



INSTALLATION OF 10M. LONG OCTAGONAL HIGH MAST TOWER WITH 6 NOS. OF SOLAR LIGHT FITTINGS INCLUDING BATTERIES, SUPPLY OF MATERIALS, ERECTION WORK, LABOUR COMPLETE AS PER REQUIREMENT IN 32 LOCATIONS AT FOUR LANING OF BARAJAGULI- KRISHNAGAR SECTION AND 19 LOCATIONS IN KRISHNAGAR TO BERHAMPORE SECTION OF NH-12 (OLD NH-34)

**Authority: - National Highways Authority of India
(Ministry of Road Transport and Highways, Govt. of India)
Project Implementation Unit - Krishnagar**

Contractor: - Sustainable Power Engineering & Solutions



**National Highways Authority of India
(Ministry of Road Transport and Highways)**

Project Implementation Unit-Krishnagar
Vill. & P.O.- Bhatjangla, Krishnagar, Dist.-
Nadia, Pin - 741102



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Introduction

The National Highways Authority of India is an autonomous organization under the Ministry of Road Transport and Highways, Government of India. It is responsible for the development, maintenance, and management of National Highways across the country. NHAI plays a major role in improving transportation infrastructure, economic growth, and connectivity between different regions of India.

History of NHAI

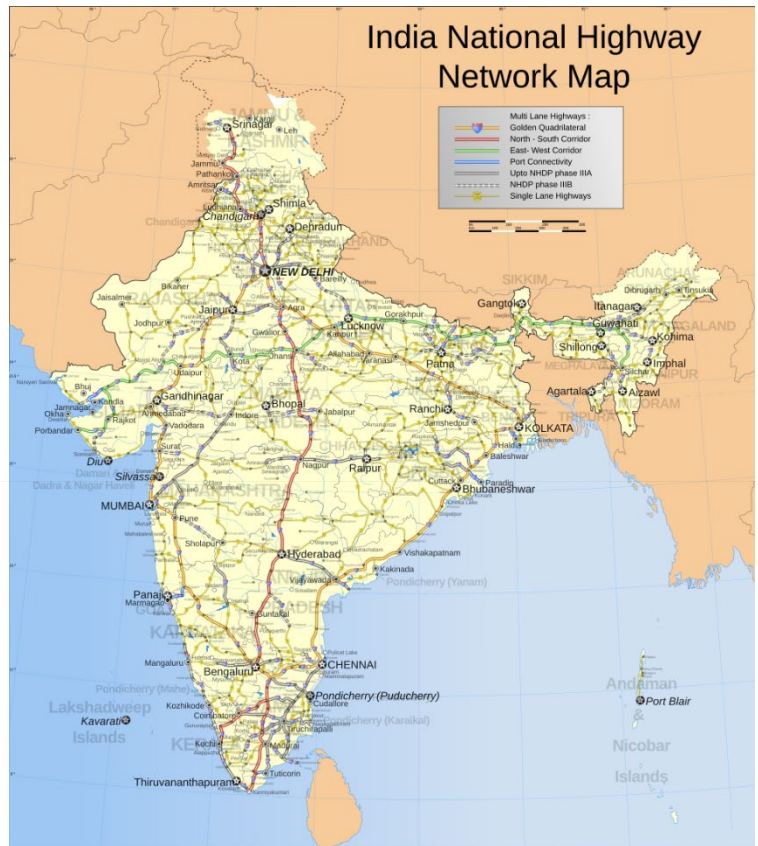
NHAI was constituted through the National Highways Authority of India Act, 1988, passed by the Indian Parliament. Although the Act was enacted in 1988, the authority became operational in February 1995.

The primary objectives of NHAI are:

- Development of National Highways
- Maintenance and modernization of highways
- Improvement of road safety
- Construction of expressways, flyovers, bridges, and bypasses
- Toll collection and highway management

One of the most significant projects undertaken by NHAI was the National Highways Development Project (NHDP), launched in 1998 under the leadership of former Prime Minister Atal Bihari Vajpayee. This project included the famous Golden Quadrilateral network connecting Delhi, Mumbai, Chennai, and Kolkata through high-quality highways.

Over the years, NHAI has constructed thousands of kilometres of highways and expressways throughout India. It also introduced advanced technologies, electronic toll collection systems, and modern road safety measures Like Automatic Speed Detection System, **Solar Highway Lighting System**, Solar Powered Signalling System etc.



NHAI PIU Krishnanagar

National Highways Authority of India established the Project Implementation Unit (PIU) at Krishnanagar to supervise and execute National Highway development projects in the Nadia, Murshidabad and North 24 Pargana of West Bengal. The PIU mainly handles the development, widening, maintenance, land acquisition, and modernization works of the old NH-34 corridor, presently known as NH-12.

The Krishnanagar PIU became important during the large-scale four-laning and upgrading projects of NH-34 under the National Highways Development Programme (NHDP). NH-34 was historically one of the busiest and most critical highways in West Bengal, connecting Kolkata with North Bengal districts such as Malda, Raiganj, and Siliguri. Due to increasing traffic congestion and road deterioration, NHAI initiated modernization works through different regional PIUs including Krishnanagar.

The jurisdiction of PIU Krishnanagar mainly covered stretches between Barasat, Krishnanagar, Berhampore, and adjoining areas. this PIU was responsible for land acquisition and project coordination for the 4/6 laning projects of NH-34 from Barasat to Baharampore under NHDP Phase IIIA. These projects covered the districts of North 24 Parganas, Nadia, and Murshidabad.

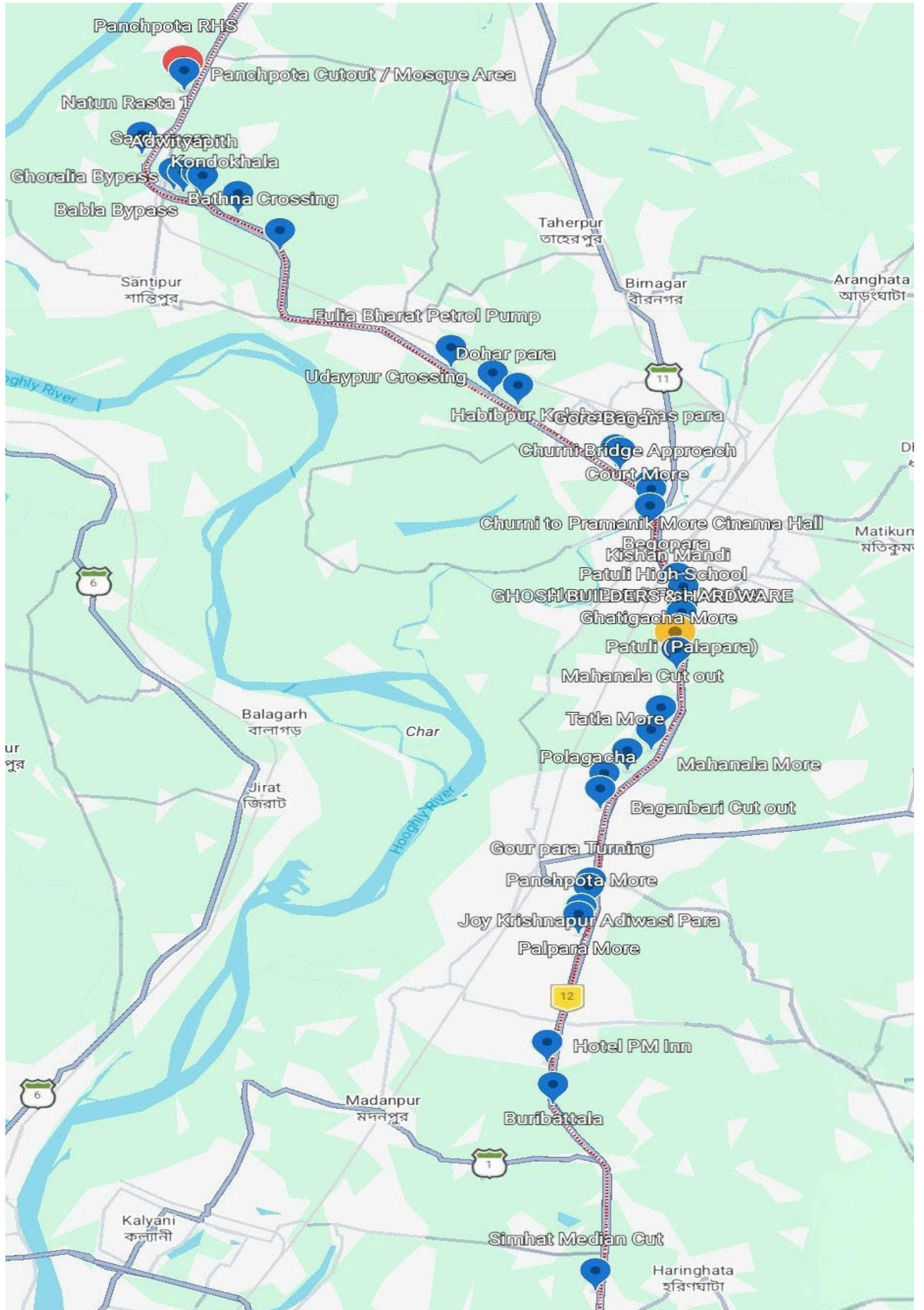
One of the major responsibilities of NHAI PIU Krishnanagar was the four-laning of the Barajaguli–Krishnanagar section of NH-34.

