Jurnal Teknik dan Science
JTS Vol 4 No. 2 June 2025 | ISSN: 2828-7002 (Print), ISSN: 2828-6871 (online), Hal 117-125

Working Method of Column Casting In Residential House Construction Project at Jl. Martimbang No.2

Rifaldi Adi Saputra[1], Agung Sakti Meldian[2], Lutfi Hanafi[3] , Aep Saepuloh[4]
[1,2,3]Civil Engineering Study Program, Faculty of Engineering and Informatics, Universitas Dian Nusantara,
[4]Univeristas Nusa Megar Kencana

Article History
Received : 2025-06-07
Revised : 2025-06-23
Accepted : 2025-06-28
Published : 2025-08-30

Corresponding author*:
agung.sakti.meldian@dosen.undira.ac.id

Cite This Article:
Rifaldi Adi Saputra, Agung Sakti Meldian, & Lutfi Hanafi. (2025). Working Method of Column Casting In Residential House Construction Project at Jl. Martimbang No.2. Jurnal Teknik Dan Science, 4(2), 117–125.

DOI:
https://doi.org/10.56127/jts.v4i2.2227

Abstract: Column work is one of the important stages in constructing a residential house structure, functioning as the main element supporting the load. In the house construction project at Jalan Martimbang No. 2, South Jakarta, the column implementation method is designed to prioritize the accuracy, strength, and durability of the structure. The stages of work include material preparation, formwork manufacture, assembly and installation of reinforcement, and concrete casting according to the established technical specifications. The entire process is carried out by paying attention to quality standards and work safety procedures, as well as considering the conditions of the surrounding environment. With a systematic approach and the use of quality materials, it is expected that the column structures will be able to support the building optimally and meet the planned lifespan of the building.

Keywords: Column, Implementation Method, Column Structure. Quality control

INTRODUCTION

Column casting is one of the crucial stages in the work of a multi-storey building structure, which has a major role in supporting the load. Success in column casting work greatly determines the strength and stability of the building structure as a whole. Therefore, the selection of implementation methods, time planning, quality control, and coordination between workers are very important aspects in the construction process.

The construction project located at Jalan Martimbang No. 2, Jakarta, which is one of the densely populated areas in South Jakarta, presents its own challenges in carrying out construction work, especially in the process of casting vertical elements such as columns. The narrow location, heavy traffic, and limitations on the operating hours of mixer trucks in urban areas force contractors to apply efficient, adaptive, and field-appropriate working methods.

In practice, column casting work often faces various obstacles, including delays in the supply of ready-mix concrete, errors in the installation of formwork, errors in concrete compaction, and inconsistencies between the time of concrete delivery and the readiness of the work area. In addition, weather factors and the quality of labor also affect the final results of column casting.

This research is motivated by the importance of analyzing the method of implementing column casting on the project at Jalan Martimbang No. 2, both from the technical, managerial, and time and cost efficiency aspects. By understanding the working methods used, including equipment systems, material logistics, and field coordination, the effectiveness of the method can be evaluated, and potential improvements can be identified that can be made on similar projects in the future.

Furthermore, this study also aims to provide technical and managerial recommendations in the implementation of column casting in urban areas characterized by limited work space and strict transportation regulations. A deep understanding of the casting methods applied at this location can be used as an important reference for construction professionals, especially in overcoming the typical challenges of urban projects in Jakarta.

In this study, we discuss the column casting method on the third floor, as well as various aspects related to structural work, material procurement, and weather conditions that affect the progress of the work.

RESEARCH METHODS

This research used data collection in the form of primary and secondary data. Primary data in the form of observation data and observation data field. Observation was done during the ongoing column work. While secondary data is the data obtained from intermediary media from PT. Elok Kokoh Abadi, including shop drawing data and WMS (Work Method Statement). The observation object was in the work column on the 3rd floor.

Data collection

Data collection methods include :

1. Observation field directly to the method of work of the concrete column during the period of work practice
2. Review the documentation specification of the project, image structure, and methods of work
3. Semi-structured interviews with field technicians, supervisor, and skilled workers
4. Documentation of photos and videos during the assembly, installation, and removal process of formwork

Observation was focused in a way specifically on the aspects following from the implementation method work column:

1. Preparation
2. Sequence and technique for assembling a concrete column
3. Install formwork and check the verticality of the column
4. Implementation casting
5. Procedure release formwork
6. Steps control quality
7. Protocol safety

Data Analysis

The collected data was analyzed through a systematic process of categorization, comparison, and interpretation. The analysis focused on identifying the specific implementation methods, evaluating their effectiveness, and determining the factors that

influence performance in the casting process. The findings were compared with established best practices, and recommendations for improvement were provided.

