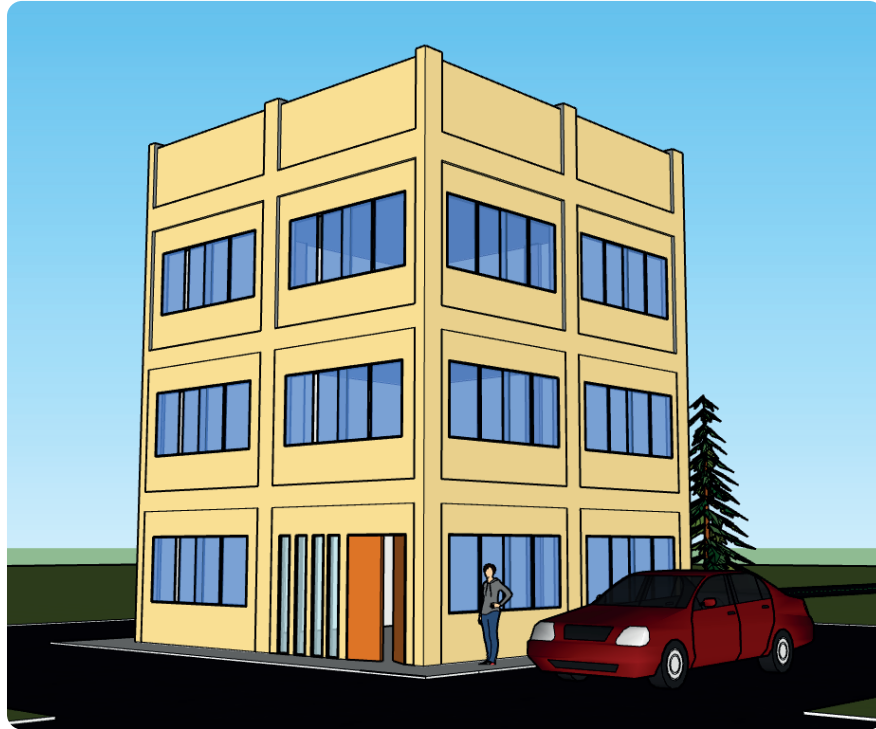
4.C.2 For Second (2nd) Floor Beam

Beam Size

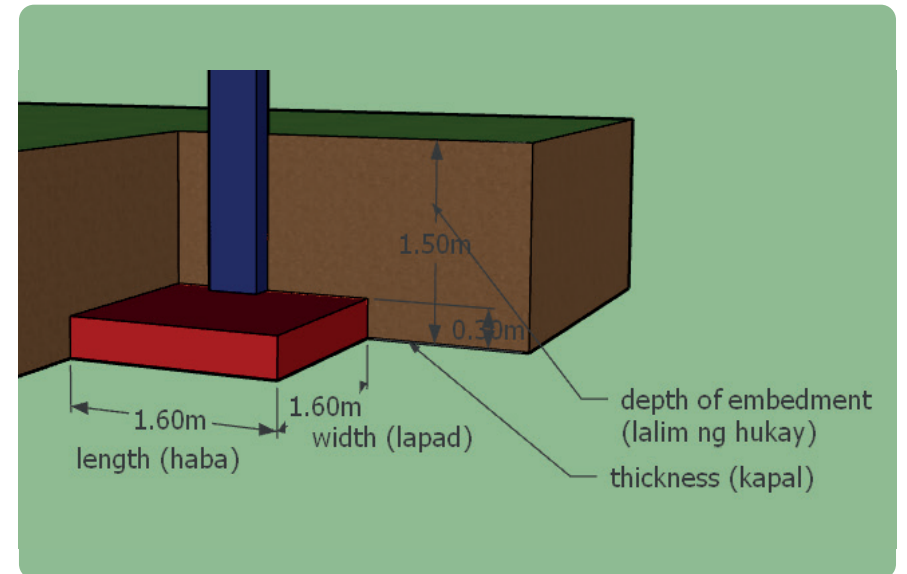
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm



5-6. THREE (3) STOREY RESIDENTIAL BUILDING WITH/WITHOUT ROOFDECK



5.A FOOTING DESIGN



5. IF YOUR DESIGN STRUCTURE ARE THE FOLLOWING:

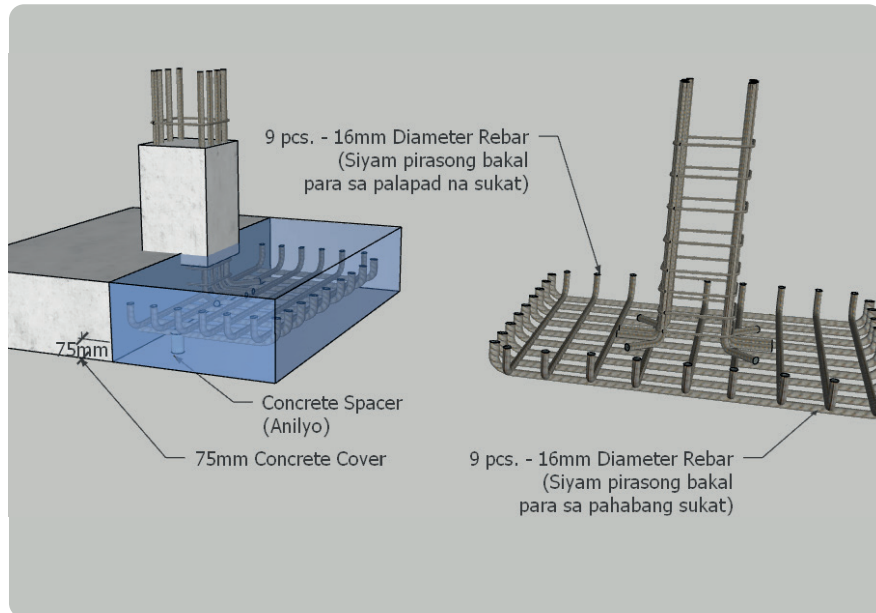
With Seismic Loads/ Consideration for 5km Closest Distance to known Seismic Source.	With maximum span of four (4) meters
With Storey Height of three (3) meters	Footing Tie Beam is required