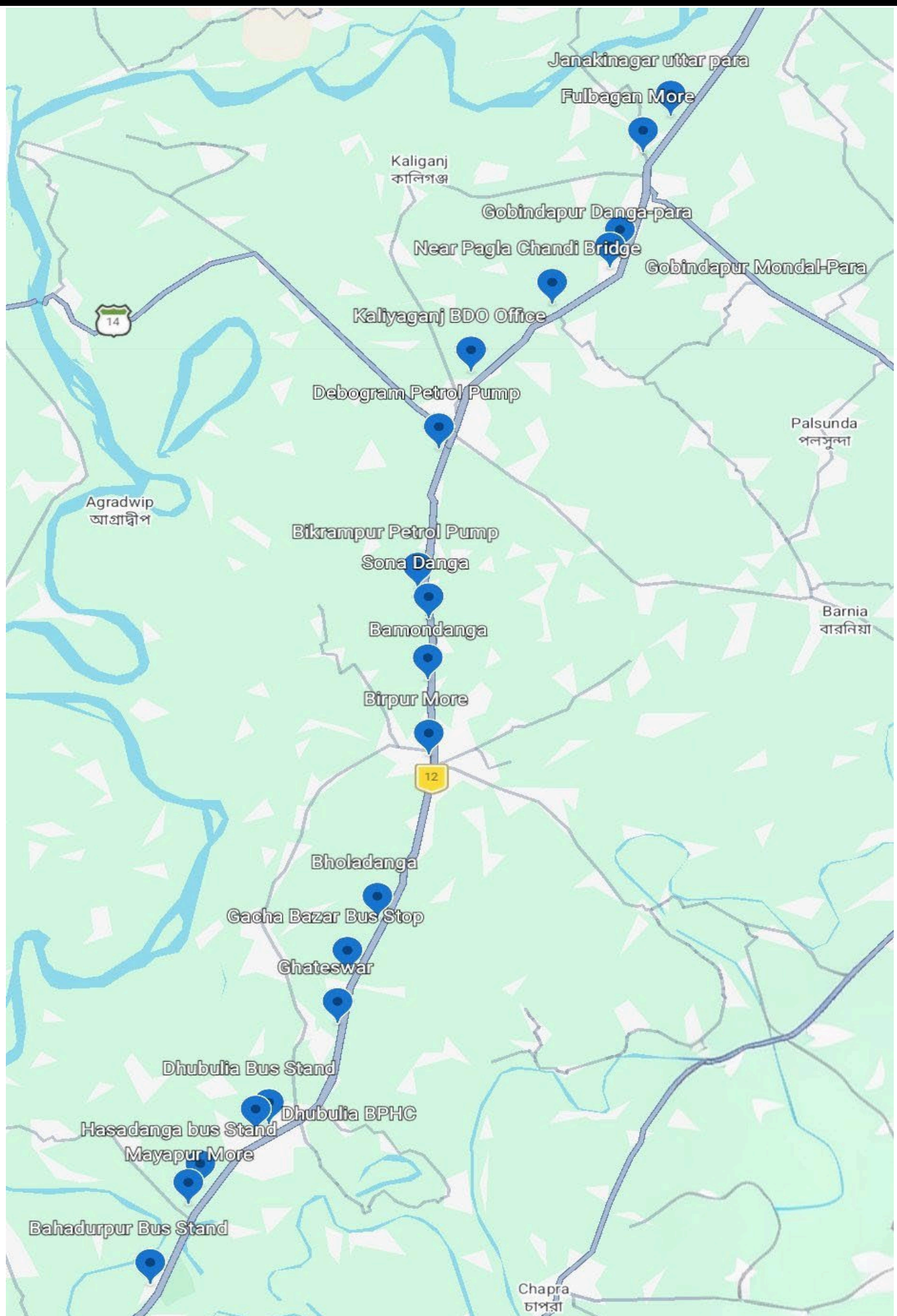
After most of the work of highway building was done many Black Spots have shown up, the speed Limit of NH-12 is 80km/h, over the last few years many accidents have occurred, to minimise and prevent future accidents NHAI stepped in with Solar high mast lights which will be installed on the black spot areas to light-up the surrounding areas. So that the percentage of accidents drops significantly.

Other than this Other PIU's like PIU - Malda and PIU - Jalpaiguri have also installed this solar High-mast Lights.



Site Locations





Project Details

Installation of 10m. long Octagonal High Mast Tower with 6 Nos. of Solar light fittings including batteries, supply of materials, erection work, labour complete as per requirement in 32 Locations at Four laning of Barajaguli- Krishnagar Section and 19 Locations in Krishnagar to Berhampore Section of NH-12 (Old NH-34). Under National Highway Authority Of india, PIU – Krishnagar

A solar high mast tower light is an advanced outdoor lighting system designed for illumination of Highway projects. The system operates completely on solar energy, providing an energy-efficient and environmentally friendly lighting solution without dependence on grid electricity.

As the Internal study says that Light intensity of 40 lux gives very good visibility without giving any eye strain to the driver which in turn decreases any probability of accidents.

The lighting arrangement is designed to meet this National Highway illumination requirement of 40 lux, ensuring proper visibility, improved road safety, and enhanced driving conditions during night hours.

Materials used in this project with Details

■ SOLAR PANELS (POLY CRYSTALLINE SOLAR MODULE): -

To implement this project, we vastly used the top manufacturers' modules with its benchmark quality & efficiency.

