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Installation of Clean Water Piping for Resident on Jl. Arjuna, RW 08 and 09, East Labuh Baru, Pekanbaru

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Abstract

Water is a crucial resource for sustaining life; however, access to it through the Regional Drinking Water Company (Indonesian: *Perusahaan Daerah Air Minum* [PDAM]) remains limited in certain communities. As a result, residents frequently depend on groundwater sourced through independent pumping by households, places of worship, public facilities, private and government offices, and others. An assessment of the buildings on Jl. Arjuna RW 08 and 09, East Labuh Baru District, Pekanbaru, indicates a significant lack of adequate clean water installation systems, highlighting a need for targeted community service efforts. This initiative aims to rectify these deficiencies by drilling wells to establish reliable sources of clean water and installing a comprehensive clean water piping system to ensure effective distribution from the source to the end users, thus aligning with Indonesian National Standards (SNI). The project involves faculty members as part of their commitment to the tri-dharma of higher education, offering both a practical learning opportunity for students and a valuable service to the community.

Keywords: clean water, installation, piping

Introduction

The village of Labuh Baru was established in 1982 as part of the Siak Hulu District in Kampar Regency. Under Government Regulation No. 12/1987, which addressed administrative restructuring within Riau Province, Labuh Baru Village transitioned to Tampan District, Pekanbaru City. Subsequently, regional regulations in 1999 further subdivided Labuh Baru Village in Tampan District into East Labuh Baru and West Labuh Baru Subdistricts within the same district. As of the most recent data, East Labuh Baru has a population of 22,591, distributed across 9,744 family cards (Indonesian: *Kartu Keluarga* [KK]). The population is composed of 11,002 males and 11,589 females. The religious demographics are as follows:

16,719 Muslims, 1,368 Catholics, 1,900 Protestants, 670 Hindus, and 1,930 Buddhists (Source: The Office of East Labuh Baru Subdistrict).

Water is a fundamental requirement for all living organisms (Syahriani et al., 2022). With drought becoming a pressing concern, ensuring the availability of clean water infrastructure is crucial for meeting community needs. An effective solution for clean water distribution is the construction of a piping network, which enhances distribution efficiency and significantly improves community access to water (Qadafi et al., 2023). Proper planning of this network is essential to address drought-related challenges in frequently affected regions. (Budiman et al., 2023)

As detailed by Hamar (1975), Steel (1960), and Birdi (1976), the types of pipes commonly used in water transmission and distribution systems include cast iron, steel, concrete, asbestos cement, and plastic. (Setyari et al., 2022)

To minimize physical damage from vegetation or other external factors, distribution piping should be installed underground whenever possible (Mbarep et al., 2022). The depth of pipe installation, measured from the ground surface to the top of the pipe, depends on field conditions. Typically, a depth of 50 cm is used for general conditions, while pipes located beneath roadways are installed at a depth of 150 cm. (Walsh & Ward, 2022)

A pipe is a closed conduit with a circular cross-section designed for transporting fluids under full flow conditions (Sukri et al., 2023). The fluids conveyed through the pipe can be either liquids or gases, and their pressure may vary relative to atmospheric pressure (Sonawan et al., 2022). When the fluid does not fully occupy the cross-section of the pipe, the flow is classified as open flow due to the presence of a free surface, with the surface pressure equating to atmospheric pressure (Karen et al., 2023). As noted by Triatmojo (1995), flow within a pipe represents a closed system in which the fluid is in contact with the entire cross-sectional area of the conduit. The rate at which fluid flows through a cross-sectional area per unit of time is termed the flow rate. (Azmanajaya et al., 2022)

In this community service project, the team executed the initiative through several stages. The planning phase for the clean water supply system for residents of RW 08 and 09 on Jl. Arjuna, East Labuh Baru, involved determining the required pressure and selecting the appropriate pipe capacity and type (Ningsih et al., 2023). The installation process included multiple steps: implementing a closed-system clean water model, drilling wells, installing temporary pumps, setting up a generator to power the pump, purifying the water, installing permanent pumps, laying piping, and constructing support columns (Kinovaro et al., 2023).

