



# Electrical Installation in Temple Area, Mranggen Village, Srumbung District, Magelang, Central Java

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**Abstract.** This community service will be carried out at Ngejawa Ngebali Temple, Mranggen Village, Srumbung District, Magelang Regency, Central Java Province. The service is carried out by installing new lighting at the temple site. The installation of the lighting is assisted by partners, namely the temple caretakers, students from the Electrical Engineering Department of Politeknik Negeri Bali, and the local community around the temple. The primary purpose of installing lighting is to enhance the safety of electricity users and increase the intensity of lighting in the temple area, enabling all nighttime activities to be carried out properly and safely. The community service has prepared the electrical installation of the Ngejawa-Ngebali Temple in Mranggen Village, Srumbung District, Magelang, Central Java, with three lines: spare for the temple, SDP 01, and SDP 02. Each active line is loaded with 600 W using a 2.5 mm<sup>2</sup> single-core NYY cable.

**Keywords:** Community Service, Electrical Installation, Mranggen Village

## 1 Introduction

Rijadi & Wismiana stated that there is a risk of fire due to short circuits for individuals who perform electrical work but lack a basic understanding of electricity or are self-taught. They conduct community service (ComServ) by presenting and training kiosk or stall owners in the tourist area of Sirnajaya Village on electrical installations that meet security and safety requirements, including knowledge of sockets, cable insulation, cables, and fuses/MCB (Rijadi & Wismiana, 2020). In Cogreg Village, Wahyuningsih et al. improved comprehension and protection in the operation of electrical equipment by introducing regular maintenance activity, providing training, and conducting repairs to electrical installations (Wahyuningsih et al., 2025). Tasiyam reported a ComServ that conducts training to create jobs in the field of repairing and installing electrical installations in Minahasa Utara. The group of people in this training is families in the village who are repairing electrical installations (Tasiyam, 2020). Retyana & Hasbi reported on the ComServ project at Pare-Pare, South Sulawesi. This project is fulfilled through training for the maintenance and repair of single-family electrical equipment. The motive of this ComServ project is to enable people to maintain single-family electrical equipment, identify the nature, cause, and extent of harm or malfunction in the equipment, and repair failures based on this identification (Retyana & Hasbi, 2023). In 2024, Mufid analyzed the practices of electrical

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installation and energy-saving plans in single-family homes. The study found that inappropriate electrical installation practices can escalate the risk of fire and electrical disturbances. The use of energy-efficient marked electrical instruments and smart home technology has been proven effective in lessening energy consumption in single-family homes (Mufid, 2024). Kusumah et al. stated that electricity plays an important role in daily life. Therefore, the electricity system should be properly preserved and protected. Otherwise, not only interrupt the need for electricity, but it can also put someone at risk or in danger. One example of an electrical risk that frequently occurs is fire caused by electrical instruments that do not comply with the PUIL Standard (General Requirements for Electrical Installation in Indonesia) and the COE (Certificate of Operation Eligibility) (Kusumah et al., 2021).

In the Philippines, Bulosan investigated the examination of electrical installation and maintenance, focusing on core competency and the level of knowledge and skills required for safety measures and procedures. This examination assessed the knowledge and skills of Technical Vocational Livelihood students (Bulosan, 2023). In Nigeria, the technical colleges of Kano State have identified strategies to strengthen students' practical skills in electrical installation and maintenance, thereby optimizing the acquisition of practical skills among students (Tumba & Shuaibu, 2016).

This article discusses the electrical installation in Mranggen Village, located in Srumbung District, Magelang, Central Java. The village has a new tourist attraction in the form of a village economic hall and reservoir, which was inaugurated in April 2023 by the Minister of PUPR, Basuki Hadimuljono, and a member of the Indonesian House of Representatives, Ir. Sudjadi. Following the completion of the tourist attraction, the development of the destination area proceeded with the construction of the Ngejawa-Ngebali Temple of Mount Merapi. The construction of this temple was marked by the laying of the first stone by the Acting Head of the Magelang Regency Disparpora, Slamet Husein (10/5/2023), accompanied by Ratu Gede Pedande Kuwum from Bali and community leaders of Mranggen Village. The temple occupies 1600 square meters of village land and was built with funds reaching billions of rupiah. The construction process of the Ngejawa-Ngebali Temple is still ongoing. Figure 1 shows a photo of the temple. This temple is designed to combine elements of Javanese and Balinese temples. This temple faces the foot of Mount Merapi with a quite charming view. The ornaments of this temple are similar to those of temples in Java and Bali. To the west of the temple, there is a reservoir called Dewi Surya Buana or Dewi Suba reservoir, located on 2 hectares of village land with a depth of up to 4 meters. It has been opened for tourism. the Dewi Suba reservoir's water source comes from the Putih River, which originates at Mount Merapi. Despite being a path for rain-fed lava during Mount Merapi eruptions, the Putih River remains a haven for the communities living along its banks. The Dewi Suba reservoir's water supply supplies approximately 28 hectares of agricultural land in Mranggen Village and several other villages in the area. Figure 2 shows the situation of the Ngejawa-Ngebali Temple.