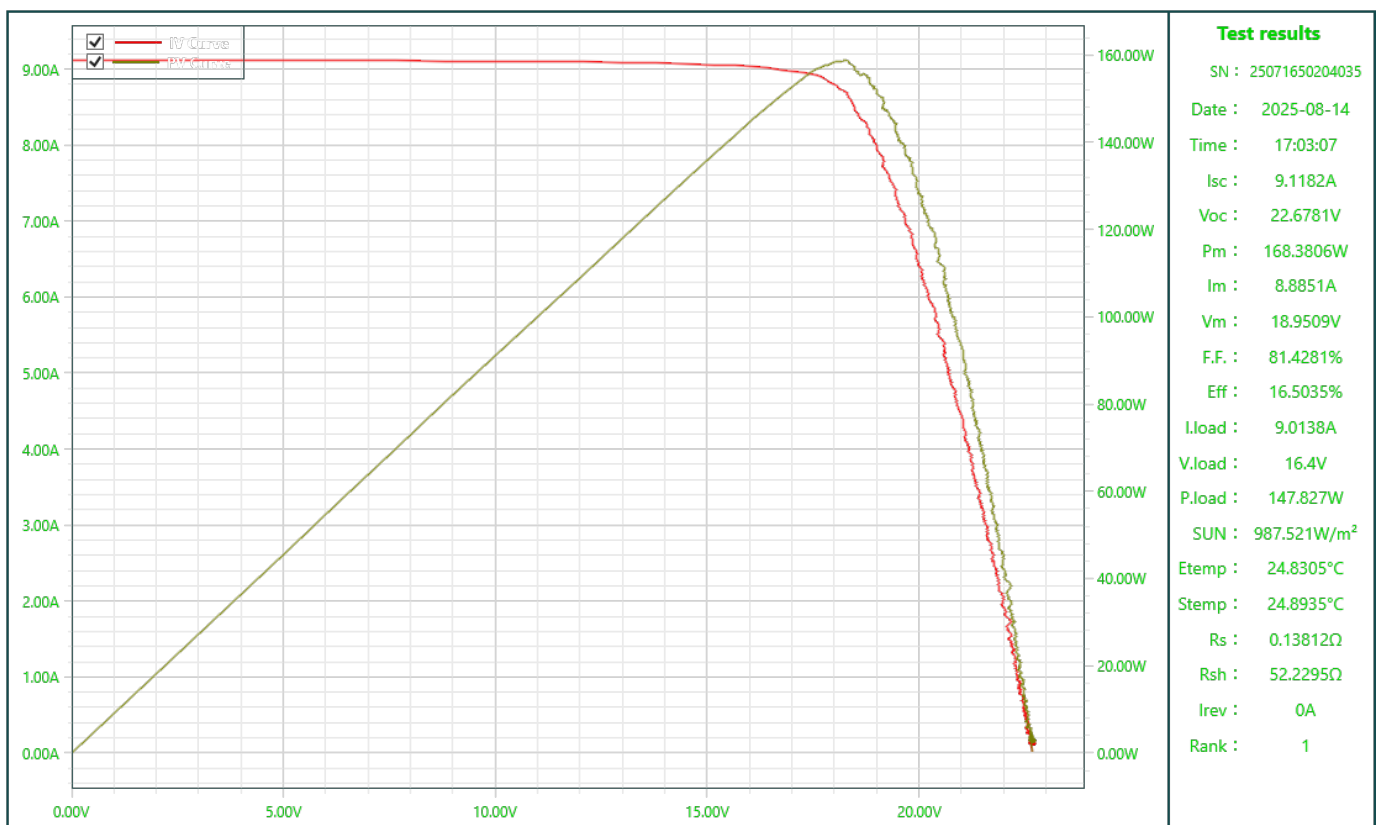
In this project we used the quality material with its genuine certificated affiliated by the MNRE, Govt. of India / IEC. The Solar Module of multi crystalline cell with min. efficiency of 15% and fill factor more than 70%, laminated between sheet of Ethylene Vinyl Acetate (EVA) and high transmissivity 3.2 mm tempered glass, framed in anodized aluminium frame.

The power output of individual PV modules used in the system, under STC. A minimum of 150-Watt peak with adequate provision for measurement tolerances. Modules supplied with the system have certificates as per **IEC61215 specification** or equivalent National or International standards. Modules qualified the **IEC 61730 part I and part II for safety qualification testing and Salt Mist Corrosion Testing as per IEC61701/IS 61701.**

Having warranty for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

Here we used 6 nos of Solar Modules which each has a capacity of **165 Wp**. Total 990 Wp module used in each of the Mast's. Total 516 no's 165 Wp Solar polycrystalline modules used in this entire project. Total $516 \times 165 = 85140$ Wp / 85.14 KWp module used regarding this combined project.

The current voltage curves (IV Curve) which located the quality of the generation of the used module with its complete data to optimize the project.



Polycrystalline Module

**36
Cells
SERIES**

- Excellent power output with +ve tolerance up to 4.8Wp
- 10 years limited product warranty
- 25 years of performance warranty*
- All the modules are PID resistant
- 100 % EL Tested
- Sustain's heavy wind load 2400 Pa
- Sustain's heavy snow load 5400 Pa

**As per standard warranty terms*



CONSTRUCTIONAL CHARACTERISTICS

- Solar PV modules are constructed with toughened, low iron and textured high light transmission glass with anti-reflective coating (ARC)
- Multi-layer tedlar-based back sheet and ultra fast cure EVA
- 15 micron anodised aluminium frame
- Pre-drilled frame for easy mounting
- IP67 rated junction box

GLOBAL CERTIFICATIONS



Certified to ISO 9001 : 2015 standard



Certified to ISO 14001 : 2015 standard



Modules assigned CE certification



R-51001686

IS 14286 : 2010 / IEC 61215 : 2005
IS / IEC 61730 (Part 1) : 2004
IS / IEC 61730 (Part 2) : 2004



IEC 61701 - Salt Mist test
IEC 62804 - PID test

HR Solar Solution (P) Limited

Registered Address : 14 NS Road, Suite no - 102, Kolkata - 700001

Factory Address : Raghudebpur, NH 6, Panchla, Block - Uluberia II, Howrah, West Bengal - 711322

Email : info@hrsolarsolution.com **Website :** www.hrsolarsolution.com **Phone :** +91 33 2243 4540

SPECIFICATIONS:

Electrical Characteristics

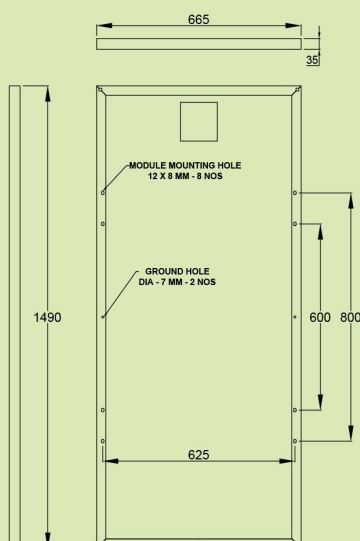
Model Name	H150P36	H160P36	H165P36
Maximum Power Pmax (Wp)	150	160	160
Open Circuit Voltage (Voc)	22.70	22.80	22.80
Optimum Operating Voltage (Vmp)	18.65	18.91	19.22
Optimum Operating Current (Imp)	8.07	8.47	8.60
Short Circuit Current (Isc)	8.60	8.92	9.15
Fill Factor (%)	77%	79%	79.25%
Module Efficiency (%)	15.19%	16.16%	16.68%
Temp Co-eff for Voc / °C (B)	-0.35%		
Temp Co-eff for Isc/ °C (a)	0.05%		
Temp Co-eff for Power/ °C (y)	-0.40%		
NOCT	45 C ± 2 C		
System Voltage (V)	600V		
Fuse rating (A)	10A		

Mechanical Characteristics

Weight (Kg)	10.6 Kg
Dimension (mm)	1490 X 665 X 35 mm
Static Load Wind/Snow	2400 Pa / 5400 Pa
Fire Rating	Class C

*Standard Test Conditions (STC) - 1000 W/m² irradiance, Air Mass 1.5 and 25°C cell temperature.

