



# SUSTAINABLE POWER ENGINEERING & SOLUTIONS

**Quality, Perfection & Efficient**

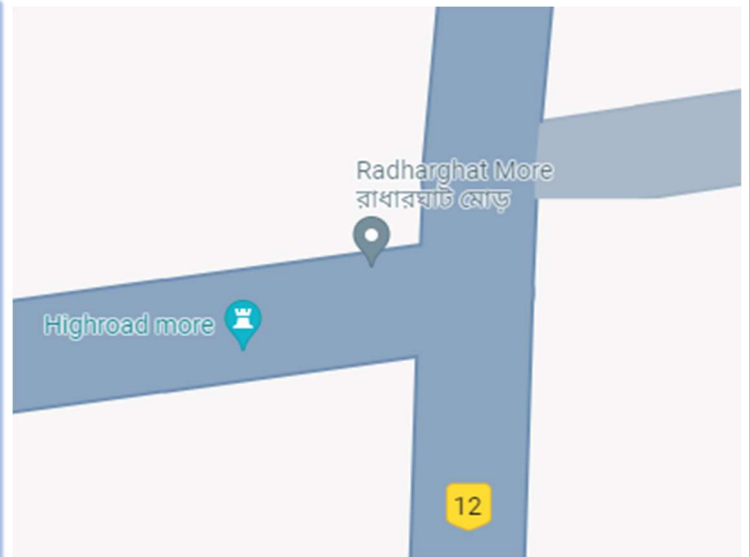
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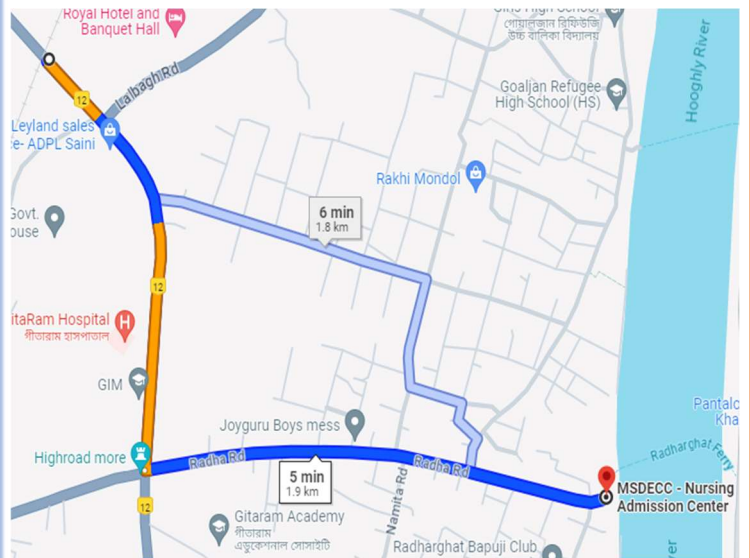
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High Road More – 26 B Nowdapara Rail Gate



The Place of FEEDER PANEL BOX fixed for operation



Total Area Covered by the 85 Nos Street Lights (2.1 Km)

# ELECTRICAL STREET LIGHTING

Many people have a phobia of darkness, so to assist them in such situations, we have explained a simple circuit that will automatically turn on the Street Light consisting of LEDs. It is lit well enough to see the objects nearby. Street lights are so integral to our daily lives that we often don't even notice them. Most people only know that street lights illuminate our paths and roads at night and remain off during the day. However, as innovation progresses, smart cities develop, and the need for energy-efficient solutions increases, new technologies are allowing street lights to observe us, detecting our movements and locations. Street lights are becoming crucial in making cities smarter and more efficient.

Today, modern street lighting systems are expected to do much more than ever before. They are assessed not only for their ability to light up dark areas but also for how they reduce energy consumption, enhance safety for pedestrians and drivers, and act as a platform for various Internet of Things applications.

Street lighting, a public utility, consumes a considerable amount of electricity. Studies show that it accounts for 18% to 38% of energy usage. The growing demand for electricity, coupled with a significant gap between supply and demand, leads to issues like power outages and wasteful consumption, such as bright lighting in low-traffic zones. Therefore, it's essential to optimize consumption with Smart Street Lights while ensuring public safety is not compromised.

This feeder panel, which is the heart of the system & operate the system smoothly is recognized for its robust design, precise dimensions, resistance to corrosion, and extended operational lifespan. It is primarily installed at the downstream end of the lighting distribution system and main power supply. They are manufactured using cutting-edge technology and high-quality raw materials sourced from reliable vendors.

Street lighting systems generally consist of low-voltage loads spread over a wide area, protected collectively by a single device. In case of faults, dangerous voltages could arise on the metal casings, posing shock risks to individuals. To mitigate these risks, various bonding and grounding methods are employed. The IEC 60364 standard and prevailing global trends advocate for the adoption of Class II equipment in street lighting systems. Class II components, like wiring systems and light fixtures, feature double or reinforced insulation. This paper discusses technical options for safeguarding against indirect contact according to IEC standards and suggests implementing specialized circuits and bonding connections to perpetually monitor the insulation integrity of metal poles.

Metal-sheathed cables are intended for use with a metal junction box to ground the wires properly. It is crucial that the electrical box is firmly attached to a stud, not just anchored to drywall. Metal electrical boxes, being rigid and resistant to warping, are suited for the heavy-duty screws required for a secure attachment to a stud. An electrical junction box serves as a protective enclosure for electrical connections, safeguarding them against weather conditions and preventing accidental electric shocks to individuals. Here we used 4 pole connector with a porcelain bonded cut out switch including the Metal Loop box specified by 16 SWG GI sheet.

An LED Street light is a cohesive unit that utilizes light-emitting diodes (LED) as its source of illumination. These lights are deemed integrated because the luminaire and the fixture typically form a single unit. During production, the LED cluster is encased on a panel and then attached to the LED panel with a heat sink to create a unified lighting fixture. Various designs have emerged that integrate different types of LEDs into a single fixture. The configuration may include a few high-power LEDs or numerous low-power LEDs. The design of an LED street light is influenced by factors such as the arrangement of LEDs, the accompanying heat sink, and preferred aesthetic design. The heat sinks in LED street lights resemble those used in cooling other electronic devices, like computers. These heat sinks are designed with multiple grooves to maximize the dissipation of heat from the LEDs. The efficiency of heat exchange is crucial as it significantly impacts the LED street light's longevity. Most LED Street lights are equipped with a lens on the LED panel, designed to project light in a rectangular pattern. This is a distinct advantage over conventional street lights, which often use a reflector behind a high-pressure sodium lamp, resulting in significant light loss and contributing to light pollution in the atmosphere and surrounding areas.

Here we cover total 2.1 Km / 2100 Meter with 85 nos 120-Watt electrical street lighting pole starting from Radharghat Ferry Ghat to 26B Nowdapara Railway level crossing under Radharghat-I Gram Panchayat area. The feeder panel box was fixed at High Road More of Berhampore which is a junction of Khagraghat Station, Radharghat Ferry Ghat, Berhampore Farakka Malda road & the Uttarpara More.

# Details of Department

**Murshidabad** served as the capital of Bengal before the advent of British in India. This city holds considerable historical importance, as it was here in 1757 that the British defeated Siraj-ud-Daula in the Battle of Plassey, an event which subsequently led to the imposition of British Colonial Rule over the entire country.