**Figure 1.** Construction of the Ngejawa-Ngebali Temple



**Figure 2.** Situation of the Ngejawa-Ngebali Temple

## 2 Methodology

The electrical installation at the community service location in Mranggen Village is designed to determine the lumens required to illuminate the open space. To measure

lumens in open spaces, first, we measure the area in square feet. Then, use the room lighting standard to determine the number of lumens needed. For open areas, the general lighting standard is around 100-200 lumens for street lighting and parking areas (Fross & Gumińska, 2020; Rajesh et al., 2021). Next, determine the type of lamp used along with its armature. Then, calculating the load lamp power along with the cable size is the last thing to do before installation. We select the conductor type based on the PUIL Standard (General Requirements for Electrical Installation in Indonesia), year 2000, as stated in Table 1.

### 3 Result and Discussion

#### 3.1 Result

First, we measure the illumination level at the community service location. The calculation of lumens and the number of lamps needed is as follows. According to Figure 3, the temple measures 32.60 m in length and 28.30 m in width. So the area of the temple is 922.58 m<sup>2</sup>.

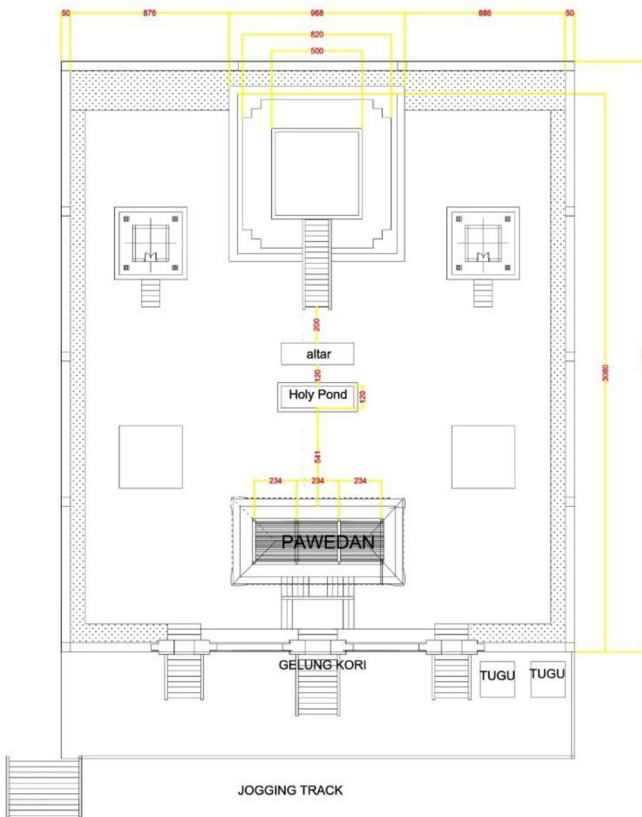


Figure 3. Dimensions of the Ngejawa-Ngejali Temple

For that open space area, a lighting level of 200 lux is used. To calculate the number of lumens needed, multiply the lux by the area. So 184,400 lumens are needed. From this value, 12 lamps with a total of 16,000 lumens.

### 3.2 Discussion

Figure 4 illustrates the temple lighting installation, where the source is distributed to three lines: the space line for the temple, the SDP 1 line, and the SDP (Sub Distribution Panel) line. The source uses a  $3 \times 4 \text{ mm}^2$  NYY conductor with a 1-phase 10 A MCB protection. Each line is secured with a 6A MCB with a  $3 \times 4 \text{ mm}^2$  NYY conductor. The SDP 01 line is divided into 3 groups. Each group serves 2 units of 100 W LED lamps, so that the total SDP 01 feeder is 600 Watts. This group uses a  $2 \times 2.5 \text{ mm}^2$  conductor. The SDP 20 line is divided into 3 groups. Each group serves 2 units of 100 W LED lamps, so that the total SDP 02 load is 600 Watts. This group uses a  $2 \times 2.5 \text{ mm}^2$  conductor. The Spare For Temple line is currently not connected and is temporarily prepared for 1100 Watts. According to this description, the total power prepared to serve the temple is 2,300 watts.

