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Quality Control Analysis in Construction Works of 80/100 U-Ditch Channel with 15 Ton Axle Cover (Jl. Manyar Indah)

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ABSTRACT: This research records experiences and findings during the Work Practice Internship (MPK) on the 80/100 U-Ditch channel construction project with 15 Ton Axle Cover on JL. Manyar Indah, Surabaya. This MPK is part of the Bachelor of Building Engineering Education curriculum at Surabaya State University and aims to provide students with insight and practical experience that cannot be obtained in the classroom. This project, which will run from April to June 2024, provides an opportunity for students to understand the difference between academic theory and practice in the field, as well as getting to know construction implementation methods directly. The main focus of this project is quality control in construction, especially in the use of precast methods for drainage channels. Effective quality control is essential to ensure that construction meets established standards, prevent wasted costs, and guarantee the quality of the final result. In this project, quality control is carried out through several methods, including Quality Control (QC) for wiremesh, Fc'30 Ready Mix concrete, and core concrete compressive strength tests (core drill test). Each stage of quality control aims to ensure that materials and construction implementation comply with established specifications. The quality of the wire mesh used is checked through measurements and structural verification to ensure durability and sturdiness. Fc'30 Ready Mix concrete is tested through a slump test and laboratory compression test to ensure its strength. Core drill testing was carried out on the completed U-Ditch structure to evaluate the strength of the installed concrete. The findings from MPK show that strict quality control and the application of precast technology can improve construction efficiency and quality. The practical experience students gain in the field not only enriches their knowledge but also strengthens the technical and professional skills required in the construction industry. In addition, this MPK helps students build relationships with professionals in the industry, expand their network, and prepare them for careers in the building engineering field. It is hoped that this experience can improve students' competence as prospective professionals in the field of building engineering. This research also highlights the importance of collaboration between universities and industry. This collaboration not only provides benefits for students in the form of practical experience but also provides opportunities for universities to strengthen relationships with industry and expand partnership networks. Thus, this MPK not only contributes to improving the quality of building engineering education but also to the development of better construction industry practices. It is hoped that this research can make a positive contribution to the development of the building engineering education curriculum and encourage increased collaboration between universities and the construction industry. Through effective quality control and the use of precast methods, this project can be used as an example in creating efficient and high-quality construction, in line with the needs and expectations of stakeholders.

KEYWORDS: control, channels, quality, construction.

1. INTRODUCTION

Introduction The Work Practice Internship Program is one of the graduation requirements for undergraduate students in Building Engineering Education at Surabaya State University. This program aims to provide students with the opportunity to gain knowledge and practical experience that they do not get in college. The difference between theory learned in an academic environment and practice in the field is the main focus in this internship. This Work Practice Internship activity was carried out on a drainage project located on JL. Manyar Indah, Surabaya. This project stretches 507 meters and has been running since April 2024 with an estimated completion time of around two months. This project provides an opportunity for students to learn and get to know construction implementation methods in drainage channel projects directly. Drainage channels have an important role in controlling water flow by removing excess water from rain, seepage, or irrigation. The quality of good drainage channels greatly influences the environmental conditions in an area, such as preventing flooding or standing water. Currently, the construction of drainage channels has progressed with the application of the precast method in making concrete. This method is an evolution of previously existing conventional methods. In the precast method, the manufacture of concrete structures is carried out in fabrications such as U-Ditch and Axle Cover, making it

possible to construct a complete structure without requiring a lot of formwork. Quality control in construction projects is an essential process to ensure that work is carried out in accordance with established standards. The main objective of quality control is to prevent wasted costs due to work that does not meet the specifications agreed in the contract. In this context, the role of supervisory consultants is very vital. The supervising consultant is responsible for carefully supervising the implementation of construction work, ensuring that the work is carried out according to plan, completed on time and of good quality. One of the crucial aspects in quality control is the building structure, where every detail of the work must be planned and carried out in accordance with standards, both in terms of strength and physical characteristics of the building. The implementation of quality control is also very important in the construction of U-Ditch channels with certain specifications, such as the 80/100 U-Ditch with 15 ton axle cover on JL. Manyar Beautiful. It is hoped that with effective quality control, this project can produce high quality construction in accordance with the needs and expectations of stakeholders. Thus, through this Work Practice Internship, students not only gain practical experience in the field but also understand the importance of quality control in construction projects.This is expected to increase their competence as prospective professionals in the field of building engineering.