The Zilla Parishad is a local self-government duly constituted under the West Bengal Panchayat Act, 1973. It looks after the administration of the rural area of the district and its office is located at the Panchantala, Berhampore, Murshidabad. Members of the Zilla Parishad have been elected from the district on the basis of adult franchise for a term of five years. There are 70 Constituencies under this Zilla Parishad. The Executive Officer (EO), who also happen to be the District Magistrate of Murshidabad, heads the administrative machinery of the Zilla Parishad. The EO supervises the divisions of the Parishad and executes its development schemes as decided by the State Govt. and the Parishad itself. Murshidabad Zila Parishad is the local government body responsible for rural administration in the Murshidabad district of West Bengal, India. Zila Parishad literally translates to "District Council" and serves as the apex body for the Panchayati Raj system at the district level.

**Administrative Role:** It oversees the functioning of the Panchayat Samitis (block-level councils) within the district and coordinates various developmental activities.

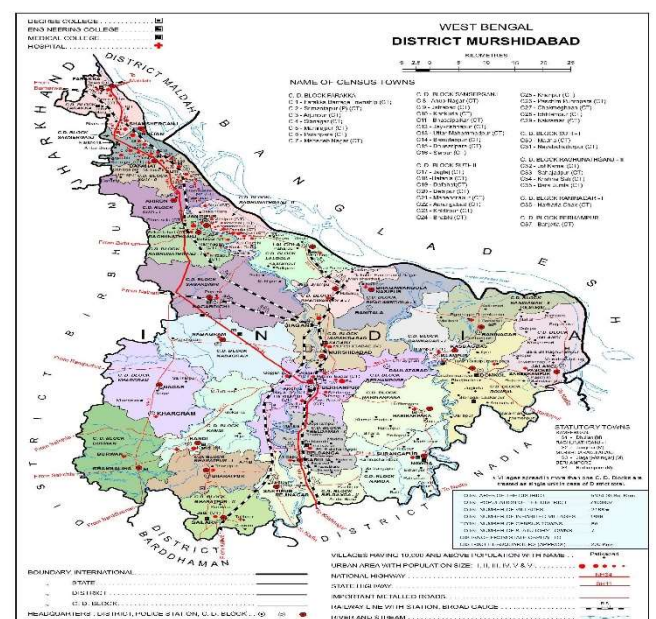
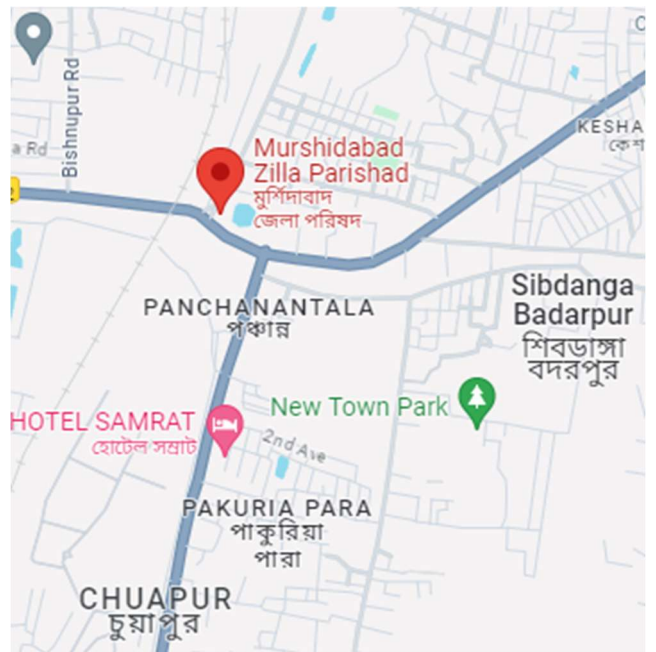
**Composition:** The Zila Parishad consists of elected members from the Panchayat Samitis and Members of Parliament and State Legislative Assembly representing the area.

**Functions:** It plays a crucial role in planning and implementing various rural development schemes, including infrastructure projects, poverty alleviation programs, and agricultural initiatives.

**Elections:** Members of the Zila Parishad are elected directly by the voters through periodic elections as per the guidelines of the Panchayati Raj system.

**Development Activities:** Murshidabad Zila Parishad is involved in promoting local governance, ensuring delivery of basic services like healthcare, education, sanitation, and drinking water to rural areas.

Overall, Murshidabad Zila Parishad is instrumental in grassroots governance and development in its district, reflecting the principles of decentralization and local self-governance enshrined in the Indian Constitution.



# **Project Details**

**Installation of Street Illumination work Starting from Radharghat Ferry Ghat to 26B Nowdapara NH34 Rail Gate towards N.H. High Road (2100 .00 M) under Radharghat – I G.P under Berhampore P.S. in the District of Murshidabad (XVFC 2023-24).**

The Project consist of 15<sup>Th</sup> Finance untied fund utilised by Zilla Parishad authority. Untied Fund is being placed at the disposal of every District with a view to providing a certain measure of financial freedom and to encourage them to plan some schemes in their discretion. This is an earmarked fund for the purpose of encouraging local level planning. The scheme under Untied Fund is of local nature.

The Finance Commission is a constitutional body, that determines the method and formula for distributing the tax proceeds between the Centre and states, and among the states as per the constitutional arrangement and present requirements. This grant is fully sponsored by Government of India.

Present 15th Finance Commission will cover a period of five years from the year 2021-22 to 2025-26.

Basic Untied Grants - 40% of the total allocation releases in two instalments.

The 15th CFC Grant allotted to the 3-Tier PRI bodies in the following manner:

- **Zilla Parishads** - **15% Of Total Grant**
- **Panchayat Samities** - **15% Of Total Grant**
- **Gram Panchayats** - **70% Of Total Grant**

The Untied Fund is being placed at the disposal of every District with a view to providing a certain measure of financial freedom and to encourage them to plan some schemes at their discretion. The Basic Untied Grants and can be used by the local bodies for location felt needs, except of Salary or other establishment expenditure. It includes the following:

- **Immunization of children.**
- **Construction, repair and maintenance of roads within / inter Gram Panchayat(s).**
- **Construction, repair and maintenance of footpath within / inter Gram Panchayat(s).**
- **Construction, repair and maintenance of LED street lights and solar lighting within / inter Gram Panchayat(s).**
- **Construction, repair and maintenance of crematorium and acquisition of land for crematorium grounds, upkeep of dead body burial ground.**
- **Providing sufficient and high bandwidth Wi-Fi digital network services within GP.**

Under the illumination programme, till date, over 64 lakh LED street lights have been installed, covering 28 States/Union Territories. The key objectives of the programme are Reduce energy consumption in public lighting which helps the Distribution Companies (DISCOMs) to manage peak demand.

Several advantages which encourage the body most to implement these kinds of projects. Streetlights enhance visibility and safety for both pedestrians and drivers during the night. They contribute to crime reduction, beautify cities, aid in navigation, and facilitate nocturnal activities. Additionally, they improve road safety by increasing visibility and decreasing the likelihood of accidents. The authority also worried about to secure the area. The main Mottos were reduction of illegal activities, enhancement of road safety, women safety during night, beautification of the area etc.