RESULTS AND DISCUSSION

The implementation method for the column work is based on the obtained project data. Following that, this implementation method is divided into a number of stages, as described below:

1. Work Preparation

Preparation work column is define column axis to use of theodolite. Aim to find out distance between column . Each column axis point taken from results of theodolite measurement, namely to determine the initial axle position and continued by other axles in accordance with planning.

2. Work Reinforcement

For the inner column project, it used the on-site assembly method during iron welding for the stirrup column. But in the main reinforcement, it used the on-site assembly process, as shown in Figure 1.

As for the stages in do work repetition columns, including :

- Cutting steel reinforcement used in the stirrup originates from the designed dimensions.
- Transportation of reinforcing steel using a crane tool at the project location.
- Assembling the main reinforcement, stirrup columns, and controlling how far the stirrup columns.
- Strengthen its connection column using the main reinforcement with a wire mesh.

Figure 1. Column reinforcement

Source: Practical Work Report, 2024

3. Installation of the Formwork

Work formwork was implemented using a semi-conventional way. In a formwork column with plywood as well as a belt, the binder utilizes steel. Formwork in the column utilizing 4 belts was fastened and clamped between the elbows.

In the column formwork implementation, it includes the following processes:

- Installing column legs to decide blanket concrete on the column, as shown in Figure 2. The installation was using a welded iron plate.

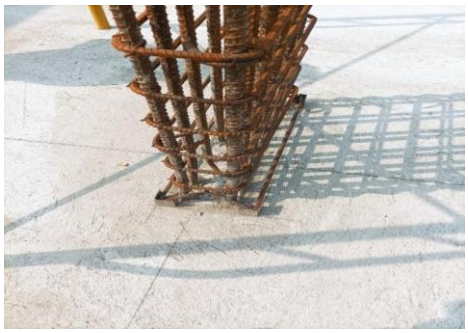

Figure 2. Installation job of column shoes

Source: Practical Work Report, 2024

- Assembly formwork column is done manually and lifted by workers, as shown in Figure 3.

Figure 3. Formwork installation

Source: Practical Work Report, 2024

- After installation, the formwork is then locked by a clamp, as shown in Figure 4.

Figure 4. Column formwork

Source: Practice Work Report, 2024

4. Implementation Casting

Casting of a column was used with a ready mix concrete in K-350 fast track quality. According to with plate and beam work, in the work column, there are various technical requirements to be noted, such as:

- Repetition of inspection during reinforcement and framework condition formwork by Quality Control.

- Fill in the letter casting permit.
- Do checking repeat together supervisor project.
- Slump test and sample making to understand the agility point of a concrete during the casting work, as shown in Figure 5.

Figure 5. Slump Test

Source : Practical Work Report, 2024

Figure 6. Making the Test Objects

Source : Documentation Work Practice , 2024

Figure 7. Test Objects

Source: Practical Work Report, 2024

- After passing the slump test, pour fresh concrete into a truck pump.
- Concrete that has been poured and then directed into cast column.

- Finally, compact it using a vibrator.

5. Formwork Dismantling

The dismantling of column formwork is carried out when the concrete is 14–28 days old. High-quality concrete is able to withstand both internal and external loads. The dismantled formwork should be cleaned of any remaining concrete attached to its surfaces and stored in a protected area for future use.
Stages in dismantling the formwork are as follows:

- Prepare the tools needed for the dismantling process.
- Dismantle the clamps that have been installed on the column formwork belt.
- Carefully remove the formwork from the column to avoid damaging either the column or the formwork. Store and clean any reusable formwork for future use.
- After the formwork dismantling process is completed, the cast result will be inspected by the supervisor, as shown in Figure 8. If any imperfections are found in the concrete work, they can be repaired according to the given instructions.

Figure 8. Column Dismantling Results

Source: Practical Work Report, 2024

5.1 Obstacles or Issues in Column Casting on the 3rd Floor

1. Porous columns caused by uneven compaction, as shown in Figure 9.

Figure 9. Porous Column

Source: Practical Work Report, 2024

Solution: The porous concrete on the 3rd floor was caused by uneven compaction. Therefore, supervision during casting must be improved, and the vibrator operator must ensure that the tool reaches all inner sides of the formwork to achieve optimal casting

results. Several methods can be applied to restore the smoothness of porous columns and ensure their components function properly, including increasing the column dimensions, patching (applying plaster to cover the damage), and grouting (injecting cement slurry into holes or cracks in the structure). The repair process for damage in the 3rd floor column was carried out using the patching method, as follows:

- Before patching is carried out, it is necessary to clean and remove any loose or detached concrete layers.
- The removed concrete components must then be thoroughly cleaned to eliminate any remaining materials using high-pressure water spray.
- After spraying and cleaning are completed, the column structure is ready for patching.
- Mark each area that requires repair.
- Perform chipping at the designated locations using a demolition jack hammer until reaching solid concrete. Then, clean the chipped area to remove dust and oil.
- Evenly coat the concrete surface using a coating material. Allow the coating layer to dry for 30 minutes after application.
- Mix the patching material thoroughly according to the product instructions.
- Apply the mixed material evenly.
- Smooth the patched surface using a putty knife.
- Provide proper curing for the patched area during the drying and hardening process.