2. LITERATURE REVIEW

2.1 Quality

Quality, which is the translation of the word "Quality" in English, has a very important meaning in the context of industry and construction. According to Nugroho et al. (2012), the concept of quality includes various characteristics such as product performance, reliability, ease of use, and other aspects that meet or exceed customer expectations. Project owners and service users often consider quality as a measure of the success of a construction project and its execution. With the right focus on quality, contractors can ensure that the products or services produced not only meet established standards, but can also increase customer satisfaction and maintain the company's reputation and competitiveness.

The quality management system, as explained by Huda et al. (2013), is an approach and technique used to ensure that each stage of production or project work runs in accordance with predetermined requirements. Through this system, contractors can identify, measure and correct discrepancies or deficiencies in the process and final project results. This not only contributes to improving overall quality, but also increases operational efficiency, reduces risk, and builds trust between contractors and project owners and other related parties.

2.2 Quality System

According to the ISO 8402 standard, a quality system includes organizational structure, accountability, procedures, processes and various resources needed to implement quality management effectively. The main objective of this quality system is to provide a systemic approach in preventing product failure. This means that the quality system does not only focus on detecting defects after the product is finished, but also aims to prevent these defects from occurring from the start of the production or work process.

Along with developments over time and market demands, the concept and practice of quality systems continues to evolve. Initially, quality systems were known simply as "inspections", where the focus was on inspecting the final product to detect defects. However, this approach is considered less effective because it is only reactive. Later, the concept evolved into "quality control", which includes steps to monitor and control quality during the production process. Furthermore, with the emergence of the need to ensure that the entire organization complies with certain quality standards, the concept of "quality assurance" (Quality Assurance) emerged, which includes the activity of developing systems and procedures to ensure that products or services meet the desired standards. Finally, the "quality management" (Quality Management) and "integrated quality management" (Total Quality Management) approaches place more emphasis on the involvement of the entire organization and a holistic approach in continuously improving quality, efficiency and customer satisfaction.

2.3 Factors Affecting Quality

Subandiyah et al (2016) found that understanding technical specifications was the dominant factor influencing the failure to achieve time targets in construction projects. Insufficient understanding of technical specifications can result in errors in work planning and execution, which in turn slows down project progress. On the other hand, the factor that most influences the failure to achieve quality targets is the method of carrying out the work. Inappropriate or less effective methods can reduce the quality of the final project result, causing deficiencies in aspects such as structural strength or other technical details.

To overcome this challenge, the recommended strategy is to employ consultants who are experts and experienced in drafting contract documents. The consultant must have the ability to understand in depth the technical specifications expected in the project, so that he can organize and direct the execution of the work appropriately. Apart from that, the appointed supervisory consultant must also have sufficient experience and understanding of the work implementation methods used in the project. In this way, they can monitor project implementation effectively and ensure that the methods applied comply with established quality standards.

Abas (2015) in his research on evaluating factors that influence the quality of construction projects also highlighted the importance of quality in all aspects of the project. The success rate of a construction project depends greatly on the quality of the final result. Problems in quality often cause projects to be ineffective and inefficient, which can result in additional costs, delays, and even significant rework. This study emphasizes the importance of identifying factors that can negatively influence project quality, as well as improving management and supervision during all stages of a construction project to ensure optimal quality is achieved.

2.4 Quality Control (Quality Control)

Control and supervision, according to Assauri (2004 in Susiady, 2012), refers to activities carried out to ensure that production and operational activities are in accordance with predetermined plans. If deviations occur, corrective actions can be taken so that the desired goals can be achieved. Meanwhile, the definition of quality control according to Assauri (1998 in Ilham, 2012) is an effort to maintain the quality or quality of goods in accordance with predetermined product specifications, based on company management policy.