# **Key Material with Details**

## ▪ **GALVANISED IRON TUBULAR TYPE POLE WITH SINGLE LIGHT ARM:**

A street light, light pole, lamp pole, lamppost, street lamp, light standard, or lamp standard is a raised source of light on the edge of a road or path. It is the most essential part of the system. The size of the pole is calculated on the basis of the luminous intensity on the ground as well as the area of reflection. As per the standard design of electrical street lighting system here we used 9 Meter / 30 Feet long Swaged and welded type Steel Tubular Pole with the zinc coated hot dip galvanisation (thickness of GI was 80 Micron). The pole matched the specification as per **410-SP-26 (IS 2713-1980)**. The poles are made from high quality steel of ultimate tensile strength 42 kgf/mm<sup>2</sup>. It has a length of 9 meters and weighs approximately 92 kilograms. Swaged poles are made of seamless or welded tubes of suitable lengths swaged and jointed together. There are no circumferential joints in the individual tube lengths of the poles. Swaging done by the mechanical process. The upper edge of each joint chamfered at an angle of about 45°. The length of joints on swaged poles are in accordance with clause No. 5.4 of IS: 2713 (Part-I): 1980. Poles are well-finished, clean and free from harmful surface defects. Poles are straight, smooth and cylindrical. The welded joints are best quality, free from scale, surface defects, cracks etc. Tolerances of outside diameter, thickness, length, weight and straightness in accordance with are 2713 (Part-I): 1980. For earthing arrangement, a through hole of 14mm diameter provided in each pole at height of 200mm above the base plate of the pole. The Size of the base plate used on these poles are 200 mm X 200 mm with a thickness of 6 mm. The cable entering hole was situated at the 180 mm height from the bottom of the pole. The poles are swaged in 3 parts. The bottom part which was 5 Meter from the bottom has 114.3 mm outer diameter with a 4.50 mm thickness, the middle part was 2 Meter above from the bottom part has an 88.9 mm outer diameter with 4.05 mm thickness & the top part 2 Meter of the final size has 76.1 mm outer diameter with 3.25 mm thickness.

Decorative **Single Arm Bracket** with head cap made of 40 mm / 1.5-inch hollow iron pipe internally & externally galvanised in hot dip zinc thoroughly. Size of the arm is 1.5 Meter / 5 Feet with a clean cap welded at the end of the pipe to fix the arm with the pole suitably. On another side it matched the core diameter of the LED with the fixing facility. Also, there is a hole section provided regarding cabling to connect the LED with the Loop box.

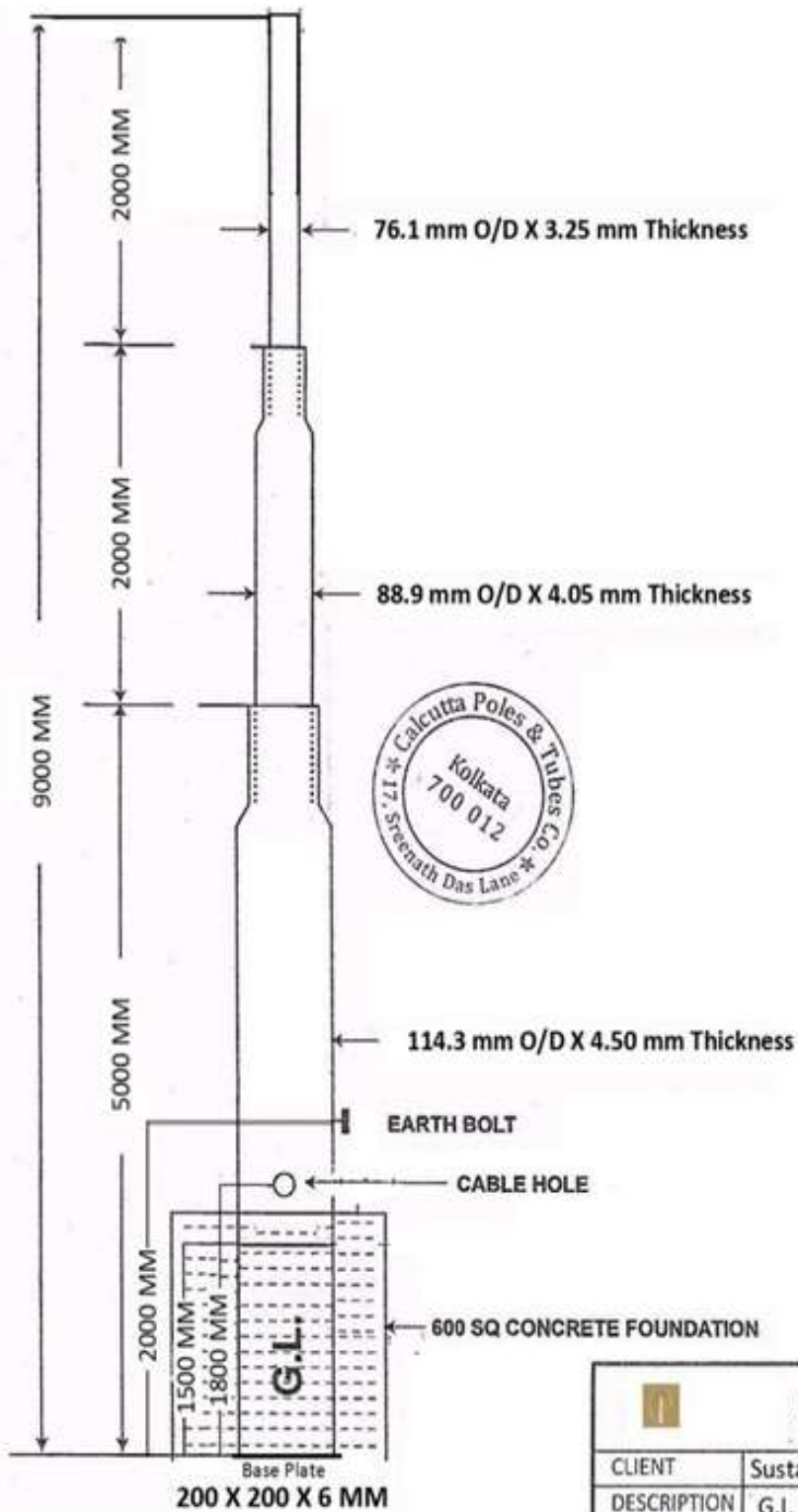
Here we used 16 SWG CRCA sheet duly painted with a coat of red oxide and 2 coats of grey enamel paint 3 nos punched holes in bottom fitted with each pole. A 4-way terminal, Porcelain made kit kat fuse of 5A & 3 nos brass glands including the **Loop Box** which are working as an intermedicator of street lights with the main connections.

Here we used the **Cable Duct** for input & output cables towards one loop box to another loop box for continue the circuit. The HDPE cable ducts are manufactured for mechanical protection to fibre optic, electrical cables etc. Ducts are with the spec of 40 mm / 1.5 inch with minimum 4-meter size in every pole to project the armoured cable from the ground hazards.