Footing Size

Length	1.60 m
Width	1.60 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75 m
Depth Of Concrete Spacer	75 m

Footing Rebar

Length Rebar Diameter and Pieces	9 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	9 pcs. - 16 mm Diameter Rebar



5.B COLUMN DESIGN

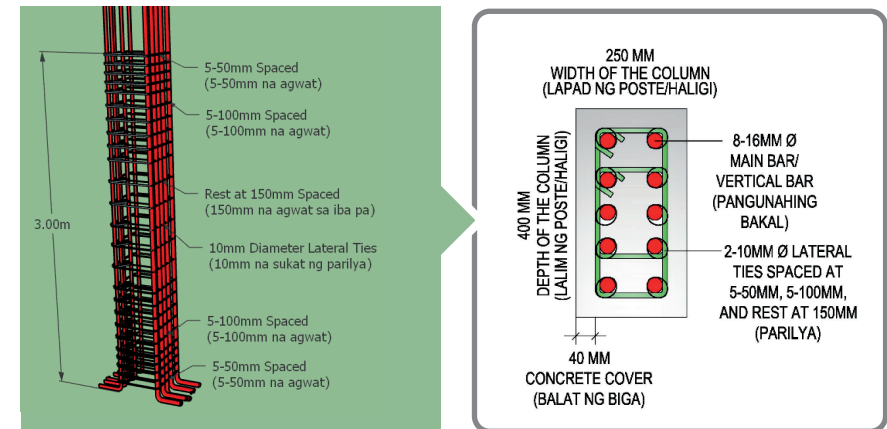
5.B.1 For Ground to Second (2nd) Floor Column

Column Size

Width	250mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	10 pcs. - 16 mm Diameter Rebar
Lateral Ties	2- 10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



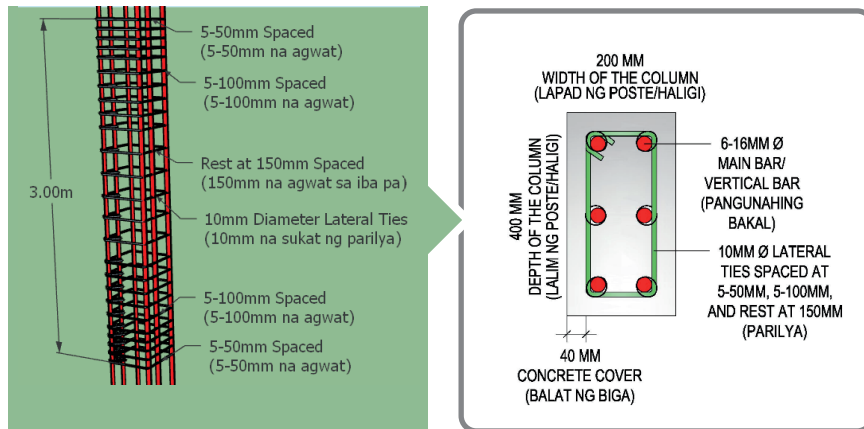
5.B.2 For Second (2nd) Floor to Roof Column

Column Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	6 pcs. - 16 mm Diameter Rebar
Lateral Ties	10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



5.C BEAM DESIGN

5.C.1 For Footing Tie Beam

Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

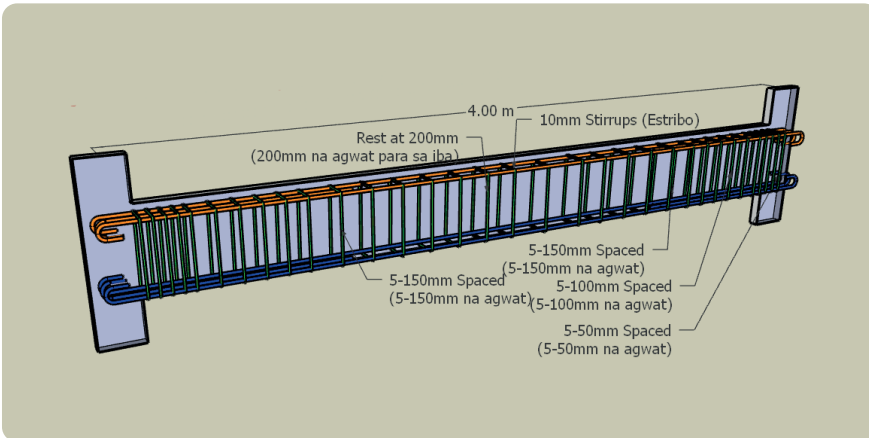
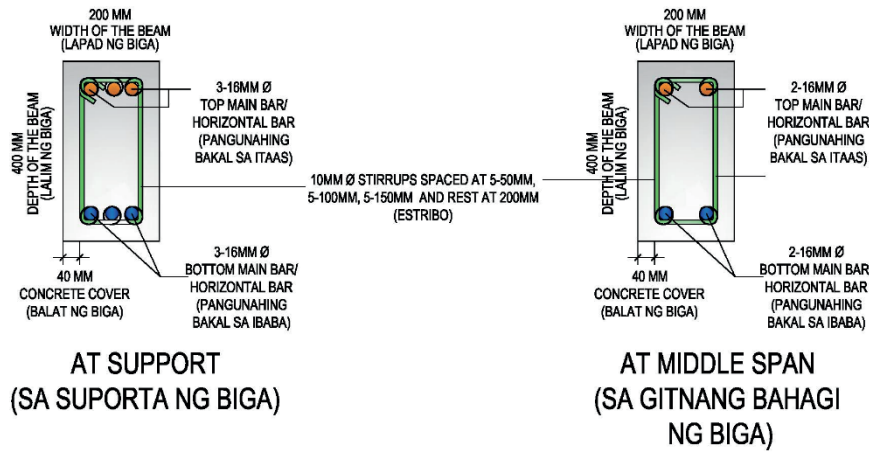
BEAM REBAR