Module Frame Assembly



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HR SOLAR SOLUTION (P) LTD.

A Leading Manufacturer of Solar Photovoltaic Modules

DEALERSHIP CERTIFICATE

We, M/s. HR Solar Solution Pvt. Ltd. is pleased to appoint
M/s SUSTAINABLE POWER ENGINEERING & SOLUTIONS

(6/8, Kshetra Hazra Lane . P.O& PS- Berhampore)

Dist- Murshidabad, West Bengal, Pin- 742101

as our Authorized Dealer of Solar PV Modules to attend Direct Sales and Government Tender
from April 2025 to March 2026.



Authorized Signatory

HR SOLAR SOLUTION (P) LTD.

Registered Office: 14 NS Road, 1st Floor, Room No -102, Kolkata – 700 001, West Bengal, India

Factory Address : Fortune Industrial Park, NH-6, Panchla, Uluberia - II, Howrah - 711322, West Bengal, India

Contact : +91 33 2243 4540, E-mail: info@hrsolarsolution.com

Web: www.hrsolarsolution.com



TEST VERIFICATION OF CONFORMITY

Verification No. : SHG20060043-V1

HR SOLAR SOLUTION PVT. LTD.

Name And Address
Of The Applicant:

RAGHUDEBPUR, PANCHLA, NH-6,
BLOCK-ULUBERIA-II, HOWRAH – 711322, WEST
BENGAL, INDIA

HR SOLAR SOLUTION PVT. LTD.

Name And Address
Of The Manufacturer:

RAGHUDEBPUR, PANCHLA, NH-6,
BLOCK-ULUBERIA-II, HOWRAH – 711322, WEST
BENGAL, INDIA

Name Of Product: Photovoltaic (PV) Modules

Model reference: See additional information in Appendix

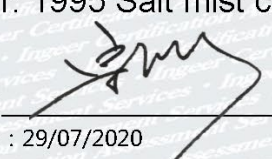
Brand Name:



Standards: IEC 61701: 1995

Report No. SHG20060043

has been assessed and registered as meeting the requirements of
IEC 61701: 1995 Salt mist corrosion testing of photovoltaic (PV) modules

Signed by : 

Approval Date : 29/07/2020

Shanghai Ingeer Certification Assessment Co.,Ltd.

CNCA Authorized No.: CNCA-R-2003-117

Tel: 400-182-9001/+86 21-51114700

Web: www.icas.org.cn

Add: Room 801, HuaDing Mansion, 2368# West Zhongshan Rd.,

Xuhui District, Shanghai, China, 200235



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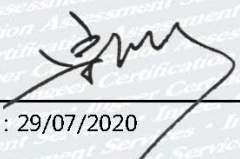


The ownership of the certificate belongs to Shanghai Ingeer Certification Assessment Co., Ltd. and the information is available on the CNCA website: WWW.CNCA.GOV.CN. The validation of the certificate can also be checked either through ICAS website or by calling ICAS customer services department. The certificate is only valid when used within the approved administrative and qualification scope as well as within its valid date. The certified organization shall accept annual surveillance audit regularly once issued the certificate in order to maintain the validity of the certificate. ICAS has rights to withdraw the certificate if the enterprise fails to effectively maintain the above product standards/technical requirements.



This is an Appendix to Test Verification of Conformity Number: SHG20060043-V1

Model/Type reference H10 – 10WP, H20 – 20WP, H30 – 30WP, H40 – 40WP,
H50 – 50WP, H60 – 60WP, H600 – 60WP, H75 – 75WP,
H80-80WP, H100 – 100WP, H110 – 110WP,
H125 – 125WP, H135 – 135WP,
H150 – 150WP / 155WP / 160WP / 165WP,
H1500 – 150WP / 155WP / 160WP / 165WP,
H200 – 200WP / 210WP / 215WP,
H230 – 230WP / 235WP / 240WP / 245WP,
H250 – 250WP / 255WP / 260WP / 265WP / 270WP / 275WP,
H2500 – 250WP / 255WP / 260WP / 265WP / 270WP / 275WP,
H300 – 300WP / 305WP / 310WP / 315WP / 320WP / 325WP /
330WP / 335WP / 340WP

Signed by : 

Approval Date : 29/07/2020

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First Surveillance Audit

Second Surveillance Audit

Third Surveillance Audit

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PRODUCT WARRANTY CERTIFICATE

Customer name	Sustainable Power Engineering & Solutions
Invoice No & Date	HR-G/25-26/0883
Model	165WP
Quantity	354 PCS

Five (5) Year Limited Product Warranty:

Subject to the exclusions contained below, ("HR Solar Solution Pvt Ltd ") warrants to the original buyer (the "Buyer") that the modules shall be free from any material defects and workmanship that have an effect on module functionality under normal application, installation, use and service conditions as specified in HR Solar Solution Pvt Ltd standard product documentation.

HR Solar Solution Pvt Ltd guarantees that the module will maintain the mechanical integrity and stability in accordance with approved operation methods described in our installation instructions; the glass of a module will maintain its integrity provided there are no indications of localized impacts or external forces; and that the cable and connector plug of a module will remain safe and operational provided modules are professionally installed.

Any damages caused by abrasion, improper installation or animals are exempt from this warranty.

If during the Term of Warranty, the Module(s) is / are found to be having Manufacturing Defects, then HR Solar Solution Pvt Ltd will, at its sole discretion either (i) repair, (ii) replace such Module with similar Module, (iii) refund the purchase price of the module without interest or any charge, as measured by considering 5% depreciation per year on original purchase price or the then prevailing price of similar Module whichever is lower, provided that the then prevailing price does not exceed the Original Sale Price at which HR Solar Solution Pvt Ltd has sold the Product (iv) provide supplementary Module free of charge to the purchaser, for the balance Term of Warranty.

This limited warranty is only for the Product and does not warrant the level of power output. This warranty is subject to Warranty Exclusions and Limitations. Any color change on module or any other changes on module appearance does not represent defect in material and/or workmanship unless it affects the performance of the module.



CIN Number – U40108WB2011PTC162243

Registered Address – 14 NS Road, First floor, Suite number – 102, Kolkata – 700001

Website – www.hrsolarsolution.com

E-mail – info@hrsolarsolution.com



Twenty Five (25) Years Limited Performance Warranty:

HR Solar Solution Pvt Ltd guarantees that for a period of twenty-five years the module will maintain a performance as set forth below:

- 90% of rated power output for 10 years
- 80% of rated power output for the remaining 15 years

The actual power output of the module shall be determined for verification using Standard Testing Conditions only. The actual power output measurement is either carried out at HR Solar Solution Pvt Ltd facility or by a HR Solar Solution Pvt Ltd recognized 3rd party testing institute. Testing equipment tolerances will be applied to all actual power output measurements.

If the product fails to conform to this warranty, HR Solar Solution Pvt Ltd will, at its option, either repair or replace the product, or provide an appropriate residual market value of the product(s) as compensation to the buyer.