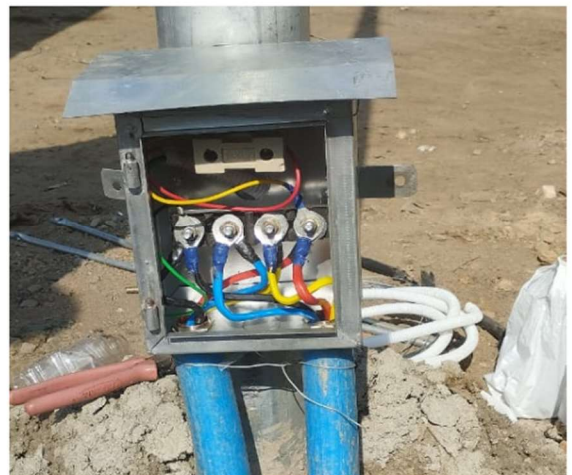
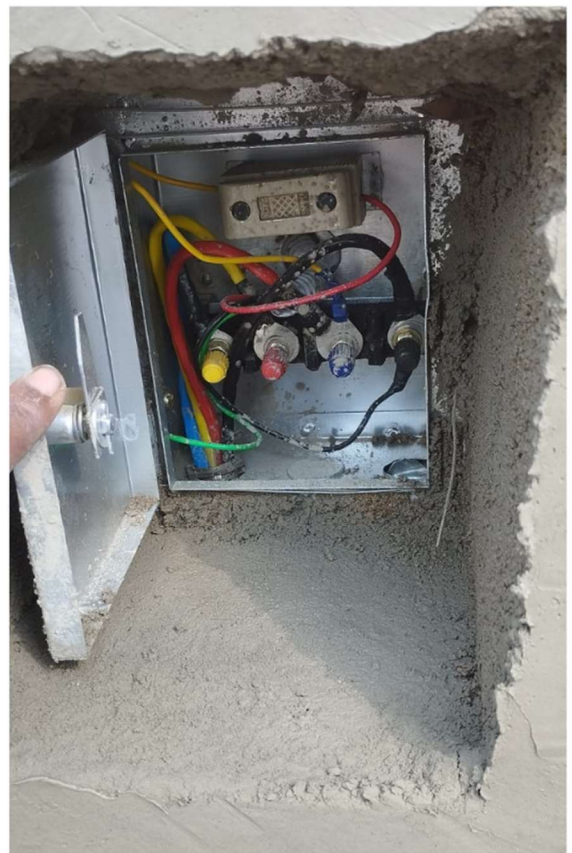
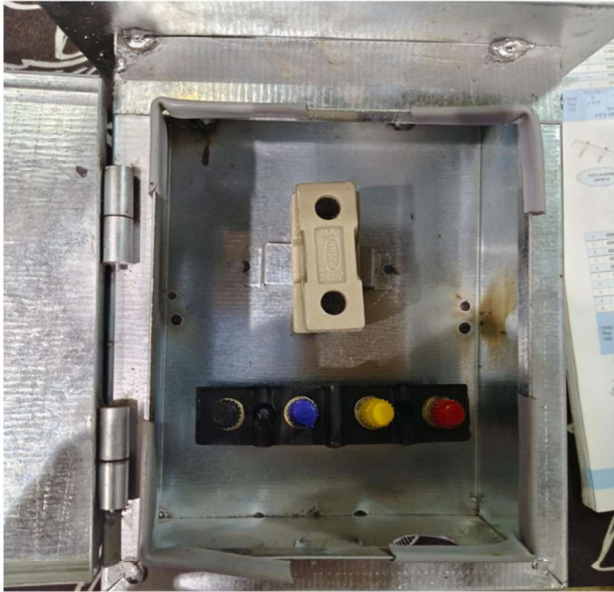
# SWAGED & WELDED STEEL TUBULAR POLE

ALL DIMENSION ARE IN MM

As Per 410-SP-26 (IS:2713-1980)



| CALCUTTA POLES & TUBES CO |   |
|---------------------------|---|
| CLIENT                    | Sustainable Power Engineering & Solution. |
| DESCRIPTION               | G.I. Steel Tubular Pole 410-SP-26.        |
| DRAWING NO                | CPT/11                                    |
|                           |   |
|                           |   |



## ▪ **FEEDER PILLAR FOR STREET LIGHT CONTROL:**

A feeder pillar is a reliable electrical enclosure that offers electrical services for low voltage distribution applications. It is designed to be compact and sturdy for outdoor or rugged use, with an appropriate level of protection against dust, solids, and water/rain. A feeder pillar is akin to a large steel cabinet. Its exterior may be constructed with either a double-walled or single-walled design, set upon a steel base. Typically, a feeder pillar houses ammeters, selector switches, whole-house surge protectors, service fuses, and instrument panels equipped with voltmeters. The role of a feeder pillar is to receive an electrical energy supply from a transformer and distribute it through fuse ways to various outgoing circuits, each equipped with protection and control mechanisms. Essentially, they serve as a fundamental type of low-voltage switchboard. Feeder pillars provide an organised and centralised location for electrical distribution, ensuring safer connections, ease of maintenance, and a structured system for electricity distribution.

Here the system voltage is 3 Phase 415V AC. The Board is fabricated out of a 3mm thick CRCA sheet steel enclosure which is dust & vermin proof. The panel box is Floor Mounted with free standing, cubical type, non-compart along with metal shed. The base of the structure is manufactured with ISA 40 which matches the standard with outdoor application.

Here we used the devices mentioned below as per the estimate provided by the department & consult with the EIC of the project.

- **100A 4P SDFU:** This switch is designed to handle currents up to 100 amperes. This is crucial for ensuring that the switch does not overheat or malfunction under load. Being a 4-pole switch means it can control or disconnect four separate circuits simultaneously. This is useful in applications where multiple circuits need to be controlled or isolated together. The specific functionality denoted by "SDFU" would detail how the switch operates, such as whether it's manual or automatic, its switching mechanism, any safety features, and so on. For exact details, consulting the device's datasheet or manual would provide comprehensive information. In essence, "100A 4P SDFU" describes a robust electrical switch capable of handling high currents (up to 100A) across four separate circuits simultaneously, with additional features denoted by "SDFU" that specify its exact operational characteristics. These switches are commonly used in industrial and commercial electrical systems where reliability and safety are paramount. Reliability and safety are paramount.





- **HRC 80A Fuses:** This stands for "High Rupturing Capacity". HRC fuses are designed to safely interrupt high fault currents. They are typically used in applications where the fault currents can be significant, and reliable interruption is critical. This indicates the current rating of the fuse, which is 80 amperes. It specifies the maximum current that the fuse can safely carry without opening (blowing) under normal operating conditions. This part of the term is likely a specific model or part number designation, which can vary based on the manufacturer and the exact specifications of the fuse. It may include additional details about the fuse's construction, voltage rating, characteristics, and other technical specifications. HRC fuses are designed to safely interrupt high fault currents. When a fault occurs in an electrical circuit, such as a short circuit or an overload, the current flowing through the circuit increases rapidly. The HRC fuse is rated to handle these high fault currents without allowing excessive heat build-up or damage to the electrical system. This fuse is rated to handle currents up to 80 amperes. If the current exceeds this rating for an extended period or experiences a sudden surge (such as during a fault), the fuse will "blow" or open the circuit to protect the connected equipment and wiring from damage. "HRC 80 A OFAFNooGG80" describes a fuse with a high rupturing capacity (suitable for interrupting high fault currents), rated for 80 amperes, and identified by the specific model number "OFAFNooGG80". This type of fuse is crucial in ensuring electrical safety by protecting equipment and circuits from overcurrent situations that could lead to damage or hazards.



- **I/L R, Y, B CL-523 R/Y/L:** - This could stand for "Insulated Line". It suggests that the cable has insulated conductors for carrying electrical signals or power. R, Y, B: These letters likely denote the colours of the insulated conductors within the cable. In electrical wiring, R typically stands for Red, Y for Yellow, and B for Blue. These colours are commonly used to identify different phases or conductors within a cable. CL-523R/Y/L: This part of the term is a specification code that provides detailed information about the cable's construction, materials, and possibly its intended use. Specific details such as the voltage rating, insulation type, temperature rating, and other technical characteristics may be indicated by this code. CL-523R/Y/L: This part of the term is a specification code that provides detailed information about the cable's construction, materials, and possibly its intended use. Specific details such as the voltage rating, insulation type, temperature rating, and other technical characteristics may be indicated by this code.