At Support

Top Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	3 pcs. -16mm Diameter Rebar

At Middle Span

Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm



5.C.2 For Second (2nd) and Third (3rd) Floor Beam

Beam Size	
Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

BEAM REBAR

At Support

**Top Main Rebar/
Horizontal Bar**

3 pcs. - 16mm Diameter Rebar

**Bottom Main Rebar/
Horizontal Bar**

3 pcs. - 16mm Diameter Rebar

At Middle Span

**Top Main Rebar/
Horizontal Bar**

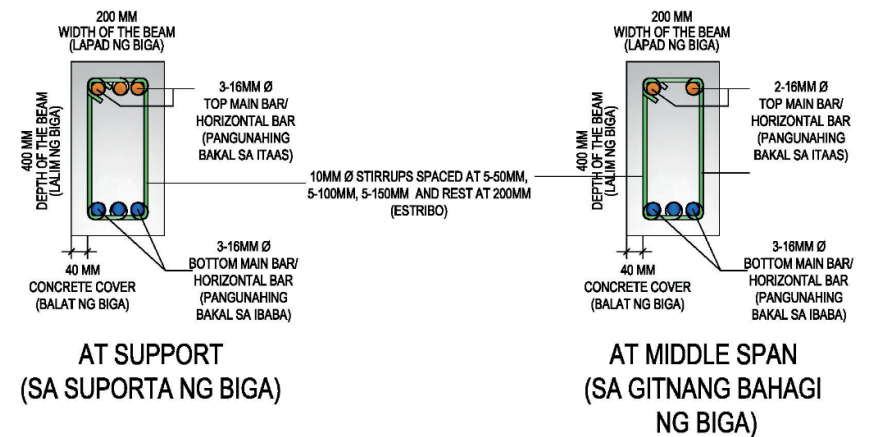
2 pcs. - 16mm Diameter Rebar

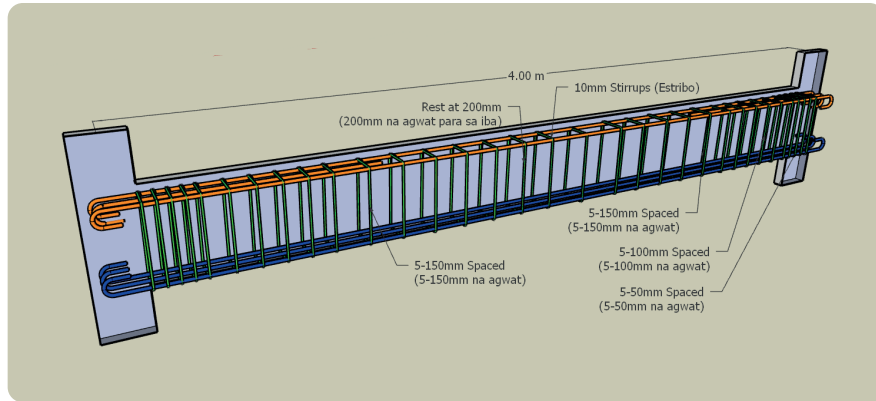
**Bottom Main Rebar/
Horizontal Bar**

3 pcs. - 16mm Diameter Rebar

Stirrups

10mm Diameter Stirrups
Spaced at 5- 50mm, 5-100mm,
150mm and rest at 200mm





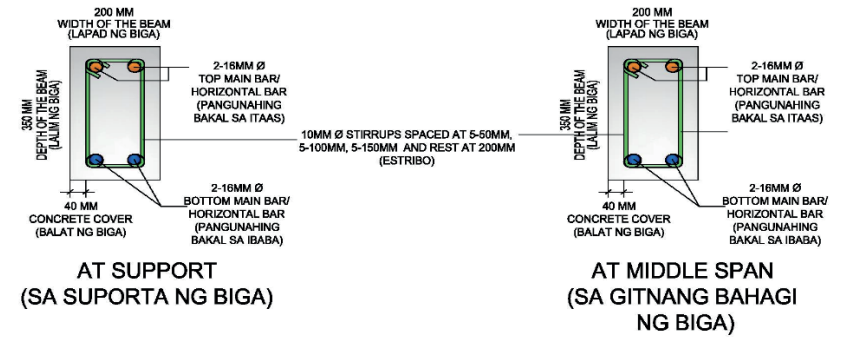
