

# Comparison of Work Between Bottom Up Method and Top Down Method: Execution and Timing

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## Abstract

The purpose of this paper is to find the best method by comparing the implementation (phase of work) and the time of execution of work in the methods of top down and bottom up. Objects in this paper is on the building project one apartments kertajaya east residence with apartments and strata concept of service apartments, located street Kertajaya Surabaya. This comparative study covers the implementation of work and timing of work in the method of top-down and bottom up. And the results of comparison in this paper shows that in terms of the implementation of bottom-up method is more efficient and allows from the top down method, and in terms of execution time of a top-down method is faster than the bottom up method.

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Peer-review under responsibility of organizing committee of The Narotama International Conference on Civil Engineering 2015 (NICCE-2015).

*Keywords: Implementation and time in the method of Top down and bottom up, Indonesia*

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## 1. Introduction

Economic development in the city of Surabaya, and many high-rise buildings, shops, malls, and in particular in the field of property, It encourages the parties of MNC LAND as the developer erect a building named Apartment Kertajaya Apartment, On the road Kertajaya Indah. The apartment building Kertajaya One East Residences concept strata apartments and service apartments occupies a land area of 5,704 m<sup>2</sup> and has 33 floors, 3 basements with an area of 76 415 m<sup>2</sup>. With the building height and depth basementnya floor, then in the preparation of this paper will discuss the report on the comparison between the execution of the work top down to bottom up in terms of implementation and execution time, considering the party as the owner MNC LAND pursue the project completion time.

With the comparison of the implementation of the work top down bottom up with the expected work goes according to the planned time and can finish a predetermined schedule. The purpose of this paper is to find the best method by comparing the implementation (phase of work) and the time of execution of work in the methods of top down and bottom up.

## 2. Literature Review

### 2.1. The Meaning of Top down

In the construction of a multistory building and with the basement floor of the building, the contracting parties as the executor of the development of the building will be thinking about what to wear methods such as soil excavation work.

In the implementation of the current work of the basement structure, there are two ways, one is the top-down method. In this case the basic understanding of the top-down method is the implementation of the work can be carried out in two directions, namely work above and below

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the work carried out simultaneously, and the top-down method is in terms of implementation and execution time, including the following:

#### *2.1.1 In terms of execution*

In the top-down method, work on the structure can be done simultaneously with the excavation work for the basement area.

But between the upper and lower structural work, which must be done in advance of the work that is the basic structure that will continue to work the structure of it. Because it serves as a binder such as king-post structure, ground floor columns, beams and slab foundation will become a single entity, to help the soldier pile (retaining) the active voltage withstand ground.

After work the ground floor and 1st floor finishes, new excavation and bottom structure can begin. Here to post his own king divided into 2 groups, including:

1. A permanent king post is king post whose position has been planned from the beginning and later king of this post will be a column by adding reinforcement structure and casted back.
2. Temporary king post is the king post temporary post that serves as a buffer load thereon (strutting beam), and the king of this post will be cut (dibobok), and to position it was not required location right column position plan (design).

#### *2.1.2 In terms of execution time*

In terms of execution time, the method is arguably the top down quickly, because the work can be from two directions, namely the implementation of the above structures can work simultaneously with the execution of work under the structure. But in this case, if the implementation of land and excavation work under the structure there is a problem, then work on the structure can not continue the job.

### *2.2 The Meaning of Bottom up (Open cut)*

Bottom-up method is commonly referred to as the conventional method and is a method that is simple, in a building mostly as a contractor in the construction of this building implementation using a bottom-up method, with simplicity in commonly used method. And the bottom-up method can be in terms of implementation and execution time, which include the following:

#### *2.2.1 In terms of execution*

In the implementation of this bottom-up method in which the excavation work carried out starting from the ground floor or the original ground surface to the elevation of the basement is planned. So in the implementation of bottom-up method is aranya one direction, namely downward, then when it reaches the planned elevation, a new direction to work on. Unlike the top-down method of work that could be a two-way jobs at once, namely the direction of work upward and downward directions work simultaneously.