- **DMTME Multi-function Meter:** - As a multi-function meter, the DMTME is designed to measure various electrical parameters simultaneously or sequentially. These parameters commonly include:

- ✓ Voltage (V): Measures the electrical potential difference between two points.
- ✓ Current (I): Measures the flow of electrical charge through a conductor.
- ✓ Power (P): Calculates the instantaneous power consumption (active power).
- ✓ Energy (kWh): Measures the cumulative energy consumption over time.
- ✓ Power Factor (PF): Indicates how effectively electrical power is being used.
- ✓ Frequency (Hz): Measures the frequency of the electrical supply.

The meter typically has a digital display that shows these measurements in real-time. It may also have buttons or a keypad for setting parameters, configuring the display, or accessing additional functions. The meter is usually installed in electrical distribution panels or control panels where it can monitor and display electrical parameters relevant to the system's operation and efficiency. Calibration ensures that the displayed values correspond correctly to the actual electrical parameters in the system. In summary, the "DMTME Multi-function meter 72x72 2CSL170040R1021" is a versatile meter used for monitoring and measuring various electrical parameters in real-time. Its functionality is essential for maintaining and optimizing the efficiency of electrical systems in industrial, commercial, and residential applications.



- **16A DPMCB:** - A "16 A DPMCB" typically refers to a circuit breaker, specifically a miniature circuit breaker (MCB) that is designed to handle currents up to 16 amperes. Let's break down how a DPMCB (Din Rail Mounted Circuit Breaker) works and its functionality in electrical distribution boards and consumer units to protect electrical circuits from overcurrent situations, such as short circuits and overloads. Current Rating (16 A) indicates that the circuit breaker is rated to carry a maximum current of 16 amperes continuously. If the current exceeds this rating for a sustained period or experiences a sudden surge (e.g., due to a fault), the circuit breaker will trip to interrupt the flow of electricity, thereby protecting the connected wiring and devices. DPMCBs are designed to trip (open) when the current flowing through them exceeds their rated capacity for a prolonged period. This protects against overheating and potential damage to the wiring and devices connected to the circuit. In the event of a short circuit (a sudden, very high current), the DPMCB detects the fault and quickly interrupts the circuit to prevent damage and potential hazards such as fire. DPMCBs typically use an electromagnetic mechanism to detect overcurrent's and short circuits. When the current exceeds the breaker's rated capacity, the mechanism causes a rapid release of a spring-loaded mechanism, which trips the breaker, opening the circuit. After tripping due to an overload or short circuit, DPMCBs can be manually reset by toggling the switch to the OFF position and then back to the ON position. Some models may also have a visual indication of the tripped state. DPMCBs are installed on DIN rails within electrical distribution panels or consumer units.

In summary, a "16 A DPMCB" is a miniature circuit breaker rated to handle currents up to 16 amperes. It works by detecting overcurrent's and short circuits, tripping to interrupt the electrical circuit and protect connected devices and wiring. These devices are crucial for ensuring the safety and reliability of electrical installations by preventing damage from electrical faults.



## • **115 A, 3P CONTACTOR, AC 1 COIL VOLTAGE-230 V, AC: -**

A "115 A, 3P CONTACTOR, AC 1 COIL VOLTAGE-230 V, AC AX65-30-11-80" describes a specific type of electrical contractor used in industrial and commercial applications. Let's break down what each part of the description signifies and how such a contactor typically works:

- ✓ **115 A:** This indicates the contactor's current rating, which is 115 amperes. This specifies the maximum current that the contactor can safely switch under normal operating conditions.
- ✓ **3P:** This stands for 3 poles. A 3-pole contactor has three sets of contacts that operate together. Each pole typically controls one phase of a three-phase electrical system.
- ✓ **AC 1:** This indicates the type of duty cycle the contactor is rated for. AC 1 duty is typically used for resistive loads.
- ✓ **COIL VOLTAGE - 230 V:** This specifies the voltage required to energize the contactor's coil. In this case, the coil operates on 230 volts AC (Alternating Current).
- ✓ **AC AX65-30-11-80:** This appears to be a specific model or part number designation for the contactor, providing additional details such as its construction, size, and possibly unique features.

A contactor is an electrically-controlled switch used for switching a power circuit. It allows remote control of large electrical currents typically in motor control applications, lighting, heating, and other industrial machinery.

The contactor's coil operates at 230V AC. When this coil is energized, typically through a control signal from a switch or a control system, it generates a magnetic field.

The magnetic field created by the coil pulls in the movable contacts, closing the circuit across the fixed contacts. This action completes the circuit and allows current to flow through the main contacts of the contactor.

When de-energized, the coil releases the contacts, allowing springs or other mechanisms to open the circuit. This disconnects the load from the power source, effectively stopping the flow of current.

The 115 A rating indicates that this contactor is suitable for switching large electrical loads up to 115 amperes, making it ideal for controlling heavy-duty equipment or machinery. Contactors are typically mounted in control panels or enclosures, often alongside other control devices such as relays and circuit breakers. Regular inspection and maintenance are necessary to ensure the contactor remains in good working condition, as the contacts can wear out over time, especially under heavy use. Contactors are designed for reliability and long service life under heavy electrical loads. They often include features such as arc suppression to minimize wear on contacts and ensure safe operation. In summary, a "115 A, 3P CONTACTOR, AC 1 COIL VOLTAGE-230 V, AC AX65-30-11-80" is a robust electrical switch used in industrial applications to control large electrical loads up to 115 amperes. It operates by energizing a coil with 230V AC to close its contacts, allowing current to flow through the controlled circuit.



### • **Fuse protection 2/4/6A with fuse base: -**

- ✓ Fuses (2A, 4A, 6A): Fuses are overcurrent protection devices designed to protect electrical circuits and equipment from excessive current. The amperage ratings (2A, 4A, and 6A) indicate the maximum current each fuse can safely handle without opening (blowing).
- ✓ Fuse Base (OFFNF1GG2): The fuse base is the housing or socket into which the fuse is installed. It provides electrical connections for the fuse and ensures proper alignment and installation.
- ✓ 1SYNA833001R2005: This appears to be a specific part number or designation for the fuse base, providing additional details such as its model, type, or manufacturer's reference.

The fuses (2A, 4A, 6A) are installed in the corresponding fuse bases (OFFNF1GG2) within an electrical panel or enclosure. Each fuse protects a specific circuit or device. The selection of 2A, 4A, or 6A fuses depends on the maximum current rating required for the protected circuit. If the current flowing through a circuit exceeds the rating of the installed fuse (due to overload or short circuit), the fuse will "blow" or open the circuit. This interrupts the flow of current, protecting the connected equipment and wiring from damage or overheating. When a fuse blows, it needs to be replaced with a new fuse of the same rating. This ensures continued protection of the circuit and equipment. Fuses provide effective protection against overcurrent situations but should not be used as a substitute for proper circuit design and load management practices. In summary, the "fuse protection 2/4/6A with fuse base OFFNF1GG2 & 1SYNA833001R2005" setup involves using fuses of different amperages to protect electrical circuits or devices. The fuses are installed in corresponding fuse bases, and when current exceeds the fuse rating, the fuse will blow to prevent damage to the connected equipment, ensuring safety and reliability in electrical installations.