Warranty Effective Date:

The warranty effective date shall be defined as the date of invoice to the buyer.

Exclusions:

1. In no event, shall HR Solar Solution Pvt Ltd be liable, or in any way responsible, for damages or defects in the product which were caused by:

- a) Repairs or attempted repairs performed by anyone other than the company or any of its authorized service agents
- b) Exposure to extraordinary salt or chemical exposure
- c) Flood, fire, direct or indirect lightning strikes
- d) Improper installation, application or alteration
- e) Any other act of nature which is beyond HR Solar Solution Pvt Ltd control

2. Warranty claims will not apply if the product label, type or serial number of the applicable product has been altered, removed or made illegible.

Note:

Unless otherwise required by any mandatory applicable law, the limited warranties do not cover any transportation costs for return modules, or for reshipment of any repaired or replaced module, or any other cost associated with installation, removal or reinstallation of modules.

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HR SOLAR SOLUTION

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Sl No	H165P36-165WP
241	25081650205453
242	25081650205454
243	25081650205455
244	25081650205456
245	25081650205457
246	25081650205458
247	25081650205459
248	25081650205460
249	25081650205461
250	25081650205462
251	25081650205463
252	25081650205464
253	25081650205465
254	25081650205466
255	25081650205467
256	25081650205468
257	25081650205469
258	25081650205470
259	25081650205471
260	25081650205472
261	25081650205473
262	25081650205474
263	25081650205475
264	25081650205476
265	25081650205477
266	25081650205478
267	25081650205479
268	25081650205480
269	25081650205481
270	25081650205482



HR SOLAR SOLUTION

building a greener future

Sl No	H165P36-165WP
271	25081650205483
272	25081650205484
273	25081650205485
274	25081650205486
275	25081650205487
276	25081650205488
277	25081650205489
278	25081650205490
279	25081650205491
280	25081650205492
281	25081650205493
282	25081650205494
283	25081650205495
284	25081650205496
285	25081650205497
286	25081650205498
287	25081650205499
288	25081650205500
289	25081650205501
290	25081650205502
291	25081650205503
292	25081650205504
293	25081650205505
294	25081650205506
295	25081650205507
296	25081650205508
297	25081650205509
298	25081650205510
299	25081650205511
300	25081650205512

Sl No	H165P36-165WP
301	25081650205513
302	25081650205514
303	25081650205515
304	25081650205516
305	25081650205517
306	25081650205518
307	25081650205519
308	25081650205520
309	25081650205521
310	25081650205522
311	25081650205523
312	25081650205524
313	25081650205525
314	25081650205526
315	25081650205527
316	25081650205528
317	25081650205529
318	25081650205530
319	25081650205531
320	25081650205532
321	25081650205533
322	25081650205534
323	25081650205535
324	25081650205537
325	25081650205538
326	25081650205539
327	25081650205540
328	25081650205541
329	25081650205542
330	25081650205543

Sl No	H165P36-165WP
331	25081650205545
332	25081650205546
333	25081650205547
334	25081650205548
335	25081650205549
336	25081650205550
337	25081650205551
338	25081650205553
339	25081650205554
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341	25081650205556
342	25081650205557
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344	25081650205560
345	25081650205561
346	25081650205562
347	25081650205564
348	25081650205565
349	25081650205566
350	25081650205567
351	25081650205568
352	25081650205569
353	25081650205570
354	25081650205571



CIN Number – U40108WB2011PTC162243
Registered Address – 14 NS Road, First floor, Suite number – 102, Kolkata – 700001
Website – www.hrsolarsolution.com
E-mail – info@hrsolarsolution.com

■ **SOLAR BATTERY (LITHIUM IRON PHOSPHATE (LIFEPO4)):-**

What is the benefit of generating high-density energy if it cannot be efficiently harnessed and stored for reliable usage? A solar power system is only as dependable as its energy storage solution. That is why we source our battery systems from some of India's leading battery-bank manufacturers, who are not only experts in advanced solar battery technology but are also pioneers in high-performance EV battery manufacturing.

For this project, we have used customized 12.8V 60Ah Lithium Iron Phosphate (LFP) solar batteries integrated with an advanced Smart Battery Management System (BMS). The Smart BMS incorporated in the system belongs to one of the world's most trusted and proven technology platforms, ensuring superior operational safety, performance, and long-term reliability.

LFP battery technology offers significant advantages over conventional battery systems,

- Excellent thermal stability,
- higher charging efficiency,
- deeper discharge capability,
- low maintenance requirements,
- longer operational life.

BATTERY PACK PERFORMANCE

Working Voltage

Rated V:12.8

V Range: 10.8-14.6V

Rated Capacity

60Ah

Battery Power

25°C

768 Wh (100%DOD @ 0.2C rate)

Operating Temperature Range

-10°C to -50°C

Continuous Charge Current (A)

8A

Max. Continuous Charge Current (A)

10.5A

Continuous Discharge Current (A)

10A

Max. Continuous Discharge Current (A)

13.5A

Storage Temp. Range (recommended)

Optimal <35°C

Weight

6kg.

Self Discharge

30days

Cycle Life

More than 2000 times

BATTERY PACK CONSTRUCTION

BatteryPack 12.8V 60Ah is made by 4S10P, 40pcs of 32700-6Ah battery cells, charge and discharge with same port

PCB DATA		
Overcharge Protection	Single cell's over charge protection voltage (V)	3.90±0.025V
	Single cell's over charge remove voltage (V)	3.80±0.05V
Charge Protection	Rated Charge Current (A)	≤15A
	Charge Protection Current	/
Over Discharge Protection	Single cell's over discharge protection voltage (V)	2.0±0.1V
	Single cell's over discharge remove voltage (V)	2.3±0.1V
	Rated discharge Current (A)	≤10.5A
	Discharge Protection Current (A)	≤15A
Short Protection	Short Circuit Protection	YES
	Short Circuit Protection Resume Condition	Disconnect the load
Temperature Protection	Over-Temperature Protection Temperature	60°C
	Resume Temperature/Time	50±5°C/2ms
Balance	Balanced Voltage (V)	3.55
	Balanced Current (mA)	50-70mA
Interior Resistance	B-,P- breakover Interior Resume (m) _Ω	≤5mΩ
Current Consumption	Self-consumption (uA)	≤30uA
Dimensions		170 X 150 x 135 mm

Here we used 516 Nos of Solar Battery capable of storing 396.23 Kwh of Energy (12.8V X 60Ah= 768Wh X 516Nos Battery =396288 Wh/1000 = 396.23Kwh)

The battery-Pack supplied with the project comes with an industry-leading 5-year warranty and an operational life exceeding 2000 charge-discharge cycles at 80% Depth of Discharge (DOD), ensuring dependable long-term performance with minimal maintenance requirements.



भारतीय मानक ब्यूरो

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

BUREAU OF INDIAN STANDARDS

(Ministry of Consumer Affairs, Food & Public Distribution,
Govt. of India)

मानक भवन, 9 बहादुर शाह जफर मार्ग, नई दिल्ली - 110002
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi - 110002
दूरभाष/Phone: +91-11-23230856/2323010131/23233375/23239402
ई-मेल/E-mail: registration@bis.gov.in
वेबसाइट/Website: <https://bis.gov.in/>, <https://www.crsbis.in/BIS/>

Our Ref: REGISTRATION /CRS-2021-4174/R-81009350

Dated: 2025-09-12
02:14:33

RENEWAL ID : 35500

Subject : RENEWAL OF LICENCE R-81009350 AS PER IS 16046 (Part 2) : 2018 / IEC 62133-2 : 2017

Inverted Energy Pvt Ltd
D-28, SECTOR-63, NOIDA, GAUTAM BUDDHA NAGAR
Uttar Pradesh, India, 201301



Dear Sir/Madam,

This has reference to your BIS Self Declaration of Conformity Registration No. R-81009350, held by you, for SEALED SECONDARY CELLS/BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES FOR USE IN PORTABLE APPLICATIONS PART 2 LITHIUM SYSTEMS which was valid upto **08-07-2025**.