5.C.3 For Roof Beam

Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

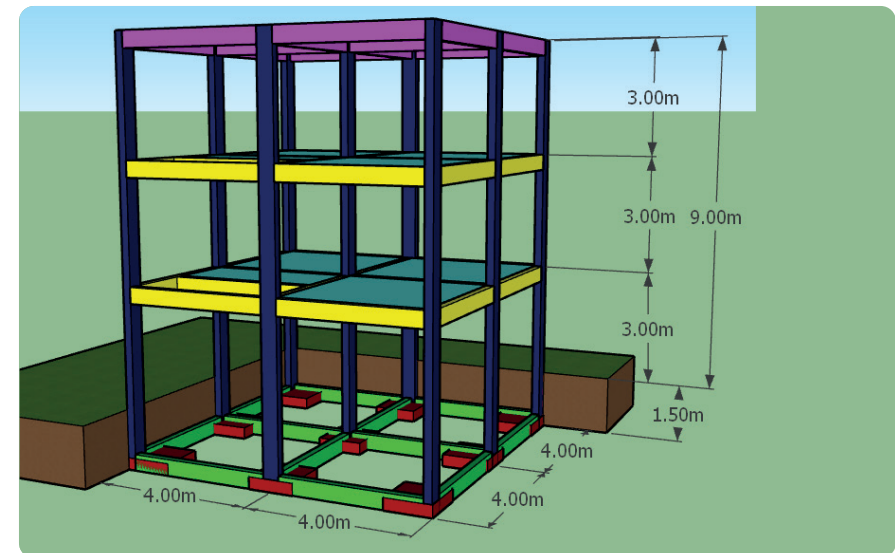
Beam Rebar

Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm

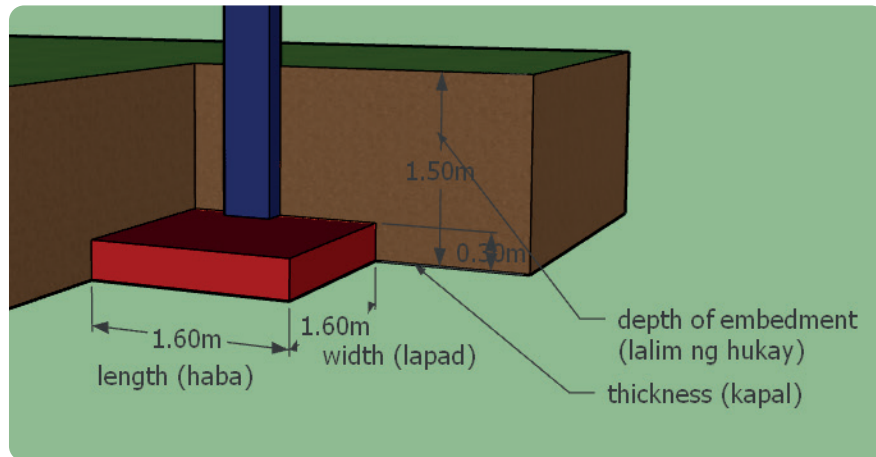


6. IF YOUR DESIGN STRUCTURE CONTAIN THE FOLLOWING:

With Seismic Loads/ Consideration for 2km Closest Distance to known Seismic Source.	With maximum span of four (4) meters
With Storey Height of three (3) meters	Footing Tie Beam is required



6.A FOOTING DESIGN

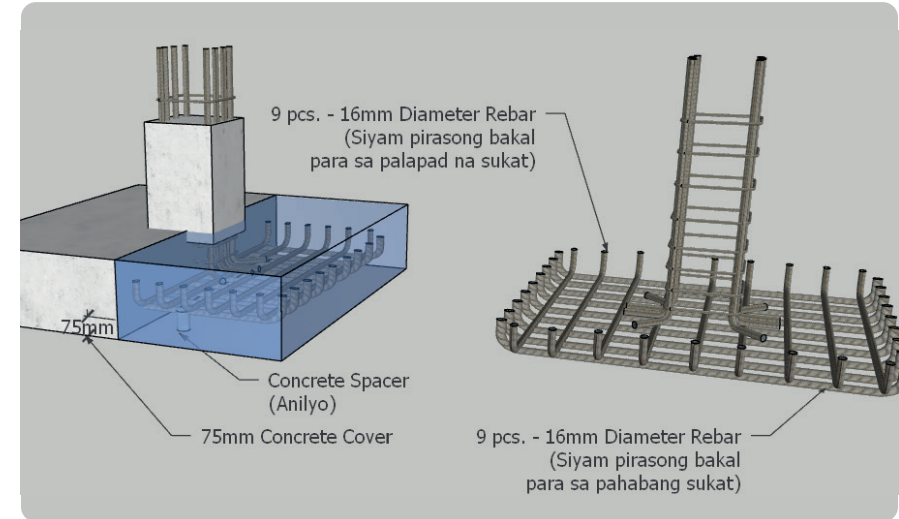


Footing Size

Length	1.60 m
Width	1.60 m
Thickness	300 mm
Depth Of Embedment	1.50 m
Concrete Cover	75 m
Depth Of Concrete Spacer	75 m

Footing Rebar

Length Rebar Diameter and Pieces	9 pcs. - 16 mm Diameter Rebar
Width Rebar Diameter and Pieces	9 pcs. - 16 mm Diameter Rebar