According to Haming and Nurjamuddin (2017: 117), quality includes continuous creation and innovation to provide products or services that not only meet but also exceed customer expectations, with the aim of continuing to satisfy their needs and desires. Factors influencing quality control, as cited by Bakhtiar et al. (2013) from Douglas C. Montgomery (2001), including process capabilities that must be adjusted to existing capability limits, applicable product specifications, inappropriate acceptance rates, and production costs that affect the effectiveness of controls to produce high quality products.

3. RESEARCH METHODS

This research uses a qualitative descriptive method to examine quality control in the U-Ditch channel construction project on JL. Manyar Indah, Surabaya, which will take place from April to June 2024.

Research data comes from two sources: primary data and secondary data. Primary data was obtained through direct observation in the field, interviews with related parties (supervisory consultants, contractors and workers), as well as testing construction materials such as slump tests and concrete compressive strength tests. Secondary data comes from project documentation, such as daily reports and literature related to construction quality.

Data collection is carried out by:

a. Observation

Directly observe activities at the project site, including wire mesh installation, concrete mixing, and core drill tests.

b. Interview

Talk to parties involved in the project to get detailed information about quality control.

c. Material Testing

Conduct tests on construction materials to measure their quality and strength.

d. Documentation

Collect and analyze project reports and related literature.

Data analysis was carried out in three stages:

a. Data reduction

Simplify and select data that is relevant to the research focus.

b. Data Presentation

Organize data in the form of narratives, tables and graphs to facilitate understanding.

c. Drawing Conclusions

Conclude the results based on the data analysis that has been carried out.

To ensure data accuracy, triangulation techniques are used, namely combining data from various sources and methods. In this way, this research is expected to provide a clear picture of quality control in U-Ditch duct projects and provide useful insights for students and construction professionals.

It is hoped that this research method can provide a comprehensive overview of the implementation of quality control in U-Ditch channel construction projects, as well as provide useful insights for students, construction professionals and other related parties.

4. DISCUSSION

4.1 *Quality Control*Wiremesh

Wiremesh is an iron or steel type material that is formed by weaving or welding, used to strengthen cast concrete on roads or other buildings. One of the main functions of wiremesh is as structural reinforcement. When used in concrete, wiremesh acts as reinforcement providing additional strength to the building structure. This helps increase the durability of the building and prevents cracking or damage due to pressure or vibration. The existence of wiremesh can also increase the overall stability and reliability of the building structure.

In the context of its use, quality control is very important when wiremesh iron is used. This involves strict checks during the installation process to ensure that the specified specifications are met. Checks include verifying the dimensions of the wiremesh, the quality of the welding or weaving, as well as the sturdiness of the structure after installation. These steps are important to ensure that the wire mesh functions effectively in accordance with the design and established standards, so that it can provide maximum contribution in strengthening the concrete and maintaining the structural integrity of the building as a whole.

Figure 4. 1 ***Tensile Test***

4.2 *Quality Control*Concrete

Quality control of Fc'30 Ready Mix concrete is a crucial step in ensuring that the concrete used meets the specified quality standards. Fc'30 concrete has a compressive strength of 30 MPa (megapascal). The quality control process starts from the production stage, where raw materials such as cement, aggregate and water are mixed in the right proportions according to technical specifications. During the mixing process, a slump test is carried out to ensure that the concrete has the appropriate consistency and workability, thereby facilitating the casting and compaction process.

Once the concrete is mixed, quality testing continues in the field. Concrete samples are taken periodically during casting to be tested in the laboratory. These samples were then tested for strength after 7, 14, and 28 days through compression tests to ensure that the concrete reached the desired strength. Additionally, control of temperature and humidity during the curing process is essential to prevent cracking and ensure optimal curing. Quality control also involves checking at the stage of receiving concrete at the project site, including verification of delivery tickets to ensure that the concrete mix matches the order. All these steps, from mixing to field testing, are an integral part of the Quality Control process to ensure that Fc'30 Ready Mix concrete meets the standards required for the durability and reliability of building structures.