As you are aware that renewal of your Registration was deferred due to the non-receipt of renewal application & fees. In view of receipt of renewal application & fees on 12-09-2025, Competent Authority of BIS has decided to renew your above referred Registration for 2 years i.e. from 09-07-2025 to 08-07-2027. It has also been decided to allow you to resume marking on your article as per marking guidelines of the above referred Registration with immediate effect.

It may please be noted that your registration shall *expire* at the end of the above mentioned period. You are, therefore, requested to send your renewal application along with fees for its renewal within three month before the expiry of the Registration.

Thanking you.

Yours faithfully,

Registration Department
Bureau of Indian Standards,
9, Bahadur Shah Zafar Marg,
New Delhi-110002.
Telfax : +91-11-23230856
E-mail: registration@bis.gov.in

Note: This is a system generated letter. Hence signature is not required.
To verify authentication of letter, kindly scan the QR code on this letter.

INTERNAL TEST REPORT

Model No.	INV LFP 1260							
Battery Serials No.								
Offered Quantity	30							
Customer Name	Sustainable Power Engineering & Solutions							
Customer Address								
	Charging				Discharging			
Serials No.-1	Time	Current	Voltage	Capacity	Time	Current	Voltage	Capacity
INXTXI126000013	00:00:00	12.00148	13.4672	0.00000	03:08:15	-12.00148	12.9712	0.10001
	01:00:00	11.99776	13.7214	11.99795	04:00:15	-12.00148	12.8596	10.50091
	02:00:27	11.99776	13.9322	24.08904	05:00:15	-12.00520	12.6984	22.50284
	02:57:45	0.09114	14.9863	35.54502	06:00:15	-12.00148	12.5310	34.50522
					07:00:15	-12.00148	12.1403	46.50697
					07:37:45	-12.00148	10.1128	60.00786
Serials No.-2	Time	Current	Voltage	Capacity	Time	Current	Voltage	Capacity
INXTXI126000008	00:00:00	12.00148	13.5672	0.00000	03:08:15	-12.00248	12.9712	0.10001
	01:00:00	11.99776	13.7314	11.98795	04:00:15	-12.00148	12.8596	10.50091
	02:00:27	11.99776	13.8322	24.09904	05:00:15	-12.00620	12.6984	22.51284
	02:57:45	0.09114	14.9763	35.55502	06:00:15	-12.00148	12.5410	34.50522
					07:00:15	-12.00148	12.1403	46.50697
					07:37:45	-12.00148	10.1228	60.04786
	Charging				Discharging			
Serials No.-3	Time	Current	Voltage	Capacity	Time	Current	Voltage	Capacity
INXTXI126000015	00:00:00	12.00148	13.5672	0.00000	03:08:15	-12.00148	12.9012	0.10001
	01:00:00	11.99776	13.7514	11.89795	04:00:15	-12.00148	12.9596	10.50191
	02:00:27	11.99776	13.7322	24.08904	05:00:15	-12.00520	12.6984	22.53284
	02:57:45	0.09114	14.8863	35.84502	06:00:15	-12.00148	12.7310	34.50522
					07:00:15	-12.00148	12.1403	46.50697
					07:37:45	-12.00148	10.2128	60.09786
	Charging				Discharging			
Serials No.-4	Time	Current	Voltage	Capacity	Time	Current	Voltage	Capacity
INXTXI126000024	00:00:00	12.00148	13.4672	0.00000	03:08:15	-12.00148	12.9712	0.10001
	01:00:00	11.99776	13.7214	11.93795	04:00:15	-12.00148	12.8596	10.50031
	02:00:27	11.99776	13.9322	25.08904	05:00:15	-12.00520	12.6984	22.50384
	02:57:45	0.09114	14.7863	34.84502	06:00:15	-12.00148	12.5310	34.50522
					07:00:15	-12.00148	12.1403	46.50697

					07:37:45	-12.00148	10.1128	60.40786
	Charging				Discharging			
Serials No.-5	Time	Current	Voltage	Capacity	Time	Current	Voltage	Capacity
INXTX1126000010	00:00:00	12.00148	13.4672	0.00000	03:08:15	-12.00148	12.9712	0.10001
	01:00:00	11.99776	13.7214	11.99795	04:00:15	-12.00148	12.8596	10.50091
	02:00:27	11.99776	13.9322	25.08904	05:00:15	-12.00520	12.6984	22.50284
	02:57:45	0.09114	14.8863	35.94502	06:00:15	-12.00148	12.5310	34.70522
					07:00:15	-12.00148	12.1403	46.60697
					07:37:45	-12.00148	10.1128	60.30786

For INVERTED ENERGY PVT. LTD.

For Inverted Energy Private Limited


Raghav Janki, Authorised Signatory

■ **DC FLOOD LIGHT (60W @ 12V DC):-**

The main objective of any Solar High-Mast Lighting System is to provide sufficient illumination so that the intended roadway or highway corridor is illuminated as per prescribed lighting and safety norms. Proper roadway lighting improves night-time visibility, enhances driver safety, and reduces the risk of accidents. In this project, the lighting system has been designed to deliver high illumination with maximum energy efficiency and long-term reliability.

For this installation, we have used a 12V DC 60W high-efficiency super bright LED solar luminaire capable of producing bright and uniform illumination with very low power consumption. To achieve maximum brightness with minimum energy usage, the luminaire uses premium-grade Philips/Osram LED chips known for high luminous efficacy and long operational life.

As per the LM-79 photometric test conducted under IS 16106/IES LM-79-08 standards, the luminaire delivers a total luminous flux of 7249.20 lumens with a luminous efficacy of 120.8 lumens per watt, ensuring excellent lighting performance and energy efficiency. The luminaire also provides a beam angle of 86.5° for wide and uniform roadway illumination.

The light is fitted with an intelligent dusk-to-dawn controller that automatically switches ON at sunset and OFF at sunrise, enabling fully autonomous operation without manual intervention. Additionally, the system incorporates a highly efficient solar charge controller capable of charging the battery at up to 10A charging current while providing protection against overcharging, deep discharge, and reverse polarity.

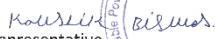
The complete lighting system is BIS Certified, ensuring compliance with Indian lighting performance standards. These certifications confirm the luminaire's quality, safety, photometric performance, and suitability for critical highway lighting applications.