• **Time Switch Electro Mechanical daily program with battery backup Analog type:**

An electromechanical daily program time switch with battery backup is a device used to control the activation and deactivation of electrical circuits based on a pre-set schedule. Time switches use a combination of mechanical gears and electrical contacts to control the switching operations. They do not rely on digital electronics but rather on physical movements driven by a clock mechanism. The time switch allows you to set specific times during the day when you want electrical circuits or devices to be turned on or off. This programming is done manually using mechanical dials or sliders on the face of the switch. Battery backup ensures that the time switch maintains accurate timekeeping and continues to operate during power outages. Typically, a small battery (often a coin cell) powers the clock mechanism so that the programmed schedule is retained even when the main power supply is interrupted. The switch operates using analog (mechanical) components to control the timing functions. This contrasts with digital time switches that use electronic circuitry for timing and programming. During normal operation with mains power, the switch runs on AC power and keeps time accurately using its internal clock. In the event of a power outage, the battery backup kicks in to maintain the clock's timekeeping function. As time progresses, the clock mechanism inside the switch moves gears according to the set schedule. When the present time arrives, the mechanical contacts inside the switch engage or disengage, controlling the flow of electricity to the connected device or circuit. You manually set the current time on the time switch using a knob or dial. Then, you use additional knobs or sliders to set the times when you want the switch to turn on and off the connected load. Compared to digital timers, electromechanical switches may have fewer programming options but are straightforward to use and set up. Electromechanical time switches are known for their reliability and durability. They require minimal maintenance beyond occasional adjustment of the time settings and ensuring the battery backup is functioning correctly.



## • **EARTHING SYSTEM: -**

Earthing with 50 mm dia GI pipe 3.64 mm thick X 3.04 Meter long and 1 X 4 SWG GI (hot dip) were (4 Meter long), 13 mm dia X 80 mm long GI bolts, double nuts, double washers incl. S & F 15 mm dia GI pipe protection (1 Meter long) properly filled with bitumen partly under the ground level and partly above ground level driven to an average depth of 3.65 Meter below the ground level. There are two sets of earthing pipe used for the protection of the feeder panel box with 25 X 3 mm GI flat connected from the body of the enclosure of FPB to the Earthing electrode. Also cover the electrode with CI make earthing pit cover of 900 X 900 mm square & clinically finished with brick chamber. The chamber is also plastered & dado with adequate cement punning.

In areas with high soil resistivity, GI (Galvanized Iron) Earthing Electrodes give a low-impedance ground. The method dissipates lightning energy and other dangerous electrical fault currents, even in sandy or rocky soil conditions, when used in conjunction with Reflow Grounding Minerals.

The earthing rods are 1853 mm (i.e., 25 + 1752 + 76) long fabricated from 20 mm dia M.S. Rod, the bottom of which to be made cut of the same rod in the shape of a cone – 76 mm long and the forged head made out of the same rod with 30 mm (dia) = 25 mm (height). The earthing arrangements having consist of G.I. Bolt/nut and washers. The rods are well forged and free from flaws and other defects and the heads shall not fail when the rods are tested to fracture at their full strength by tensile stress. There is total 85 nos of earthing rod used as earth electrode of each pole. The rods are connected with GI wire of 6 SWG from the earthing point designed at the pole drawing. The electrodes are filled with bitumen, Salt, charcoal & sand under the ground level.







## ● **CABLES: -**

An electrical cable is an assembly consisting of one or more conductors with their own insulations and optional screens, individual coverings, assembly protection and protective coverings. Electrical cables may be made more flexible by stranding the wires. In this process, smaller individual wires are twisted or braided together to produce larger wires that are more flexible than solid wires of similar size. Bunching small wires before concentric stranding adds the most flexibility. All the cables having Windproof & Waterproof, Anti-Rodent & Anti-Termite, Eco Friendly, Fire Safety & Higher Current Carrying Capacity, Higher Heat Resistance, Superior Oxygen Index, Lead Free & High Abrasion Resistance in nature.

**There are 4 types of wire used in this system.**

- ✓ **4 core 16 sq mm PVC Aluminium armoured cable:** The current capacity of a 16 sq. mm 4 core aluminium armoured cable is 50 amperes. You can use this cable for a 3phase, neutral wire system of supply. This cable is designed for a variety of installs including underground power networks. The 4 Core cable is also commonly used for three phase circuits. A hard-wearing multi-core cable that has a steel wire armour below the sheath. Aluminium can also be used for armouring, and historically iron was used. Here the cable is main distribution cable to joints loop boxes with feeder panel box. Total 2900 Meter cable used in this system. Gloster company matched the exact specification of the estimate.
- ✓ **1 core 1.5 sq mm 'FR' PVC Copper cable:** A Single Core Design, Ensuring Seamless Power Transmission in Diverse Applications. Its 1.5 Square Millimetre Gauge Offers Optimal Conductivity, Guaranteeing Consistent Performance Under Varying Loads. Manoeuvrability, Simplifying Installations Even in the Most Intricate Spaces. Designed with Flame-Retardant Properties, it Prioritizes Safety, Mitigating the Risk of Fire Hazards in Both Residential & Commercial Environments. This Cable Provides Ample Coverage, Catering to Extensive Wiring Requirements with Ease. The current capacity of the cable is 17 amperes. The cable is used here to connect the LED Luminary phase neutral from the loop box & the porcelain fuse inside the poles hollow section as well as light arm.
- ✓ **1 core 2.5 sq mm 'FR' PVC Copper cable:** This single-core cable has a cross-sectional area of 2.5 sq mm, which is suitable for various applications that require a low to medium current rating. The cable is rated for a maximum voltage of 1100 volts, making it suitable for use in a wide range of electrical installations. A 2.5 sq mm copper wire can carry 3,500 watts and 5,000 watts. Because 2.5 square copper wire, it can carry the current is in 16A to 25A, according to the conversion formula, it can withstand the power of about 3500 to 5500 watts. Mainly the cable used in Feeder Panel circuit to connects the devices with each other to complete the loop.
- ✓ **1 core 1 sq mm 'FR' PVC Copper cable:** 1 sq mm Green Single Core Multi Strand Heavy Duty FR PVC Housing Wire is a low-tension cable that is just made for heavy duty applications. It is made of polyvinyl chloride (PVC) and has a flame retardant (FR) coating that makes it safe for use in hazardous areas. Low Tension Cable is an electrical wire made of copper, rated at 1100 volts. It is available in a number of colours, including green and is RoHS and Reach compliant. This cable is part of the green series, which is designed for safety and reliability. It is also FR (Fire Retardant) certified, making it ideal for use in the event of a fire. The cable interconnected to the earthing terminal of LED from the Loop box.



## ▪ **120W LED STREET LIGHT:**

The primary role of street lights is to enhance visibility and ensure the safety of pedestrians, cyclists, and motorists at night. They light up areas that would otherwise remain dark, thus improving security and minimizing accidents due to poor visibility. LED street lamps represent the most advanced technology in street lighting, offering high efficiency by providing the greatest amount of light for each watt of power used. They also last longer than traditional bulbs, which lowers maintenance costs. Although they emit a monochromatic yellow light that has very high energy efficiency, their colour rendering is limited. LEDs use less energy than traditional bulbs, leading to reduced electricity expenses and a smaller carbon footprint. Additionally, LEDs don't need a warm-up period and can be turned on and off immediately, which is advantageous for situations that demand a quick reaction to lighting needs. Moreover, LEDs can be engineered to focus light exactly where it's needed, thereby decreasing light pollution and glare.