6.B COLUMN DESIGN

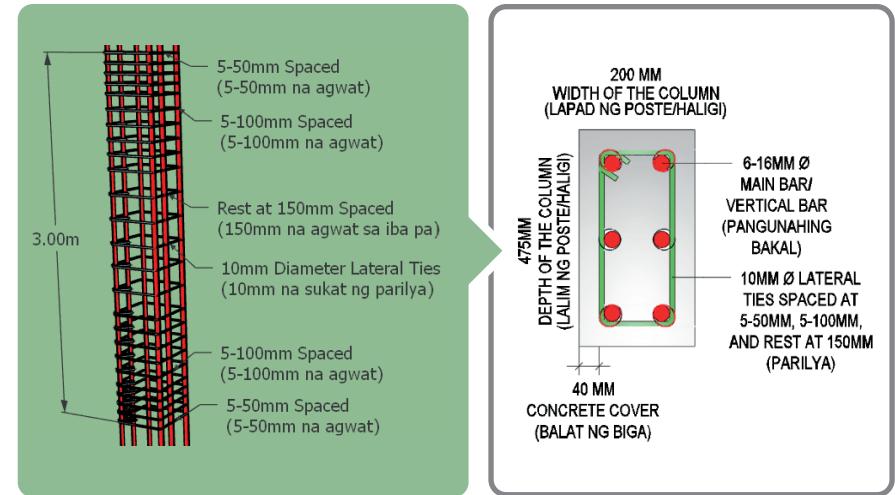
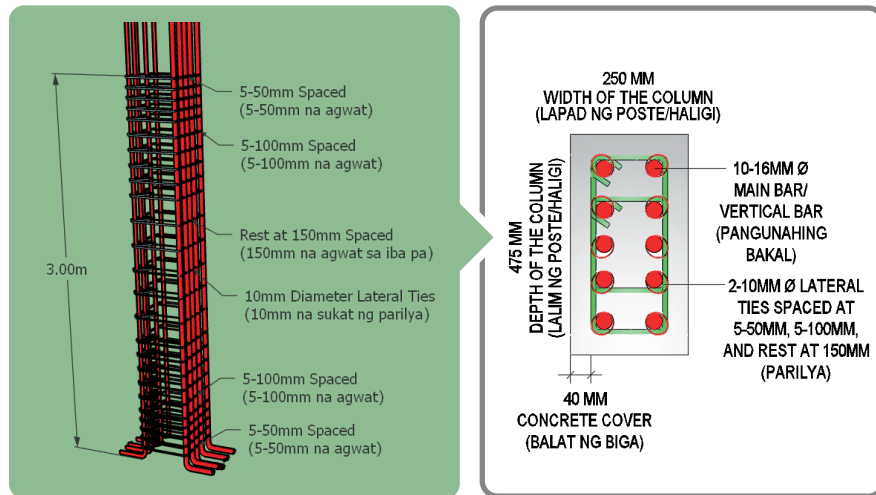
6.B.1 For Ground to Second (2nd) Floor Column

Column Size

Width	250mm
Depth	475mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	10 pcs. - 16 mm Diameter Rebar
Lateral Ties	2- 10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm



6.B.2 For Second (2nd) Floor to Roof Column

Column Size

Width	200mm
Depth	475mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

Column Rebar

Main Rebar/Vertical Bar	6 pcs. - 16 mm Diameter Rebar
Lateral Ties	10mm Diameter Ties Spaced at 5- 50mm, 5-100mm, and rest at 150mm

6.C BEAM DESIGN

6.C.1 For Footing Tie Beam

Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

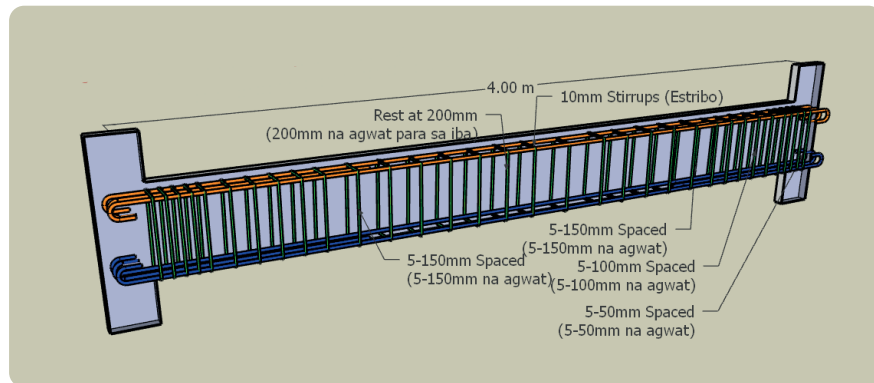
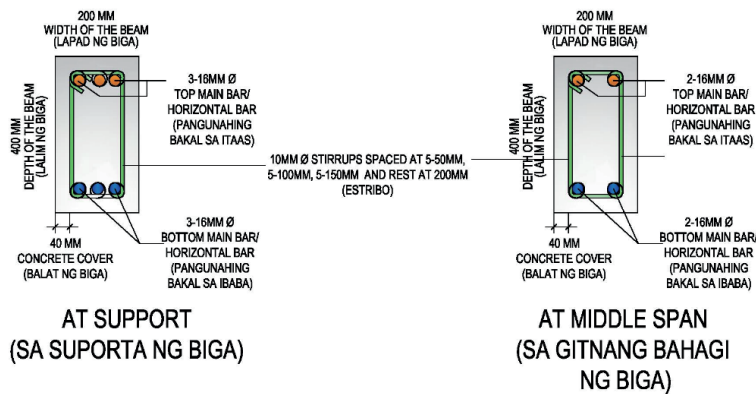
BEAM REBAR

At Support

Top Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar

At Middle Span

Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm



6.C.2 For Second (2nd) and Third (3rd) Floor Beam

Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm

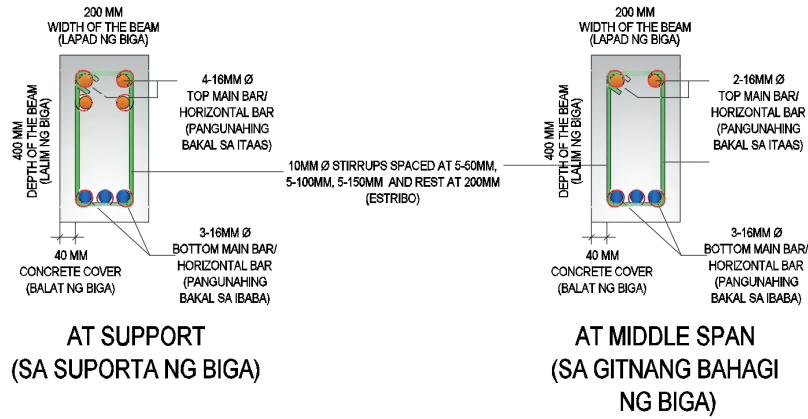
BEAM REBAR

At Support

Top Main Rebar/ Horizontal Bar	4 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar

At Middle Span

Top Main Rebar/ Horizontal Bar	2 pcs. - 16mm Diameter Rebar
Bottom Main Rebar/ Horizontal Bar	3 pcs. - 16mm Diameter Rebar
Stirrups	10mm Diameter Stirrups Spaced at 5- 50mm, 5-100mm, 150mm and rest at 200mm



Beam Rebar

**Top Main Rebar/
Horizontal Bar**

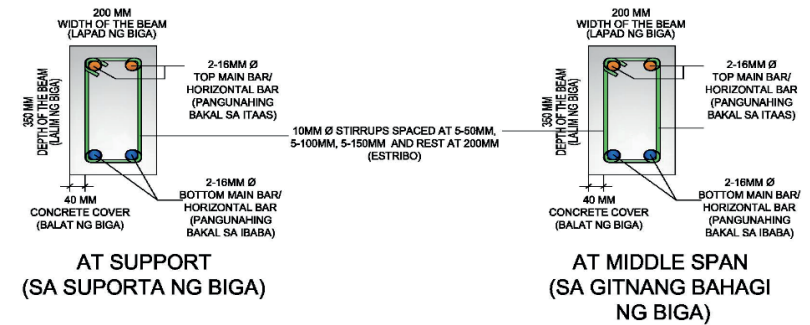
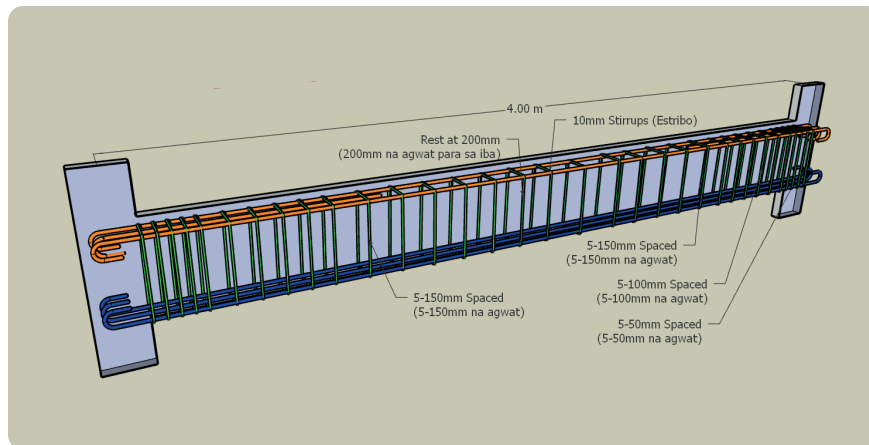
2 pcs. - 16mm Diameter Rebar

**Bottom Main Rebar/
Horizontal Bar**

2 pcs. - 16mm Diameter Rebar

Stirrups

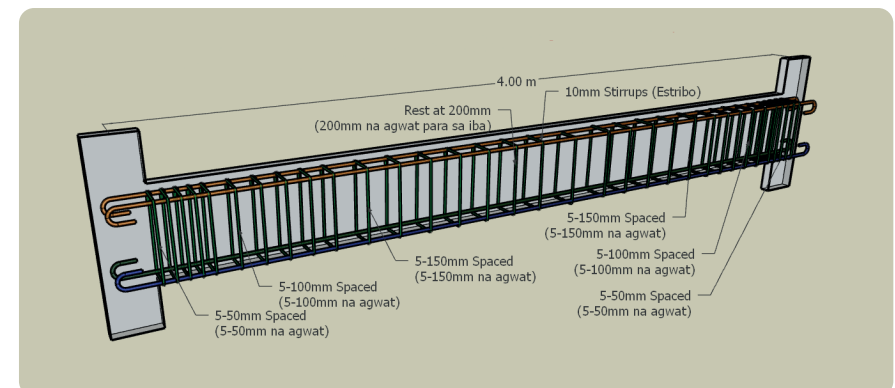
10mm Diameter Stirrups
Spaced at 5- 50mm, 5-100mm,
150mm and rest at 200mm



6.C.3 For Roof Beam

Beam Size

Width	200mm
Depth	400mm
Concrete Cover	40mm
Depth Of Concrete Spacer	40mm



PRESCRIPTIVE DESIGN

I. COLUMN DESIGN

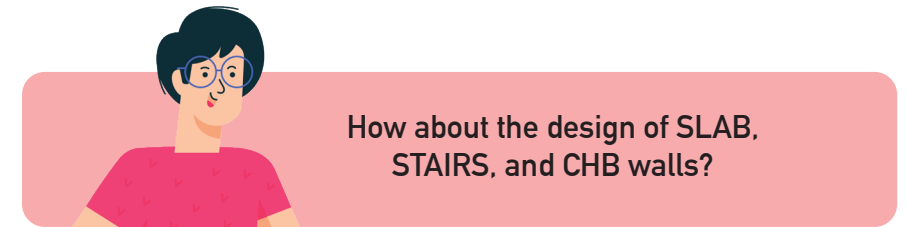
PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW									
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck				For Three (3) Storey Residential			
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration		-with Seismic Loads/Consideration		
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)
I. Column					For Ground to 2nd Floor	For 2nd Floor to Roof	For Ground to 2nd Floor	For 2nd Floor to Roof	
I.1 Size									
Depth (H) =	400 mm	400 mm	400 mm	475 mm	400 mm	400 mm	475 mm	475 mm	
Width (W) =	200 mm	200 mm	200 mm	250 mm	250 mm	200 mm	250 mm	200 mm	
I.2 Reinforcement Bar									
n =	4 pcs	6 pcs	8 pcs	8 pcs	10 pcs	6 pcs	10 pcs	6 pcs	
Φ =	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	
Pattern =	2-2	2-3	2-4	2-4	2-5	2-3	2-5	2-3	