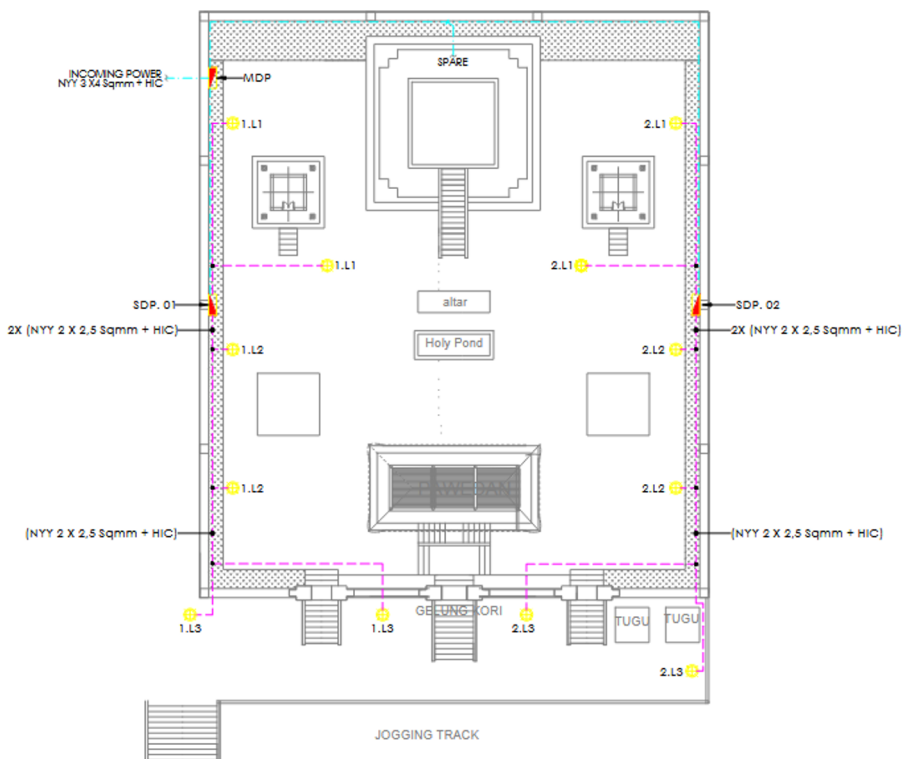


Figure 4. Temple Lighting Installation

Electrical equipment and installations must be designed to withstand weather conditions. For outdoor installations, it is mandatory to use NYY cables, namely, insulated and thermoplastic-sheathed ground cables.

As shown in Figure 5, the selection of the conductor cable and its safety is based on the load. In group 1, the SDP 1 feeder is loaded with 200 W, in a current of 0.9 A. Based on the PUIL Standard (General Requirements for Electrical Installation in Indonesia), year 2000, stated in Table 1, a 2.5 mm<sup>2</sup> single-core NYY cable in the ground can be supplied with a current of 54 A. This is to anticipate future load developments. Determination of safety in the group is based on the amount of current flowing. It has been calculated that the current flowing is 0.9 A. For safety considerations and load development, a 6 A MCB is selected. The determination of safety on the feeder is based on the amount of current flowing, which is 2.7 A. For safety considerations and load development, a 6 A MCB is selected. Safety on the Main Distribution Panel (MDP) is determined at 10 A group division to facilitate load management.

**Table 1.** Continuous Current-Carrying Capacity for Single-Core, Copper-Conducted, PVC-Insulated, and Sheathed Underground Cables Installed in a DC System with a Maximum Working Voltage of 1.8 kV at an Ambient Temperature of 30 °C

Cable type	Cross-sectional area	Continuous current-carrying capacity	
		In the ground	In the air
NYY	10	122	79
NYBY	16	160	105
NYRgBY	25	206	140
NYCY	35	249	174
NYCWY	50	296	212
NYCEY	70	365	269
NYSEY	95	438	331
NYHSY	120	499	386
NYKBY	150	561	442
NYKFGBY	185	637	511
NYKRgBY	240	743	612