After all excavation work is completed, the work structure can be done, starting from the lowest elevation, the foundation work, continue to work tie beam and so on.

#### *2.2.2 In terms of execution time*

When viewed in terms of execution time, bottom-up method or can be referred to the open cut method is, arguably longer. Why is that? Due to the implementation of the open cut method of work in only one direction, from excavation to the elevation of the work planned, just started the work of the foundation structure then continues to work under the structure and so on until the work on the structure.

Implementation of the above mentioned work will take a very long time when compared with the implementation of top-down method can be two-way simultaneous implementation. However, in the implementation of the open cut method is that all excavation work has been completed, the job structure starting from the bottom will feel easy and will quickly finish.

### 3. Research Metodology

In preparing the paper, the necessary steps are structured and systematic called research methodology, so that is expected to solve the existing problems, scientifically, detailed and accountable. Methods in writing this paper is to compile material from books related and from previous studies and from the field survey. In this method prepared by the following steps:

1. Study of the library and field
2. The data collection
3. Data processing
4. Withdrawal conclusions

In general, the research methodology can be seen in figure 1 following:

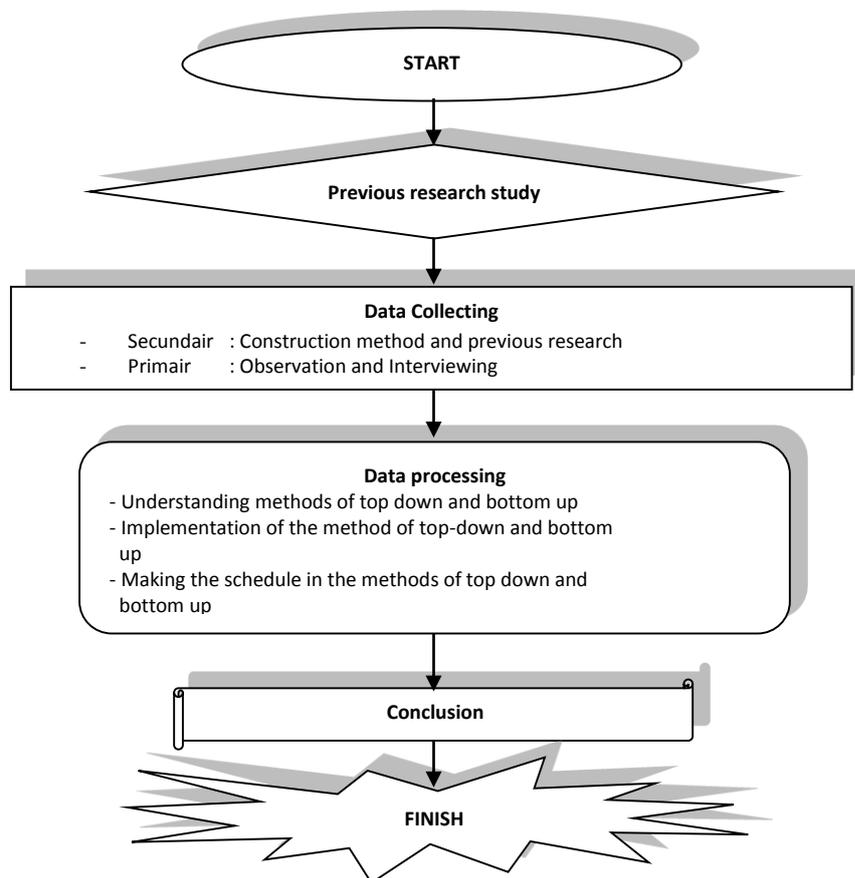


Fig. 1. Research Methodology flowchart

## **4. Results and Discussion**

### *4.1. Implementation Phase*

In this paper each time work is taken based on the observation time in the project. Observations were conducted only building up to 5 floors of the 33 floor which is planned and will be compared to the time execution of work between the two methods.