Figure 4. 2 Slump Test

1.TENSILE TEST

TEST PIECE CODE	SAMPLE SPECIFICATION						TENSILE TEST RESULTS				WEIGHT per LENGTH
	WEIGHT	LENGTH	DIA.	C.S.A	Fy	Fu	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION	REDUCT. OF AREA	
	(gram)	(mm)	(mm)	(mm2)	(kN)	(kN)	(N/mm2)	(N/mm2)	(%)	(%)	(kg/M)
1	303,03	304,24	12,71	126,81	60,00	80,00	473,15	630,87	21,16	52,00	0,9960
2	300,85	303,51	12,68	126,21	59,00	80,00	467,48	633,86	17,88	54,32	0,9912
3	305,08	303,98	12,76	127,81	61,00	79,00	477,27	618,11	20,96	57,89	1,0036

Equipment : Universal Testing Machine "MFL Systeme, UPD-20", 200 kN capacity.

NOTES : This report is valid only for the specimen tested on the Laboratory of Ships Strength and Construction

Figure 4. 3 Press Test Lab Results

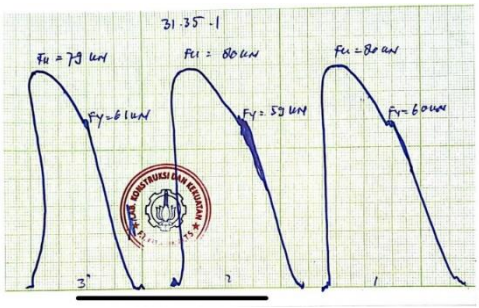

Figure 4. 4 Pressure Test Chart

4.3 Quality Control Core drills

The core concrete compressive strength test (core drill test) is carried out when the results of the concrete compressive strength test in the laboratory do not meet the desired requirements, and work on the concrete structure has been completed. In this test, a cylindrical test object is obtained by drilling directly into a concrete structure, in this case the installed U-Ditch channel. Data sampling must comply with the SNI 03-3403-1994 standard, which requires at least three test samples for each project. Concrete cores are usually drilled from parts of the structure that are suspected to be problematic or weak, or to detect aggregate separation or honeycombing (air voids in the concrete).

In practice, the compressive strength value of core concrete is often lower than the standard concrete cylinder test results. This difference is generally caused by the quality of curing control in the field which is not as optimal as curing under standard laboratory conditions. In U-Ditch channel projects, this is very important to pay attention to because U-Ditch concrete must be able to withstand the weight and pressure of water effectively. Thus, core concrete compressive strength tests not only help in identifying potential weaknesses in U-Ditch structures, but also provide important information that can be used to take necessary corrective actions to ensure the safety and reliability of such concrete structures.

Figure 4. 5 Coredrill U-Ditch

CONCLUSION

1. Quality control is a crucial aspect in ensuring that construction work meets established standards. The role of the supervisory consultant is very vital in supervising the implementation of the work so that it is in accordance with the plan, completed on time and of good quality.

Aspects such as understanding technical specifications and work implementation methods greatly influence the quality of the final project results.

2. The use of precast methods in making concrete, such as U-Ditch and Axle Cover, shows developments in construction techniques. This method allows more efficient construction of structures without requiring a lot of formwork, improving the quality and speed of construction.
3. In the U-Ditch channel construction project on JL. Manyar Indah, the implementation of quality control is carried out through various methods such as Quality Control (QC) for wiremesh, Fc'30 Ready Mix concrete, and core concrete compressive strength tests (core drill test). Each quality control step aims to ensure that the materials and construction implementation meet the specified specifications.

SUGGESTION

1. Based on the findings of this report, it is recommended to continue strengthening quality control at every stage of a construction project. Increased understanding of technical specifications and work execution methods, as well as the use of precast technology, will contribute to the success of future construction projects. In addition, it is important to maintain collaboration between universities and industry to support improving the quality of education and competency of graduates.

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