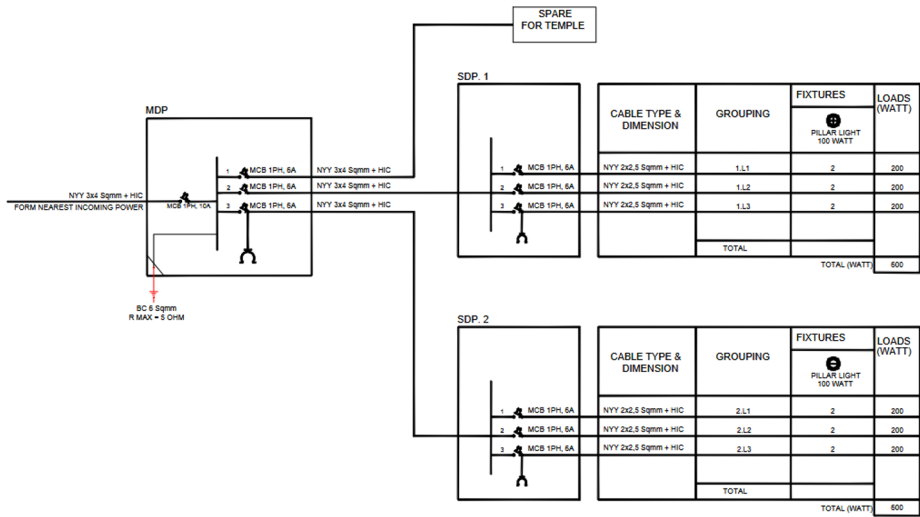


Figure 5. Single Line Diagram

#### 4 Conclusion

The community service has prepared the electrical installation of Ngejawa-Ngebali Temple at Mranggen Village, Srumbung District, Magelang, Central Java, with three lines, i.e., Spare For The Temple, SDP 01, and SDP 02. Each active line is loaded with 600 W using 2.5 mm<sup>2</sup> single-core NYY cable.

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#### References

Bulosan, R. L. (2023). Assessment of electrical installation and maintenance (EIM) Delivery among technical vocational livelihood students. *International Journal of Advanced Multidisciplinary Research and Studies*, 3(5), 7–23. [www.multiresearchjournal.com](http://www.multiresearchjournal.com).

Fross, K., & Gumińska, A. (2020). Illumination of objects and lighting of public spaces. *IOP Conference Series: Materials Science and Engineering*, 960(3). <https://doi.org/10.1088/1757-899X/960/3/032018>

Kusumah, I. H., Shobirin, M., Haryadi, E. M., Mulyadi, A., & Nurdiansari, R. (2021). Counseling on the importance of electrical installation safety in Tegalpanjang village. *REKA*

- ELKOMIKA: Jurnal Pengabdian kepada Masyarakat*, 2(2), 49–57. <https://doi.org/10.26760/rekaelkomika.v2i2.49-57>.
- Mufid, Z. (2024). Electrical installation and power-saving household. *Multifinance Jurnal Ekonomi, Manajemen dan Perbankan*, 2(1). <http://altinriset.com/journal/index.php/multifinance>.
- Retyana, W., & Hasbi. (2023). Training on repairing household electrical equipment in Pare Pare community, South Sulawesi. *Engagement: Jurnal Pengabdian Masyarakat*, 2(3), 155–161. <https://doi.org/10.58355/engagement.v2i3.34>.
- Rijadi, B. B., & Wismiana, E. (2020). Domestic electrical installation training to support the development of Simajaya tourism village. *Journal Of Community Engagement (JCE)*, 02(02), 63–66. <https://journal.unpak.ac.id/index.php/jce>.
- Tasiam, F. J. (2020). Electricity installation skills training in Rinondoran village community, Likupang East Minahasa Sub-District, North Minahasa. *Jurnal Abdimas*, 13(1).
- Tumba, I., & Shuaibu, H. (2016). Strategies for improving students' acquisition of practical skills in electrical installation and maintenance work trade in technical colleges in Kano state. *The International Journal Of Engineering and Science (IJES)*, 5(10), 30–40. [www.theijes.com](http://www.theijes.com).
- Wahyuningsih, E., Ayuningtyas, B., Kamil, I., Pratiwi, G. F., & Arifin, T. N. (2025). Enhancement of the safety and efficiency of electrical installations at UKM Kemuning Mandiri to foster sustainable production. *Abdimas Umtas: Jurnal Pengabdian kepada Masyarakat*, 8(1), 706–715. <https://doi.org/10.35568/abdimas.v8i1.6167>.
- Rajesh, T., Aravindhan, S., Sowmiya, M., & Thenmozhi, S. (2021). Energy-efficient lighting systems in industries. *International Journal of Applied Science Engineering and Management (IJASEM)*, 2(3), 214–226. [www.ijasem.com](http://www.ijasem.com).

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