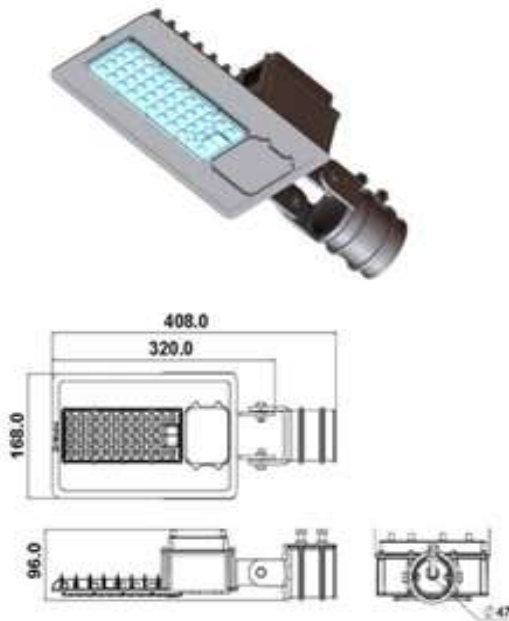
Here the LEDs are provided with Corrosion resistant Polyester powder coated pressure die-cast aluminium housing & non-yellowing decorative IP lens optics. Silicon gaskets provided for LEDs and control gear compartments. The driver used is specially designed to have built-in surge voltage, open/short circuit protections. External surge protection provided for additional safety. Side entry mounting for 50 to 58mm OD pipe bracket. Side Entry mounting with separate optical and driver compartment. IP66 (Ingress Protection 66) provides complete protection against dust and strong jets of water, ensuring durability and reliability in outdoor environments.

In the specific model with 5 years onsite warranty of the led from bajaj luminaries we got over 14400 lm luminous flux with 120 lm/w luminous intensity which indicate & confirmed us the minimum reflection area covering by the LED from the height of 30 ft / 9 meter is 15 meter in both side from the centre point of the pole. Totally we installed 85 nos led which provides no shadow area in the entire section of the road where the system is installed. Here the advance technical data sheet of the specific model we used over the project is attached below

## Edge LED Street Light 120W 757

### Features

- Corrosion resistant Polyester powder coated pressure die-cast aluminium housing.
- LEDs are provided with non-yellowing decorative IP lens optics.
- Silicon gaskets provided for LEDs and control gear compartments.
- The driver used is specially designed to have built-in surge voltage, open/short circuit protections.
- External surge protection provided for additional safety.
- Side entry mounting for 50 to 58mm OD pipe bracket.
- Side Entry mounting with separate optical and driver compartment.



Overall Tolerance ±3mm

### General Information

|                              |                 |
|------------------------------|-----------------|
| Product Category             | LED Streetlight |
| System Wattage**             | 120W            |
| Luminous flux                | ≥14400 lm       |
| Luminaire efficacy           | ≥120 lm/W       |
| Correlated Color Temperature | 5665K ±355K     |
| Color Rendering Index        | >70             |
| Maintenance of lumen output  | 50,000 hrs.     |
| Operating Temperature Range  | -10°C to 50°C   |

### Operating and Electrical

|                                 |                |
|---------------------------------|----------------|
| Input Voltage                   | 120 to 270V AC |
| Input Frequency                 | 50 Hz          |
| System Current in Amp. @240V AC | 0.52A          |
| Power Factor                    | > 0.95         |
| THD                             | <10%           |
| Built-in Surge protection       | 4 kV           |
| External Surge Protection       | 10kA           |

### Product data and Ordering data

|                   |                     |
|-------------------|---------------------|
| Product Cat. Ref. | BRLEP 120W LED V3 E |
| Product code      | 114292              |
| Case Lot          | 01 No.              |

### Approval

|                              |      |
|------------------------------|------|
| Ingress Protection           | IP66 |
| Mechanical impact protection | IK07 |

ILLUM/TDS/2223/SL/160Rev-01, Dated.13/04/2022

Note : Data subject to variation due to change/improvement in the design, materials and processes.

## ▪ **CIVIL CONSTRUCTION FOR SUPPORTING THE PROJECT VIABILITY:**

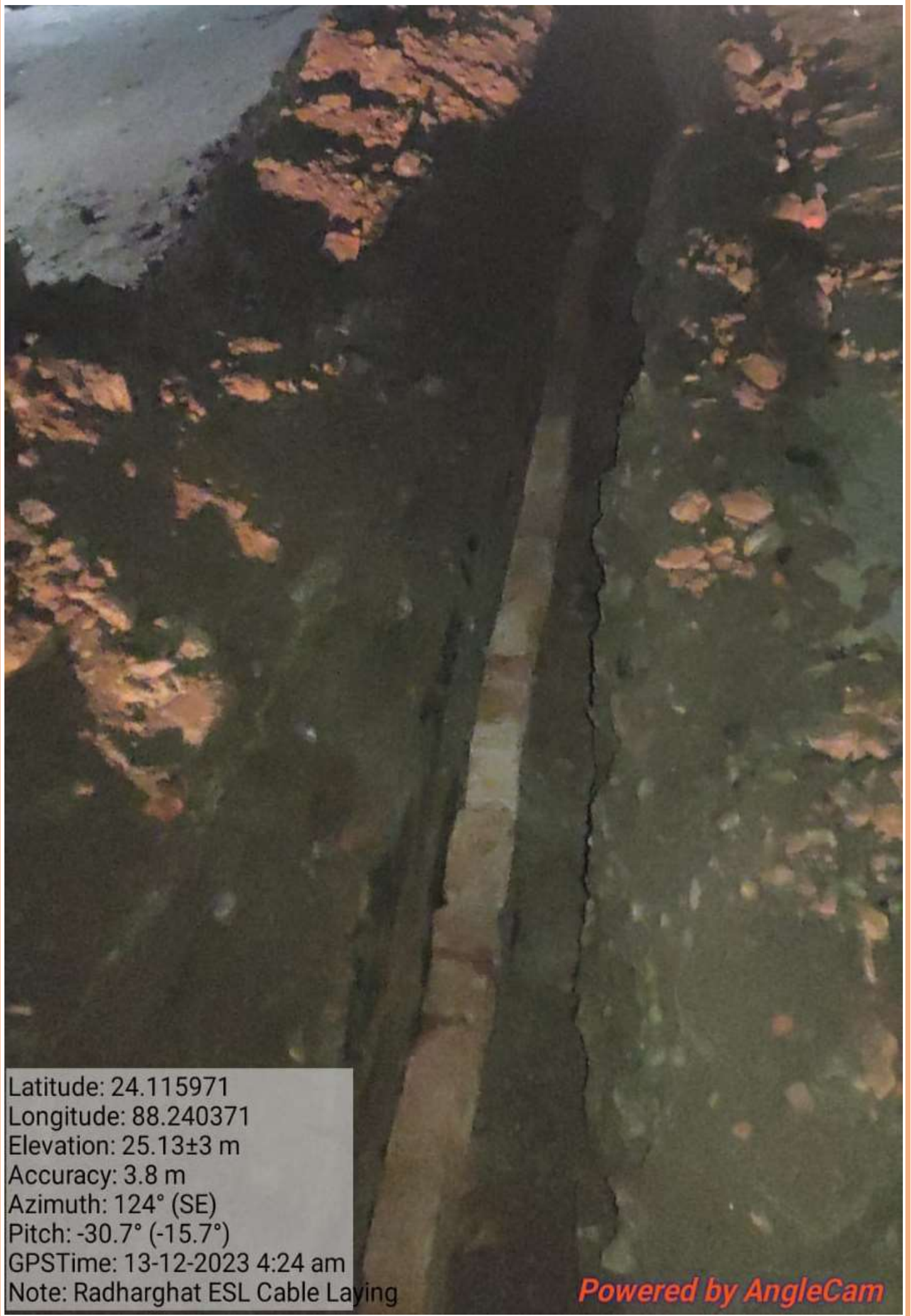
Earth excavation for a 4-core cable up to 35 sq mm involves creating an underground trench that is 460 mm wide and 760 mm deep on average. The work was done by the earth excavator & manpower. At the starting of work the entire area digging up with the help of the machines & after the laying of armoured cable the trench was filled up with the soil, sand, jhama & water.

