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Analysis of The Use of The Water System in Majesty Bandung Apartments

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ABSTRACT

Water is a natural resource that is needed in everyday life, especially in residential buildings such as apartments where the number of residents is in line with the amount of clean water needed and must be sufficient. In the provision process, there are several important things that must be considered, including an energy efficient, economical system, clean water that meets standards, and waste water treatment. Therefore, it is necessary to review the existing system design and clean water supply.

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1. INTRODUCTION

The limited land available is getting thinner day by day, making apartments a residential facility that can be developed, because apartments maximize space vertically and can provide a lot of residential space to live in (Tomi & Sari Zulfiana, n.d.). For commercial buildings such as apartments, of course, they must prioritize visitor comfort because the more comfortable a commercial building is, the more visitors will come, the number of visitors will affect the need for clean water (Syifaul Insan et al., 2022). A building must be able to meet the needs of its occupants, including the need for clean water that must be met. Water is one of the most important natural resources because water is always used in daily activities and also affects other aspects, especially health aspects (Pronika et al., 2023). Clean water is needed for domestic and non-domestic needs, domestic water needs are water needs that are intended for household needs such as cooking, washing clothes, bathing, and others.

Meanwhile, non-domestic water needs are water needs that are intended for other than household needs such as places of worship, trade, public services, and others (Pronika et al., 2023). In addition to these needs, water also functions to prevent fires and also for irrigation in the landscape (Sudrajat et al., n.d.). Tall buildings such as apartments tend to consume a lot of energy, so in their design it is necessary to make efforts to save energy in order to protect the surrounding environment (Tomi & Sari Zulfiana, n.d.). Therefore, in planning an apartment system, it must be designed properly, as well as the clean water network system. The design of the clean water network system is a piping design that can meet all clean water needs economically (Pronika et al., 2023). The purchase price of apartment water which tends to be more expensive than house rates can burden apartment residents, therefore it needs to be designed as economically as possible (FEASIBILITY STUDY AND RISK ANALYSIS OF IMPLEMENTATION (2021), n.d.).

Then there are important things that must be considered in planning a clean water system, namely the wastewater treatment system, wastewater treatment planning must be in accordance with existing standards so that it does not damage the surrounding environment and then become a disease for its residents, therefore wastewater treatment also needs good design (Syifaul Insan et al., 2022). Seeing that the use of a clean water system in an apartment requires a lot of consideration and important things that must be considered for the safety and comfort of the apartment residents themselves, it is important to look at how the clean water system is used in the surrounding environment, including at Majesty Apartments Bandung. Intended to find out how to design a system for using clean water at Majesty Apartments Bandung.

2. METHODOLOGY

The data collection method that will be used in this study is a field investigation (Survey) to the Majesty Apartment located at Jl. Surya Sumantri No. 91, Sukawarna, Sukajadi District, Bandung City, West Java. Then ask some interview questions to find out more about the design of the existing clean water system to Mr. Iwan and Mr. Hendra Apartment Manager The Majesty then observation at Majesty Apartments Bandung, documentation by taking photos in the field, and also secondary data obtained through library research, which consists of searching for data and information through supporting documents in the form of data from books, reports, scientific journals, and electronic documents via internet access containing relevant data and information related to this paper. Furthermore, the data is

analyzed using the Descriptive Analysis method to describe how the use of the clean water system at Majesty Apartment Bandung.

3. RESULTS AND DISCUSSIONS

3.1. Water Sources

The provision of clean water at The Majesty Apartment Bandung uses a roof tank and bottom tank system. The building's top water tank is generally placed on the roof or at a higher height than the area that needs to be supplied with water. Water is stored in the top tank and pressed down by gravity, providing natural pressure for water distribution throughout the building. This system does not require a pump for water distribution, and can be effective in areas with unstable electricity supplies. Meanwhile, the building's bottom water tank is placed below ground level or on the lower floor of the building. Water is pumped into the bottom tank, and then pumped back up using a pump for water distribution throughout the building. Can be used in areas with topography that does not allow the placement of top tanks. Easier to access for maintenance. The water source in this apartment comes from two artesian wells. Artesian wells are wells that produce groundwater naturally with enough pressure to make water rise to the surface of the ground without the aid of a pump. Artesian wells utilize the hydrostatic pressure generated by layers of water trapped between two layers of impermeable rock (Fitts, 2012). This is done because the water from the PDAM is not sufficient for existing needs.