#### *4.1.1 Stages of work in the method of Top down*

In the implementation of top-down methods of work, there are stages of work which includes the following:

- 1) Retaining work, in the construction of this Apartment building soil retaining walls using the soldier pile.
- 2) Bore pile Work
- 3) King post work, pole king post in this top-down method using steel elbow is designed to form a square, which will be the column while and then it will be a real column after being given reinforcement and casted.
- 4) Caping beam work
- 5) The work of digging the ground phase 1 ( $\pm 2.5$  meters), this work which will be carrying out the work for the ground floor structures, ranging from the installation of scaffolding to foundry work.
- 6) Structure of the ground floor work, in the ground floor structure work employment include: Employment beams, floor plates and columns
- 7) The 2nd floor of the structure work, in this work more or less the same as the work of the ground floor
- 8) Ramp phase 1 work, for taking soil excavation of the basement floor is used the access ramp. And manufacture of its own ramp wearing reinforcement and then casted.
- 9) The work of digging the ground phase 2, in the work of excavation excavator uses a car that will land would be distributed to the truck to be dumped into the disposal of excavated soil.
- 10) Ramp phase 2 work, in this work more or less the same as the first stage of the work ramp.
- 11) The soil dug stage 3 work, in the work of digging the soil is more or less the same explanation to dig the ground work stage 2
- 12) Unloading ramp work, after all the work already dug soil, dig soil terakhir work unloading ramp is bottom to top.
- 13) Work on the 3rd floor structure, the floor structure work 3 jobs include: Employment beams, floor plates and columns
- 14) The work of the foundation structure, the foundation work is the work include: Employment tie beam, pile cap, and raft
- 15) Work king post, because the top-down method is pole king-post will be the actual column, it must dibobok first and then given reinforcement and casted to be the actual column.
- 16) On the 3rd basement floor structure work, in the basement floor structure work 3 jobs include: Work column, shearwall.
- 17) Floor structure 4 Work, in the work of the floor structure 4 jobs include: Employment beams, floor plates and columns.
- 18) Basement floor structure 2 work, in the basement floor structure work 2 jobs include: Employment beams, floor plates and columns

- 19) Floor structure 5 work, in the work of the floor structure 5 jobs include: Work beams, floor plates and columns
- 20) Basement structure 1 work, in the first basement floor structure work employment includes: job beam, slab and columns

#### *4.1.2 Stages of work in the Bottom up method*

In the implementation of bottom-up methods of work, there are stages of work which includes the following:

- 1) Retaining work, in the construction of this Apartment building soil retaining walls using the soldier pile
- 2) Bore pile work
- 3) King post work, Pole king post in this bottom-up method using reinforcement that could be considered as bore pile, but the pole king this post will dibobok or eliminated.
- 4) Caping beam work
- 5) The work of digging the ground phase 1
- 6) Mounting strutting beam layer 1 work, In the bottom-up method is strutting beam using steel WF
- 7) Ramp work at the basement 1, for making dugouts used is ramp access. And manufacturing ramp itself was put on the reinforcement and then casted.
- 8) The work of digging the ground phase 2 (basement floor area 1), the excavation work using excavators car yan dugouts will be channeled to the truck to be dumped into the disposal of excavated soil.
- 9) Ramp work in the second basement floor, in this work more or less the same as the previous ramp work.
- 10) The soil dug stage 3 work (basement floor area 2), in this job description more or less the same as the previous soil digging work.
- 11) Waller mounting beam work, this beam waller work around the inner perimeter of the basement floor and beam waller using WF steel and mounted stuck in the soil retaining wall (soldier piles)
- 12) Strutting beam mounting layer 2 work, the bottom-up method is strutting beam using steel WF
- 13) On the basement floor ramp 3 work, in this work more or less the same as the previous ramp work.
- 14) The soil dug stage 4 (area 3 basement floors) work, in this job description more or less the same as the previous soil digging work.
- 15) Loading ramp work, loading ramp work is work from the bottom to the top of the ramp.
- 16) The work of the foundation structure, the foundation work is the work include: Employment beams, floor plates and columns
- 17) Basement floor structure 3 work, in the basement floor structure work 3 jobs include: Field work, shearwall
- 18) Basement floor structure 2 work, in the basement floor structure work 2 jobs include: employment beams, floor plates and columns
- 19) Basement floor structure 1 work, in the basement floor structure work 1 jobs include: employment beams, floor plates and columns