LIGHT ILLUMINATION TEST REPORT

Name of Work	Installation of 10m. long Octagonal High Mast Tower with 6 Nos. of Solar light fittings including batteries, supply of materials, erection work, labour complete as per requirement in 32 Locations at Four Laning of Barajaguli-Krishnagar Section and 19 Locations in Krishnagar to Berhampore Section of NH-12 (Old NH-34).
Contractor	M/s Sustainable Power Engineering & Solution

Date :10.01.2026

SL. NO.	CHAINAGE	Illumination Level Obtained (in Lux) from Highmast Light (Vertical on Road)				Illumination Level Obtained (in Lux) from Highmast Light (Horizontal on Road)				Minimum illumination Level Required (in Lux)	Remarks
		SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.	SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.		
1	163+170	LHS	217	101	54		220	105	55	40 Lux	Towards Berhampore
2	163+170	RHS	210	98	44		212	103	45		Towards Krishnagar
3	161+530	On Median	197	88	43		223	90	44		
4	161+530	On Median	198	90	44		222	89	43		
5	157+990	RHS	215	98	50		219	102	53		Towards Krishnagar
6	157+280	On Median	196	84	40		219	91	42		
7	155+080	On Median	199	86	45		216	87	45		
8	155+080	On Median	198	87	47		226	88	45		
9	151+300	On Median	192	82	45		224	83	43		
10	148+500	On Median	195	86	43		214	87	42		
11	143+440	On Median	197	91	41		210	92	44		
12	142+280	LHS	215	102	54		217	103	55		Towards Berhampore
13	142+280	RHS	218	100	55		220	101	57		Towards Krishnagar
14	140+130	On Median	198	89	40		224	90	41		
15	137+400	LHS	220	105	57		222	108	58		Towards Berhampore
16	131+200	LHS	218	102	56		220	105	57		Towards Berhampore
17	131+200	RHS	226	106	56		227	109	57		Towards Krishnagar
18	129+120	LHS	224	105	52		225	107	58		Towards Berhampore
19	127+250	LHS	219	104	56		221	107	57		Towards Berhampore
20	127+250	RHS	220	105	54		223	107	58		Towards Krishnagar
21	122+870	LHS	219	101	52		222	106	53		Towards Berhampore
22	122+870	RHS	217	98	49		219	99	50		Towards Krishnagar
23	122+350	On Median	189	88	41		197	91	42		
24	119+650	On Median	194	91	42		217	95	44		
25	119+000	LHS	224	105	53		227	107	55		Towards Berhampore
26	119+000	RHS	227	106	56		231	112	57		Towards Krishnagar
27	115+950	LHS	225	106	54		229	109	56		Towards Berhampore
28	115+950	RHS	220	105	51		227	107	54		Towards Krishnagar

Tested By: 
Contractor's Representative



Witnessed By:
AE's Representative

LIGHT ILLUMINATION TEST REPORT

Name of Work	Installation of 10m. long Octagonal High Mast Tower with 6 Nos. of Solar light fittings including batteries, supply of materials, erection work, labour complete as per requirement in 32 Locations at Four Laning of Barajaguli-Krishnagar Section and 19 Locations in Krishnagar to Berhampore Section of NH-12 (Old NH-34).
Contractor	M/s Sustainable Power Engineering & Solution

Date :12.01.2026

SL. NO.	CHAINAGE	Illumination Level Obtained (in Lux) from Highmast Light (Vertical on Road)				Illumination Level Obtained (in Lux) from Highmast Light (Horizontal on Road)				Minimum illumination Level Required (in Lux)	Remarks
		SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.	SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.		
1	98+580	LHS	218	102	55		221	106	56	40 Lux	Towards Barajaguli
2	98+580	RHS	215	104	51		219	105	53		Towards Krishnagar
3	96+300	On Median	194	87	40		221	104	48		
4	96+300	On Median	196	89	41		218	102	42		
5	94+700	On Median	198	90	41		214	100	42		
6	94+420	On Median	199	88	40		218	99	41		
7	94+170	On Median	200	91	43		225	102	44		
8	94+000	LHS	224	103	52		225	103	55		Towards Barajaguli
9	94+000	RHS	223	102	51		224	102	52		Towards Krishnagar
10	92+920	LHS	220	101	52		223	103	52		Towards Barajaguli
11	92+920	RHS	219	102	54		224	103	54		Towards Krishnagar
12	91+300	On Median	194	88	43		215	101	43		
13	84+600	LHS	215	102	54		216	103	55		Towards Barajaguli
14	84+600	RHS	216	101	56		218	102	56		Towards Krishnagar
15	83+250	LHS	220	105	57		222	108	58		Towards Barajaguli
16	83+250	RHS	218	102	56		220	105	57		Towards Krishnagar
17	82+540	LHS	226	106	56		227	109	57		Towards Barajaguli
18	79+380	On Median	195	98	43		219	103	43		
19	79+240	On Median	194	92	42		216	105	41		
20	74+840	On Median	198	96	45		215	102	40		
21	74+760	On Median	196	94	42		218	103	42		
22	74+680	On Median	194	92	41		214	104	43		
23	74+250	On Median	191	90	40		218	100	45		
24	73+820	On Median	189	87	40		198	98	40		

Tested By: 
Contractor's Representative



Witnessed By:
AE's Representative

LIGHT ILLUMINATION TEST REPORT

Name of Work	Installation of 10m. long Octagonal High Mast Tower with 6 Nos. of Solar light fittings including batteries, supply of materials, erection work, labour complete as per requirement in 32 Locations at Four Laning of Barajaguli-Krishnagar Section and 19 Locations in Krishnagar to Berhampore Section of NH-12 (Old NH-34).
Contractor	M/s Sustainable Power Engineering & Solution

Date :11.01.2026

SL. NO.	CHAINAGE	Illumination Level Obtained (in Lux) from Highmast Light (Vertical on Road)				Illumination Level Obtained (in Lux) from Highmast Light (Horizontal on Road)				Minimum illumination Level Required (in Lux)	Remarks
		SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.	SIDE	At 0 Mtrs.	At 4 Mtrs.	At 8 Mtrs.		
1	73+600	On Median	191	92	42		214	100	42	40 Lux	
2	73+100	On Median	194	95	43		217	102	43		
3	72+430	LHS	216	102	52		218	102	55		Towards Barajaguli
4	72+430	RHS	215	103	53		217	101	54		Towards Krishnagar
5	70+500	LHS	218	108	56		220	107	58		Towards Barajaguli
6	70+500	RHS	219	107	58		225	104	57		Towards Krishnagar
7	69+800	On Median	193	96	44		216	89	44		
8	68+900	On Median	194	98	45		218	103	46		
9	67+950	LHS	217	102	54		221	103	56		Towards Barajaguli
10	67+950	RHS	216	102	55		220	103	57		Towards Krishnagar
11	67+420	LHS	214	101	54		219	103	58		Towards Barajaguli
12	67+420	RHS	216	103	57		221	105	57		Towards Krishnagar
13	64+700	On Median	191	97	42		219	102	43		
14	64+530	On Median	198	101	43		222	103	45		
15	64+310	On Median	197	91	40		216	97	41		
16	63+700	On Median	194	98	41		219	104	47		
17	63+700	On Median	198	97	43		214	102	45		
18	63+410	On Median	197	98	42		216	104	48		
19	59+270	LHS	220	102	52		223	103	53		Towards Barajaguli
20	59+270	RHS	221	102	53		224	103	56		Towards Krishnagar
21	57+950	LHS	225	104	55		227	104	55		Towards Barajaguli
22	57+950	RHS	224	103	55		226	106	56		Towards Krishnagar
23	51+550	LHS	225	105	56		226	105	57		Towards Barajaguli
24	51+550	RHS	226	106	56		227	109	57		Towards Krishnagar