Figure 1. Artesian Well 1 Majesty Apartment
Source : Private Assets



Figure 2. Artesian Well 2 Majesty Apartment
Source : Private Assets

The two artesian wells are located at different points and have different depths. Artesian well one has a depth of 120 m while artesian well two has a shallower depth of 90 m. The difference in depth affects the water discharge produced. The depth of the well can affect the extent to which groundwater can be accessed, and therefore, plays an important role in determining the amount of water that can be withdrawn from the well (Putra, 2022).

Artesian well two produces less water, which is around 30-40 compared to artesian well one which can produce as much water. In both of these wells there is a water meter and is distributed using iron pipes with a diameter of 6 inches. Clean water is distributed using blue pipes. The blue color can indicate that the pipe is used for drinking water or clean water (Sari et al., 2023).



Figure 3. Majesty Apartment Recharge Well
Source : Private Assets

In addition to two artesian wells, The Majesty Apartement Bandung also has a recharge well. The recharge well absorbs rainwater into the ground to prevent puddles and support water infiltration. This recharge well collects rainwater from the rooftop and is located next to the two artesian wells which function as a backup water source and are used for non-consumption needs. Water stored in the recharge well can be used for various purposes, such as plant irrigation, filling ponds, or industrial needs. By utilizing rainwater as a backup source, this system helps reduce pressure on the two artesian wells and ensures the availability of water for purposes that do not require clean water for consumption.



Figure 4. Clean Water Tank Majesty Apartment
Source: Private Assets



Figure 5. Majesty Apartment Water Tank
Source : Private Assets

The water obtained by the three water sources is used for various domestic and non-domestic needs. Before being distributed to the upper tank, the water is filtered and medicated first to make it safer to use.

During the dry season, wells can experience a decrease in water levels, and the risk of cracks or cracks in the well walls. Water discharge can also decrease, causing limited access to water. So, sometimes when the dry season arrives, the water obtained from the water source is not sufficient for existing needs so that you have to buy water around 60-80 tanks per month.

3.2. Transfer Pump

Water from the artesian well is pushed using a pump to be stored in the upper tank or roof tank. A booster pump is a mechanical device that increases the water pressure in the distribution system. Its functions include increasing pressure, ensuring consistent water supply, and maintaining stable water pressure. This pump is used for both domestic and commercial applications, with automatic control and flexible installation. The goal is to provide comfort and reliability of water supply. There are two pumps used, both pumps run alternately automatically. When pump one has distributed 15 Kw of water, it will switch to using pump 2.



Figure 6. Majesty Apartment Booster Pump Pipe
Source: Private Assets



Figure 7. Majesty Apartment Booster Pump Panel
Source: Private Assets

3.3. Rooftop Tank

Rooftop tank is a water tank on the roof of a building. Functions as a water reserve for daily needs and fire extinguishing. Utilizes gravity for water distribution without additional

pumps. Important for reliable water availability, especially in emergencies. This roof tank is located on the top floor of the apartment with a capacity of 45 cubic meters. Before being distributed to each room, the water is still filtered using a kasbon and sand filter.



Figure 8. Majesty Apartment Rooftop Tank
Source: Private Assets

In the same place there is a booster pump to distribute water to the 5 floors down from the top floor, so that the pressure obtained in each room is the same amount and the water is distributed equally.

3.4. Clean Water Distribution

Water from the roof tank is then distributed throughout the apartment. If for the 5 floors down from the top floor using a booster pump, for the next floor down to the ground floor using natural gravity without the need for a booster pump. The advantages of water distribution using gravity (Rani et al., 2022):

1. No Pump: No pump required, reducing dependence on external energy.
2. Energy Efficiency: More efficient and energy-saving operation.
3. Simple and Easy to Manage: Simple design, easy maintenance, low maintenance costs.
4. Natural Water Pressure: Provides sufficient water pressure naturally.
5. Emergency Water Availability: Reliable in emergency conditions, does not depend on electricity.
6. Sustainable and Environmentally Friendly: Sustainable and environmentally friendly by reducing energy consumption.

This water distribution uses iron pipes. Advantages of Iron Pipes in Water Distribution (Zucker, 1995):

1. High Strength and Durability: Iron pipes can withstand water pressure and soil loads.
2. High Pressure Resistance: Suitable for large-scale water distribution.
3. Resistance to External Force: Able to withstand external pressure and safe to be buried underground.
4. Heat and Fire Resistance: Suitable for hot water distribution and resistant to fire risks.
5. Corrosion Resistance: Can be coated for anti-corrosion protection.
6. High Quality Water Transport Ability: Does not give taste or odor to water.
7. Availability and Competitive Price: Easily available and economical.