#### *4.2 Explanation of terms of execution time*

This paper discusses the comparison of the implementation of the method of top-down and a method of bottom-up in terms of execution time, the results of the schedule of work equally implemented starting implementation of employment dated 1 September 2014, with the result of long work of each according to a study conducted for in the project.

##### *4.2.1 The time taken in the top-down method*

In this top-down method in terms of execution time, can be obtained by the time taken in the top-down method, including the following:

- 1) The handover of land. For the handover of the land is like the signature of the contract and so forth require 1 day
- 2) The preparatory work. In this preparatory work includes work:
  - a. Site manager and setting out: which takes about 7 days, and its implementation after the handover of land.
  - b. Field measurements: which takes about 7 days, and the implementation is approximately 3 days after the handover of land.
  - c. Temporary fencing: which takes about 7 days, and the implementation is approximately 3 days after the work field measurements.
  - d. Preparation of the land: which takes about 21 days, and the implementation or less after work field measurements.
- 3) Work drilling. In this drilling work, the work is divided into 3 parts, including the following:
  - a. Retaining jobs (soldier pile): which takes about 49 days with the number of points 174 pieces, and the implementation or less after the work preparation of the land.
  - b. Bore pile of work: which takes about 67 days with the number of points 137 pieces, and the implementation of approximately 3 days after the occupation soldier pile.
  - c. Occupation king post: which takes about 21 days with the number of points 30 pieces, and the implementation is approximately 14 days after the work bore pile.
- 4) Excavation work. In this land excavation work is divided into 3 phases for excavation work and the 3 phases to the work ramp, and the excavation work is as follows:
  - a. Dig the ground work stage 1: which takes about 21 days to 8482.77 m<sup>3</sup> volume, and its implementation after the work hat beam
  - b. Ramp phase 1 Work : which takes about 21 days, and the implementation is approximately 5 days after soil digging work phase 1
  - c. Dig the ground work stage 2: which takes about 28 days to about 8192.22 m<sup>3</sup> volume, and implementation kuran over 7 days after soil digging work phase 1
  - d. 2 stage ramp work: which takes about 28 days, and the implementation is approximately 5 days after digging ground work stage 2
  - e. Dig the ground work stage 3: which takes about 35 days to 14147.54 m<sup>3</sup> volume, and its implementation after digging ground work stage 2
  - f. Unloading ramp Work: which takes about 7 days, and its implementation after digging ground work stage 3
- 5) Under the structure work. In the work under the structure is divided into 4 sections of work, including the following:
  - a. Caping beam work: which takes about 49 days and 50% after the implementation soldier pile work begins.
  - b. 3 basement structure work, which consists of work:
    - Work which includes the foundation raft, pile cap, tie beam, shearwall

- King post work breakdown
- Column basement floors 3 work

In the third basement structure work is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 45 days, and the implementation is approximately 7 days after the work formwork basement structure 3
- Formwork: which takes about 45 days, and the implementation is approximately 14 days after soil digging work
- Casting Work: which takes about 45, and the implementation kuran over 7 days after the work bar work basement structure 3

c. Second basement structure work, which consists of work:

- Beam Work, which include formwork beam, the beam and casting bar work beam
- Plate work, which includes formwork plate, plate casting and plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the second basement structure work is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork basement structure 2
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the third basement structures foundry work
- Casting work: which takes about 35, and the implementation over 5 days after jobs bar work basement structure 2

d. first basement structure work, which consists of work:

- Beam work, which include formwork beam, the beam and casting bar work beam
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the first basement job structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork basement structure 1
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the second basement structures foundry work
- Casting: which takes about 35, and the implementation kuran over 5 days after jobs bar work basement structure 1

6) Work on the structure. In the above structure of the work is divided into 5 sections including the following work:

a. Employment structure of the ground floor, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work

- Column work, which includes bar work column, column formwork, and casting column

In the employment structure of the ground floor is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork ground floor structure.
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of digging the ground phase 1
- Casting work: which takes about 35, and the implementation kuran over 5 days after jobs bar work ground floor structure

b. 2<sup>nd</sup> floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the work of the 2<sup>nd</sup> floor of the structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after the work floor formwork structure 2
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the ground floor structures foundry work
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 2

c. 3<sup>rd</sup> floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the 3<sup>rd</sup> floor structure work is divided into 3 parts work, bar construct, formwork and casting.

- Bar construct: which takes about 35 days, and the implementation is approximately 5 days after the work floor formwork structures 3
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 2
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 3

d. 4<sup>th</sup> floor structure work, which consists of work:

- Beam work, which include formwork beams, beam bar construct and casting beam
- Plate work, which includes formwork plate, plate and casting plate

- Column work, which includes bar work column, column formwork, and casting column

In the work of the 4th floor of the structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork structure 4th floor
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 3
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 4

e. 5 floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the employment structure of the 5th floor is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork structure 5th floor
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 4
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 5

From the above explanation, in this Apartment building construction using a top down method requires approximately 12 months starting from September 2014 through August 2015 for up to 5 floor structure, because in this paper, floor structures to be reviewed until the 5th floor.

#### *4.3 The time taken in the bottom-up method*

In the bottom-up method is reviewed in terms of execution time, can be obtained by the time taken in the bottom-up method, including the following:

- 1) The handover of land. For the handover of the land is like the signature of the contract and so forth require 1 day
- 2) The preparatory work. In this preparatory work includes work:
  - a. Site manager and setting out: which takes about 7 days, and its implementation after the handover of land.
  - b. Field measurements: which takes about 7 days, and the implementation is approximately 3 days after the handover of land.
  - c. Temporary fencing: which takes about 7 days, and the implementation is approximately 3 days after the work field measurements.
  - d. Preparation of the land: which takes about 21 days, and the implementation or less after work field measurements.

- 3) Work drilling. In this drilling work, the work is divided into 3 parts, including the following:
  - a. Retaining jobs (soldier pile): which takes about 49 days with the number of points 174 pieces, and the implementation or less after the work preparation of the land.
  - b. Bore pile of work: which takes about 67 days with the number of points 137 pieces, and the implementation of approximately 3 days after the occupation soldier pile.
  - c. Occupation king post: which takes about 14 days with the number of points 18 pieces, and the implementation of approximately 14 days after the work bore pile.
- 4) Work excavation. In this land excavation work is divided into 4 stages for excavation work and the 4 stages to ramp work, and the excavation work is as follows:
  - a. Dig the ground work stage 1: which takes about 7 days to 4313.28 m<sup>3</sup> volume, and its implementation after the work bore pile and hat beam
  - b. 1 phase ramp job: it takes about 7 days, and the implementation is approximately 5 days after soil digging work phase 1
  - c. Digging work stage 2: which takes about 21 days to volume 8626.5 m<sup>3</sup>, and its implementation after work strutting beam layer 1
  - d. 2 stage ramp job: it takes about 21 days, and the implementation is approximately 5 days after digging ground work stage 2
  - e. Dig the ground work stage 3: which takes about 28 days to 9201.6 m<sup>3</sup> volume, and its implementation after the installation work strutting beam layer 2
  - f. 3rd stage ramp work: which takes about 28 days, and the implementation of approximately 5 days after digging ground work stage 3
  - g. Dig the ground work stage 4: which takes about 28 days to 9201.6 m<sup>3</sup> volume, and implementation is approximately 7 days after digging ground work stage 3
  - h. Work unloading ramp: it takes about 7 days, and its implementation after digging ground work stage 4
- 5) Work under the structure. In the work under the structure of the work is divided into five parts, which include the following:
  - a. Caping beam work: which takes about 49 days and 50% after the implementation soldier pile work begins.
  - b. Job strutting beam, which consists of work:
    - Work strutting beam Layer 1: which takes about 28 days, and its implementation after digging ground work stage 1
    - Work waller beam: who takes 28 days, and after the implementation phase of work digging the soil 2
    - Work strutting beam layer 2: which takes about 28 days, and the implementation is approximately 7 days after the work waller beam
  - c. 3 basement structure work, which consists of work:
    - Work which includes the foundation raft, pile cap, tie beam, shearwall
    - King post break down
    - Work column basement floors 3