II. BEAM DESIGN

PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW												
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck				For Three (3) Storey Residential						
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration		-with Seismic Loads/Consideration		-with Seismic Loads/Consideration		-with Seismic Loads/Consideration	
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)
II. Beam			For FTB and Roof/Deck Beam	For 2nd Floor Beam	For FTB	For 2nd Floor Beam and Roof/Deck Beam	For FTB	For 2nd and 3rd Floor Beam	For Roof Beam	For FTB	For 2nd and 3rd Floor Beam	For Roof Beam
II.1 Size												
Depth (H) =	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Width (W) =	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm
II.2 Reinforcement Bar												
Support												
Top =	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm	3-16mm	3-16mm	3-16mm	2-16mm	3-16mm	4-16mm	2-16mm
Bottom =	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	3-16mm	3-16mm	2-16mm	3-16mm	3-16mm	2-16mm
Mid-span												
Top =	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm	2-16mm
Bottom =	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm	3-16mm	2-16mm	2-16mm	2-16mm	2-16mm	3-16mm	2-16mm

III. FOOTING DESIGN

PRESCRIPTIVE DESIGN FOR THREE (3) STOREY RESIDENCE AND BELOW						
Description	For Bangalow	For Two (2) Storey Residential with/without roofdeck			For Three (3) Storey Residential	
	-w/o Seismic Loads/Consideration	-w/o Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration	-with Seismic Loads/Consideration
	-with max. span of four (4) meters	-with max. span of four (4) meters	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 5km Closest Distance to known Seismic Source.	-with Earthquake Assessment from Phivolcs for 2km Closest Distance to known Seismic Source.
	-with storey height of three (3) meters	-with storey height of three (3) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters	-with max. span of four (4) meters
			-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters	-with storey height of three (3) meters
			-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)	-with Footing Tie Beam (FTB)
III. Footing						
III.1 Size						
Length (L) =	1.15 m	1.30 m	1.40 m	1.40 m	1.60 m	1.60 m
Width (B) =	1.15 m	1.30 m	1.40 m	1.40 m	1.60 m	1.60 m
Thickness (t) =	300 mm	300 mm	300 mm	300 mm	300 mm	300 mm
III.2 Soil Bearing Capacity						
Embedment Depth (D) =	1.50 m	1.50 m	1.50 m	1.50 m	1.50 m	1.50 m
SBC =	144 kPa	144 kPa	144 kPa	144 kPa	144 kPa	144 kPa
III.3 Reinforcement Bar						
ΦB =	16mm	16mm	16mm	16mm	16mm	16mm
NL =	6 pcs	8 pcs	8 pcs	8 pcs	9 pcs	9 pcs
NB =	6 pcs	8 pcs	8 pcs	8 pcs	9 pcs	9 pcs



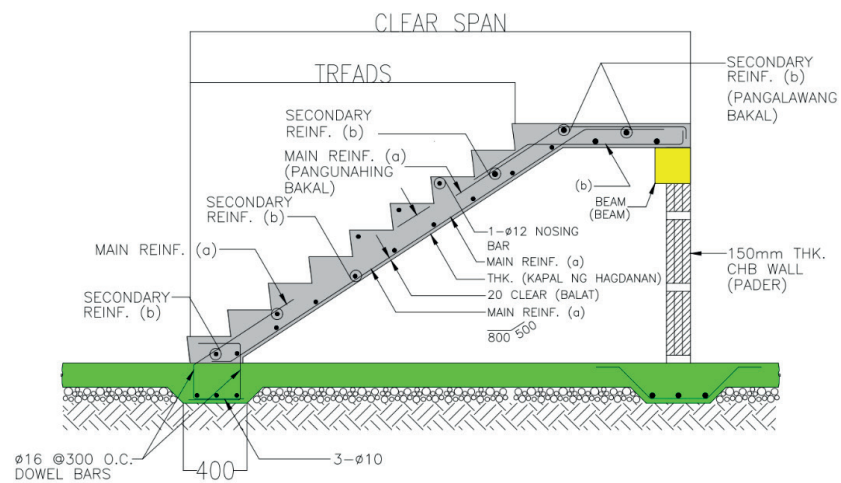
A. SLAB DESIGN

TYPICAL DESIGN FOR SLAB				
Size of Slab	Thickness of Slab	Reinforcing bars	Spacing	
			Support	Mid Span
4m x 4m	100mm	10mmØ	200mm	200mm
	100mm	12mmØ	300mm	300mm

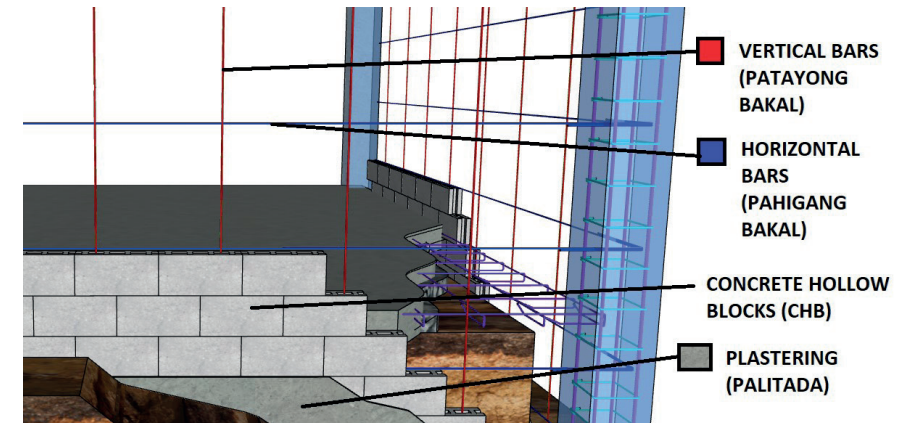
B. STAIRS DESIGN

- Stair span is the distance between adjacent stair supports whether it is a beam, a column, or a wall.
- Without a stair support location, consult and seek approval of Structural Design Engineer.