Water is distributed to all 341 units and each unit has its own water meter. In general, each unit has a wall tap, shower room, sink, toilet, bathtub, and mixing shower. In addition to being distributed to all units, clean water is also distributed to other apartment needs such as prayer rooms, public bathrooms, employee bathrooms, shop houses, and others.

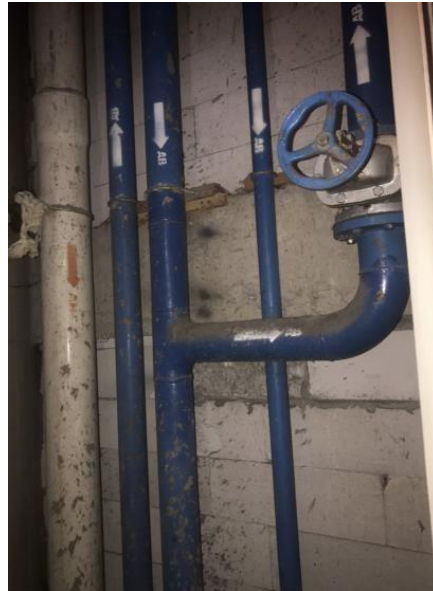


Figure 9. Main Pipe next to Majesty Apartment Unit
Source: Private Assets



Figure 10. Main pipe next to the bathroom of Majesty Apartment unit
Source: Private Assets

3.5. STP (Sawage Treatment Plant)

Sewage Treatment Plant (STP) is a facility to clean domestic and communal wastewater before it is disposed of or reused. The process involves collection, initial separation, primary and secondary (biological) treatment, and tertiary stages if necessary. Finally, the water is cleaned from bacteria and microorganisms by disinfection before being disposed of or reused. The goal is to protect the environment and maintain clean water quality (Strasser et al., 1995). The dirty water produced from this building is collected in the STP for processing before being channeled into the city's sewers. This brown waste pipe is divided into 3 pipe channels, namely the AK pipe (Dirty Water) which comes from the bathroom, the ABK pipe (Dirty Waste Water) which comes from the floor drain, and the KD (Kitchen Drain) which comes from the sink.



Figure 11. Majesty Apartment Dirty Water Pipe

Source: Private Assets



Figure 12. Wastewater Treatment With Fat Trapping in Majesty Apartment

Source: Private Assets

The wastewater first enters the first tank which contains a fat trap. Fat trapping in water treatment is the process of separating and capturing fat from wastewater. This can be done using various methods, such as filtration, coagulation, and clarifiers, to prevent fat from contaminating the environment and ensure that the discharged water is cleaned of oily contaminants.

Wastewater from the kitchen generally contains fat that can clog the pipes, therefore it is necessary to trap the fat first. Then it enters the second tank containing the bacteria house. The bacteria house in water treatment is a facility designed to support the growth and activity of bacteria that are useful in decomposing organic materials in wastewater. These bacteria help clean wastewater by decomposing organic substances into simpler compounds. The bacteria house is usually found in the secondary treatment stage of wastewater treatment plants and is an important component in ensuring good water quality before being discharged into the environment. This bacteria house absorbs bacteria from wastewater to reduce the bacteria in the water. This bacteria house is watered with bacteria every day so that absorption is optimal.



Figure 13. The last tank of dirty water in Majesty Apartment

Source: Private Assets

After the processing is carried out, the waste water is then channeled to the final tank before being discharged into the city's sewers.

3.6. Hydrant

One of the apartment needs that must be met is the need for water for hydrants. Hydrant water is a water supply system for firefighters. It consists of pipes and access points that allow firefighters to get water quickly when extinguishing fires. This water requirement is obtained from the clean water source mentioned earlier but is not filtered first and is used directly for watering plants and supplying hydrant needs. For fire fighting, The Majesty Apartemen Bandung has two water pumps that will turn on automatically if a fire occurs, this pump is located in the hydrant room. The fire fighting system in this apartment is always controlled by the Works Department once a year.



Figure 14. Hydrant Room at Majesty Apartemen
Source: Private Assets

4. CONCLUSION

The clean water source in this apartment comes from two existing artesian wells and also a recharge well. The utilization of this clean water is quite efficient, by dividing it equally to all units and utilizing rainwater for watering green open spaces or existing gardens. Then, the dirty water produced is processed first with a bacterial house system before being discharged into the city drains.

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