As per the standard working process & serious instruction of EIC thoroughly the Brick protection is placed over the armoured cable. Here we used a minimum eight nos of bricks per meter over the cable. The space between the bricks and the cable, as well as the trench, is filled with displaced soil, sand & jhama with water. The surface is then levelled, compacted, and restored, with all debris removed.

After completion of trench excavation work Hydraulic Auger Machine used to digging the soil for the construction of the pole to keep standing straight. The Post Hole Digger machine made the Fast and Easy Post Holes from The Tractor Seat. It has a Heavy-Duty Gear Box and Driveline. 18 Inch Auger used with Heavy Duty, Replaceable Carbide Cutting Edges and Spiral Point. Also, the tractor having lifting capability which helps to lifted the poles & adjusted at the point where the holes are made. After standing here we used spirit level to straining the poles.

In next phase the poles underground portion were immediately fixed with 600x600x150 mm thick Cement Concrete base block of M15 grade with the ratio of (4:2:1) incorporating hard jhama metal. This includes a Cement Concrete with M10 grade with the ratio of (6:3:1) muffing of 0.30 meters in diameter and rising 0.76 meters above ground level, finished with a 3 mm thick layer of neat cement. For the provision of a Cement Concrete with the ratio of (6:3:1) base block around the pole, with dimensions of 0.60x0.60x0.76 meters above ground level and a neatly cemented finish with a measurement of 3 mm thick at the base of the pole instead of Cement Concrete muffing, which was suitable for alkathene / polythene pipe entry as directed for street light wiring. Also, there were a provision & corridor to open up the loop boxes. The corridor is pretty small but a skilled technician can do easily maintenance work. The entire concrete section is completely dado finished as per the instruction of EIC.


Filling up excavated earth pits with shifted soil and ensuring proper compaction. A robust concrete foundation with specified proportions and dimensions ensures stability and longevity of the installation. The process includes meticulous steps such as drilling for the earth bolt and ensuring proper finishing of the concrete around the base of the pole.



Latitude: 24.115971  
Longitude: 88.240371  
Elevation: 25.13±3 m  
Accuracy: 3.8 m  
Azimuth: 124° (SE)  
Pitch: -30.7° (-15.7°)  
GPSTime: 13-12-2023 4:24 am  
Note: Radharghat ESL Cable Laying

*Powered by AngleCam*



 **GPS Map Camera**



Berhampore, West Bengal, India  
464R+CRJ, Radharghat, Berhampore, West Bengal 742187, India  
Lat 24.106219°  
Long 88.24221°  
16/12/23 02:36 PM GMT +05:30



# **Remarks**

A street light or street lamp is a raised source of light often mounted on a lamp column or pole either on the side of the road or within the median, or suspended on a wire above the road to provide illumination. Street lighting can enhance security in urban areas and improve quality of life by artificially extending daylight hours, allowing activities to continue. It also increases safety for drivers, cyclists, and pedestrians.

Reducing energy consumption and enhancing operational efficiency contribute to lower greenhouse gas emissions, which supports environmental sustainability. Centralized monitoring enables improved resource management, reducing waste and maximizing operational effectiveness.

Enhanced lighting aesthetics and functionality contribute to a more pleasant urban environment, encouraging nighttime activities and promoting economic vitality.

While there may be upfront costs associated with upgrading to smart street lighting, the long-term savings in energy and maintenance costs often justify the investment.

It is crucial to ensure that smart systems are compatible and scalable with current infrastructure and forthcoming enhancements to fully maximize benefits and minimize interruptions. Smart street lighting signifies a revolutionary transition to more efficient, sustainable, and habitable cityscapes. Utilizing cutting-edge technologies and informed by data analytics, cities can boost operational efficiency and cost savings while also enhancing safety, environmental sustainability, and the quality-of-life quality for both residents and visitors. Adopting smart street lighting is not merely an upgrade; it's a forward-thinking move towards a smarter, more robust urban tomorrow.

Smart street lighting systems are capable of collecting important data on usage patterns, environmental conditions, and the performance of infrastructure. This data can be instrumental in informing future urban planning and decision-making processes.

Well-illuminated streets improve visibility, decrease the likelihood of accidents, and foster a feeling of security among both residents and visitors.

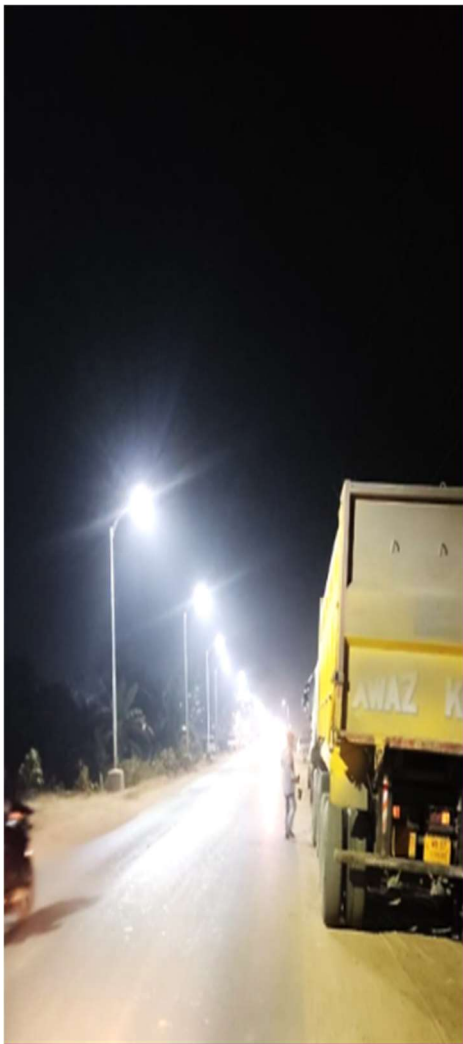
## **▪ Bibliography & references:**

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Latitude: 24.109844  
Longitude: 88.241831  
Elevation: 9.75±3 m  
Accuracy: 3.8 m  
Azimuth: 183° (S)  
Pitch: -81.2° (70.4°)  
GPSTime: 02-01-2024 2:7 pm



466J+XX3, NH114A, Nawdapara, Berhampore, West Bengal 742187, India

Latitude 24.11244469° Longitude 88.23235402°

466J+XX3, NH114A, Nawdapara, Berhampore, West Bengal 742187, India

Latitude 24.11244203° Longitude 88.23234923°