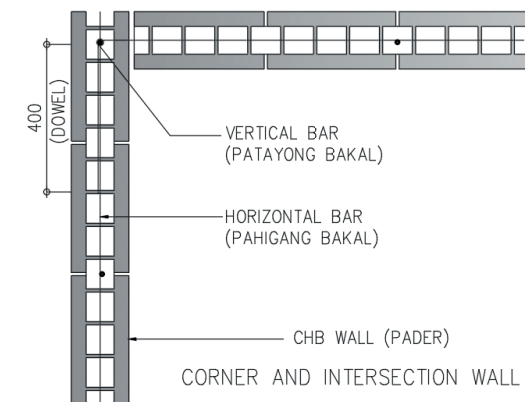
TYPICAL DESIGN FOR STAIR			
Clear Span (m)	Thickness of Stair (mm)	Size of Reinforcement and Spacing	
		Main (A)	Main (B)
4.0m	150mm	16mmØ at 200mm	10mmØ at 250mm
5.0m	150mm	16mmØ at 125mm	10mmØ at 250mm
6.0m	175mm	16mmØ at 100mm	12mmØ at 350mm



C. CHB WALLS DESIGN



TYPICAL DESIGN FOR CHB WALLS		
CHB Thickness	Horizontal Bars and its Spacing	Vertical Bars and its Spacing
100mm-125mm	10mmØ at 600mm	10mmØ at 600mm
150mm-200mm	10mmØ at 400mm	10mmØ at 400mm



STEP 5

What are the important things to keep in mind when you build your house?



Every part of a house or structure has important things to remember and consider.

A. Slab on fill must not be placed unless fill has been properly compacted.

B. The contractors/workers shall coordinate with architectural, sanitary/plumbing, electrical plan as to the exact sizes and location of the holes thru floor slabs and walls.

C. To provide adequate shoring and bracing of the structure for all loads that maybe imposed during construction.

D. All exposed structural steel members shall have at least two coats of red lead or zinc chromate primer paint.

E. CHB minimum lap length of splice be 250mm.

F. Provide right angled reinforcement at corners of CHB wall, 900mm long.

G. Where CHB walls adjoin columns and beams, dowels with the same size as the vertical or horizontal reinforcement shall be provided.



GUIDANCE ON CONSTRUCTION FACILITY HYGIENE DURING COVID-19



KEEP PHYSICAL DISTANCING

Everyone on the site should practice physical distancing to reduce their exposure to other people. They should do their best to avoid close contact with people outside their immediate families. Close contact includes being within two (2) meters (6 feet) of another person.



REGULAR HAND WASHING.

Hand washing helps remove viruses and toxic materials from the skin. It prevents workers from spreading infectious diseases, developing skin reactions and ingestion of harmful chemicals. Workers should wash their hands after using the bathroom; before and after eating, handling food; after coughing or blowing their nose; after contact with chemical agents. If soap and water are not available, apply an alcohol-based hand sanitizer and remove the visible stain with a paper towel, then reapply the alcohol-based sanitizer.



CLEANING FACILITIES

A sustainable hand washing facility helps prevent infectious diseases and keeps workers safe from toxic dirt and chemicals often found in construction sites. The builder must provide the following:

- Hot and cold water if possible.
- Paper towels and trash cans

PALAGING TANONG NI JUAN!

Paano ba mag-apply ng Building Permit sa Pamahalaang Lokal Ng Lungsod Quezon?



HAKBANG PARA SA PAG APPLY NG BUILDING PERMIT

- A** Mag-apply online at magtakda ng appointment sa website na: qceservices.quezoncity.gov.ph
- B** Sagutin ng tama ang mga katanungan sa iyong proyekto (para sa Checklist ng mga kinakailangang ipasa)
- C** I-print ang mga Form ng Application (pirmahan ang mga ito bilang aplikante kasama ang lagda ng iyong Engineer / Architect). Kinakailangan din na notarized ang Building Application Form
- D** Magsumite ng KUMPLETONG mga dokumento sa Petsa ng Appoinment.

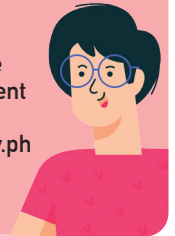
PAALALA Hangga't wasto ang impormasyon sa online application at kumpleto ang mga isinuniteng dokumento, ang pag-issue ng Building Permit ay magiging madali

PALAGING TANONG NI JUAN!



Paano naman ang pagkuha ng Certificate of Occupancy, Certificate of Final Electrical Inspection (CFEI) at iba pang clearances/certificates?

Mag-apply pa din online at magtakda ng appointment sa website na: qceservices.quezoncity.gov.ph



Paano malaman ang status ng aking application sa Lungsod Ng Quezon City?

Upang malaman ang STATUS ng iyong application, I-type lang ang iyong application number sa website na ito: qceservices.quezoncity.gov.ph



Paano kami makikipag-ugnayan sa Department of Building Official kung mayroon kaming mga katanungan, follow-up, pagkabahala, reklamo at gustong linawin?

Maari po kayong mag e-mail sa DBO@quezoncity.gov.ph o tumawag sa 8988-4242 local 8905/8916



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