In the third basement structure work is divided into 3 parts work, namely bar work, formwork and casting.

  - Bar work: which takes about 42 days, and the implementation is approximately 7 days after the work formwork basement structure 3

- Formwork : which takes about 42 days, and the implementation is approximately 14 days after soil digging work TAAP 3
- Casting work: which takes about 42, and the implementation kuran over 7 days after the work bar work basement structure 3

d. 2 basement structure work, which consists of work:

- Work beam, which include formwork beam, the beam and casting bar work beam
- Work plate, which includes formwork plate, plate and casting plate bar work
- Work column, which includes bar work column, column formwork, and casting column

In the second basement structure work is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork basement structure 2
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the third basement structures foundry work
- Casting work: which takes about 35, and the implementation kuran over 5 days after jobs bar work basement structure 2

e. First basement structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the basement 1 job structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork basement structure 1
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the second basement structures foundry work
- Casting work: which takes about 35, and the implementation kuran over 5 days after jobs bar work basement structure 1

6) Work on the structure. In the above structure of the work is divided into 5 sections including the following work:

a. Employment structure of the ground floor, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the employment structure of the ground floor is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork ground floor structure.

- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of digging the ground phase 1
- Casting work: which takes about 35, and the implementation kuran over 5 days after jobs bar work ground floor structure

b. 2nd floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the work of the 2nd floor of the structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after the work floor formwork structure 2
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the ground floor structures foundry work
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 2

c. 3rd floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the 3rd floor structure work is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after the work floor formwork structures 3
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 2
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 3

d. 4th floor structure work, which consists of work:

- Beam work, which include formwork beams, beam and casting beam bar work
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the work of the 4th floor of the structure is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork structure 4th floor
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 3
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 4

e. 5 floor structure work, which consists of work:

- Beam work, which include formwork beam, the beam and casting bar work beam
- Plate work, which includes formwork plate, plate and casting plate bar work
- Column work, which includes bar work column, column formwork, and casting column

In the employment structure of the 5th floor is divided into 3 parts work, namely bar work, formwork and casting.

- Bar work: which takes about 35 days, and the implementation is approximately 5 days after jobs formwork structure 5th floor
- Formwork: which takes about 35 days, and the implementation is approximately 14 days after the work of casting the floor structure 4
- Casting work: which takes about 35, and its implementation after the take over 5 days bar work work floor structure 5

## 5. Conclusion

Based on the analysis of the discussion concluded, as follows:

1. If the terms of the implementation in a top-down method, after drilling work is completed, the job structure of the ground floor and then carry out the excavation work the land. with the implementation barriers often faced is such excavation work are mostly mud and when the excavation area under the structure of the ground floor, and maneuver planning tools used in the work. In addition to overcoming these obstacles is the contractor before the execution of the work, must plan maneuvers the tools used.

2. If the terms of execution time and on schedule is made of both methods, top-down method of execution time takes about 346 days or about 11 months while the bottom-up method implementation period takes about 378 days or 13 months. With so from both methods if the terms of the timing of the top-down method is faster than the bottom up, top down due to the method of implementation in the kingdom two directions simultaneously.

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