Figure 10. Column Repair Results

Source: Practical Work Report, 2024

2. Misaligned or Inaccurate Column.

In column construction, checking vertical alignment is very important to prevent structural failure. Failure in column structure can lead to severe damage to the entire building.

Solution:

- The installation of scaffolding on the formwork must be firmly secured on all four sides of the column to prevent shifting and to maintain vertical alignment, thus avoiding a tilted column.
- On-site supervision must be carried out more thoroughly, especially during verticality checks. This inspection is done by hanging plumb bobs on each side of the column, with a maximum allowable deviation between the top and bottom of 55 mm as shown in Figure 11.

Figure 11. Column Verticality Inspection Using Plumb Bobs

Source: Practical Work Report, 2024

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the explanation above and observations at the internship site, the following conclusions can be drawn:

1. The casting work on this project must be strictly supervised, as many structural parts of the building, especially the columns, show signs of porous (honeycombed) concrete.
2. The column casting process includes the following stages: Preparation, Column Axis Marking, Scaffolding Installation, Reinforcement Work, Formwork Installation, Casting Execution, Formwork Removal, and Curing.
3. The repair of porous concrete on this project was carried out using the patching method, which involves applying plaster to the affected areas.

Suggestion

Based on observations and analysis conducted at PT. Elok Kokoh Abadi, the following suggestions are proposed as alternative solutions to address issues encountered during the residential housing construction project:

1. It is recommended that supervision of the casting process and the quality of materials be carried out more strictly. This is crucial to prevent structural damage, such as what occurred with the column on the 3rd floor.
2. The project management should conduct regular training sessions for on-site workers regarding proper casting techniques. By improving the workers' skills, the quality of work is expected to improve.
3. There should also be an increased focus on occupational health and safety (OHS) to ensure workers are protected from hazards—this must be prioritized.
4. It is also advisable to conduct periodic evaluations of the project's progress and the challenges encountered. This helps facilitate timely and appropriate decision-making in resolving any existing problems.
5. Lastly, project coordination and on-site supervision should be improved to reduce the risk of miscommunication and to maximize on-site performance.

REFERENCES

Strong Lukiyanto . Mandor, *Leadership Model Traditional Javanese On Project Modern Era Construction* . Edited by Maranatha Wijayaningtiyas . Jakarta, 2016.

Muhammad Ridwan Prayoga , Adhi Purnomo, et al . " Analysis and Optimization Casting Time Management Concrete Structure On Project Construction : A Case Study of Delays Casting of Columns, Beams, and Plates." *Tambusai Education* 8 (2024): 350–58.

Prayoga , Muhammad Ridwan, Adhi Pmomo , and Arief Saefudin . " Analysis and Optimization Casting Time Management Concrete Structure On Project Construction : A Case Study of Delays Casting of Columns, Beams, and Plates." *Tambusai Education Journal* 8 (2024): 350–58.

Rantung, Audy HP, Bonny F Sompie , and Robert JM Mandagi . " Analysis Control Costs And Schedules At Stage Implementation Construction With ' Earned Value Analysis'. " *Journal Scientific Media Engineering, Civil Engineering Sam Ratulangi University Manado* 4, no. 3 (2014): 190–203. http://ejournal.unsrat.ac.id/index.php/jime/article/view/6396/5912.

Arais Sastra (2019) Implementation Method Column Work and Calculation of Concrete Volume of Semi Basement Floor Columns As 31B (Gunadarma University).

Deva Agung Putra Pratama (2022) Review of Implementation Methods Work Structure of Beams, Columns and Floor Plates in the Traditional Village Council (MDA) Building, Klungkung Regency (Bali State Polytechnic).

Mohammad Khoirun Nasikhin , Arik Triarso (2023) Implementation Method Work Column Structure in the Passenger Terminal Building Construction Project of Dhoho Kediri International Airport (State University of Surabaya).

Nida Nahdia Vilanti (2018) Implementation Method Column Work Using Formwork Sateco and Productivity Analysis Formwork Sateco on the Patra Jasa Cirebon (UGM) Hotel Project .

Navy, Edward G, 1990, Reinforced Concrete A Basic Approach , PT. Eresco , Bandung. Pamungkas , AFS, & Yasin, N. (2020). Implementation Method , Column Work and Calculation

Casting Volume On Mandiri Tower Project Wijayakusma .

Calculation Procedures Concrete Structure For Building Construction .

Sudarmoko , 1996. Reinforced Concrete Column Design Diagram , Civil Engineering Department , Faculty of Engineering, Gadjah Mada University, Yogyakarta