This initiative is expected to fulfill the clean water needs of residents in RW 08 and 09 on Jl. Arjuna, East Labuh Baru, and extend benefits to the surrounding community. This effort aligns with the goals of community service by applying educational insights to address real-world needs and enhance community well-being. (Taylor & Druckenmiller, 2022)

Method

The methods employed in the execution of the community service project comprised several key stages. Initially, the team conducted a comprehensive field survey to identify the specific issues encountered by the community partners (Parwita et al., 2024). Subsequently, the internal team analyzed the survey results to develop a tailored plan that effectively addressed these issues. In the third stage, the team engaged with the community to communicate the implementation plan, outlining the type, scope, team composition, and timeline for the activities. Following these preparations, the team executed the community service activities and prepared a detailed report on the outcomes. (Auliani et al., 2023)

To facilitate the smooth execution of the project, the team employed various approaches to address the partner's issues. This included conducting direct field observations to assess the existing conditions. The identified problems were systematically documented, and detailed plans—encompassing the project's scope, team, and timeline—were communicated to the community. (Gorbanev et al., 2022)

Community service projects required active participation from partners throughout the implementation process, which involved several key steps. Partners contributed by providing input on the scope of the work and supplying essential field data, such as excavation area and length (Suraparaju & Natarajan, 2022). The community service team coordinated with the partners to align routine site activities with the planned service activities. Additionally, partners agreed to participate in the execution phase, offering support and assisting in the evaluation of the work performed.

Figure 1. Excavation work on Jl. Arjuna, RW 08 and 09, East Labuh Baru, Pekanbaru

Figure 2. Excavation work with dimensions of 1 meter × 80 cm on Jl. Arjuna, RW 08 and 09, East Labuh Baru, Pekanbaru

Result and Discussion

The first stage of the activity involved the community service team monitoring the workers who were digging trenches. These workers, hailing from West Java, were responsible for excavating along Jl. Arjuna RW 08 and 09, covering a distance of over 1 kilometer.

In the second stage, the excavation continued with the installation of PVC piping. The pipes were installed at intervals of 5 meters, with a depth of 2 meters and a width of 80 cm. To secure a reliable water source, excavation was performed until reaching the water table, which required a depth of up to 2 meters. Subsequently, preparations were made for the installation of the clean water piping system. (Rahmawati & Firman, 2022)

Figure 3. Drainage of water from the excavation site to a different location on Jl. Arjuna RW 08 and 09, East Labuh Baru, Pekanbaru

The installation of the piping system on Jl. Arjuna resulted in traffic congestion for one week, due to the road's limited width of 3.5 meters. This road functions as a local thoroughfare and an alternative route for detouring traffic jams on Jl. Tuanku Tambusai and Jl. Durian.

Figure 4. Pipe installation connection with overflow due to flooding

Following this, the installation of the water piping system was carried out. The process began with soil excavation, followed by the installation of pipes. Once the water storage tanks were in place, the next step was the setup of the reservoirs (Venkatesh & Velkennedy, 2023). The piping installation continued during this phase. The community service team also conducted site visits to observe the process as part of an experiential learning opportunity, focusing particularly on the underground connections handled by the field workers. (Anggisilova & Hendi Jaya, 2022)

Figure 5. Traffic management during pipe installation on Jl. Arjuna RW 08 and 09, East Labuh Baru, Pekanbaru

Figure 6. Underground pipe installation connection on Jl. Arjuna RW 08 and 09, East Labuh Baru, Pekanbaru

Figure 7. Community service team coordinating with workers on the installation of PDAM pipes on Jl. Arjuna RW 08 and 09

Conclusion

The completion of this community service project led to several important conclusions. Residents of Jl. Arjuna can now access water from PDAM, enhancing their existing well water supply with an automated system. Nevertheless, there are still areas where greater attention to

clean water issues is needed. In the East Labuh Baru region, the water quality remains suboptimal with low pH levels, prompting many residents to resort to purchasing bottled water for drinking.

Recommendation

It is crucial to implement comprehensive outreach and communication efforts during the project execution phase to ensure that the project's objectives and goals are fully realized. The execution of the work must adhere to the pre-established plans and standards with continuous evaluation and rigorous oversight to maintain quality and compliance. To achieve timely project completion, strict adherence to the project schedule is essential.

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