Tested By: 
Contractor's Representative



Witnessed By:
AE's Representative

**TEST REPORT**

Page: 1 of 4

TEST REPORT AS PER: IS 16106/IES LM-79-08

TEST REPORT NO.:	HT/250802/0014	DISCIPLINE:	Photometry
ULR NO.:	TC1394225000002308F	GROUP:	Luminaries
DATE OF SAMPLE RECEIPT:	02/08/2025		
TEST START DATE:	02/08/2025		
TEST END DATE:	02/08/2025		
DATE OF ISSUE:	04/08/2025		
NAME OF LABORATORY:	HT Product Services Private Limited		
ADDRESS OF LABORATORY:	B-78 (Basement, First, Fourth and Fifth Floor) Sector-5, Noida, Gautam Buddha Nagar-201301, Uttar Pradesh		
CUSTOMER NAME:	ANANTA EQUIPMENTS		
CUSTOMER ADDRESS:	6/C, BIPRA DAS STREET KOLKATA-700009 (WEST, BENGAL)		

PART A - PARTICULARS OF THE SAMPLE SUBMITTED

NATURE OF SAMPLE	SOLAR FLOOD LIGHT
Grade/ Variety/ Type/ Class/ Size etc.	12VDC, 60W,6500K
Declared Values, if any (declared by the manufacturer).	12VDC, 60W,6500K
Code no./ Sr. No.	Nil
Brand Name/Trademark	
Batch no., Date of manufacture	Nil
Model No.	Nil
Quantity of Samples	1No
Condition of the Sample when received.	OK
Standard Specification (s).	IS 16106/IES LM-79-08
Environmental Conditions.	Temperature: (25±1) °C & Relative Humidity <65%
TEST RESULT	The test was performed in accordance with IESLM-79-08, and the results have been reported accordingly
Remarks	Compliance statement in this report has been made considering decision rule as inherent in its test standard and latest version of ILAC-G-8.

PART B - SUPPLEMENTARY INFORMATION

1. This test report is valid only for the sample(s) tested in our laboratory.
2. The test report is not permitted to be duplicated /reproduced in part or in extract in any circumstances.
3. HTPSPL lab is not responsible for authenticity of photocopied or reproduced test reports.
4. The test results reported in this report are valid at the time of and under the stated conditions of measurements
5. This test report shall not be utilized for any legal purpose and shall not be produced in the court of law & no responsibility would be attached to HTPSPL Lab.

Tested By	Approved by / Authorized Signatory:	Issued By
		
Testing Engineer (Amit Sharma)	Technical Manager (Sabrez Khan)	Technical Manager (Sabrez Khan)
Date: 04/08/2025	Date: 04/08/2025	Date: 04/08/2025





Test Report No.: HT/250802/0014	Test Standard	Date of Issue: 04/08/2025
ULR No.: TC1394225000002308F	IS 16106/IES LM-79-08	Page: 2 of 4

PART C – TEST RESULT**Test Results:**

S. No.	TESTS WITH CLAUSE REFERENCE		SPECIFIED REQUIREMENT	RESULTS
1.	Photometric Results (IES LM-79-08)	i)	Total Luminous Flux	7249.20lm
		ii)	Luminous Efficacy	120.8lm/W
		iii)	Beam Angle	86.5 degree
		iv)	Luminous intensity distribution	Graph Attached
		v)	Chromaticity Co-ordinates	x= 0.3128 y= 0.3291
		vi)	Correlated Color Temperature	6542K
		vii)	Color Rendering Index	70.0
2.	Electrical Results (IES LM-79-08)	i)	Input Power	60.01W
		ii)	Input Voltage	12.08VDC
		iii)	Input Current (Amps)	4.97A
		iv)	Power Factor	--
		v)	Input Frequency (Hertz)	--
3.	Additional Parameters	i)	Stabilization time	45 min
		ii)	Photometric Method Used	IES LM-79-08 Using C type- Goniophotometer

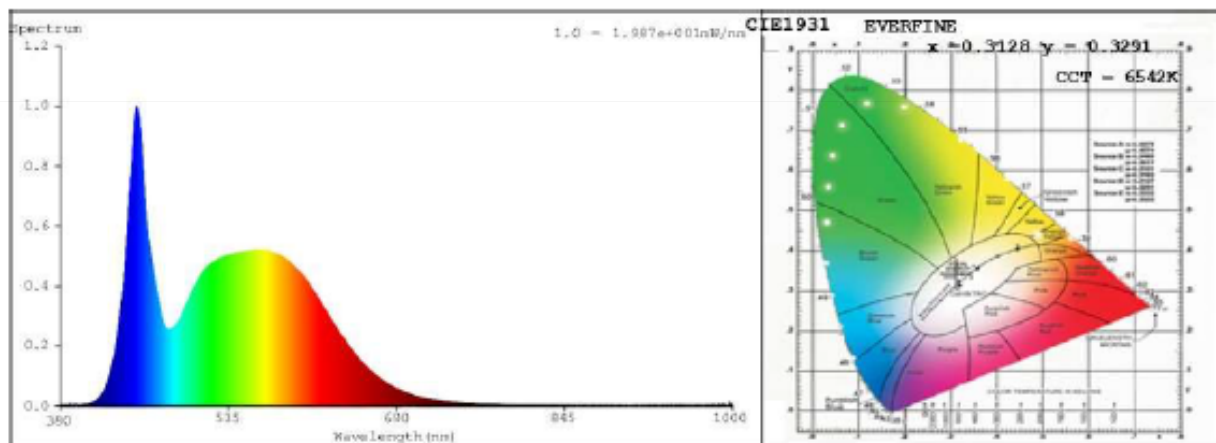




Test Report No.: HT/250802/0014	Test Standard	Date of Issue: 04/08/2025
ULR No.: TC1394225000002308F	IS 16106/IES LM-79-08	Page: 3 of 4

PART C – TEST RESULT

Spectral Parameter



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.3128$ $y = 0.3291$ / $u' = 0.3982$ $v' = 0.5689$ ($duv = 8.76e-03$)

CCT= 6542K Prcp WL: $L_d = 678.4 \text{ nm}$ Purity=13.7%

Peak WL: $L_p = 549 \text{ nm}$ FWHM: $= 36.2 \text{ nm}$ Ratio: R=23.1% G=63.8% B=6.4%

Render Index: $R_a = 70.0$ AvgR = 71.0

R1 =62 R2 =65 R3 =75 R4 =76 R5 =71 R6 =61 R7 =80

R8 =70 R9 =1 R10=82 R11=87 R12=69 R13=85 R14=88 R15=93

TLCI Parameters: TLCI = 87.9





Test Report No.: HT/250802/0014	Test Standard	Date of Issue: 04/08/2025
ULR No.: TC1394225000002308F	IS 16106/IES LM-79-08	Page: 4 of 4

PHOTOGRAPH



*** END OF TEST REPORT ***





Certificate of Compliance

We hereby declare that the technical file of product complied with the requirement of Low Voltage Directive(LVD) 2014/35/EU.

Name : ANANTA EQUIPMENTS

Address : 6C FIRST FLOOR, BIPRADAS STREET, WARD NO - 28, KOLKATA - 700009, WEST BENGAL, INDIA.

Product : MANUFACTURING OF SOLAR INBUILT STREET LIGHT, SOLAR LANTERN, SOLAR HOME LIGHTING SYSTEM, SOLAR FAN AND LITHIUM BATTERY PACK

The Certification body has performed an audit of the above product quality system covering the design, manufacture and final inspection of the certified product. The quality system has been assessed, approved and is subject to continuous surveillance according to Low Voltage Directive(LVD) 2014/35/EU.

This certificate is issued under the following conditions:

1. It applies only to the quality system maintained in the manufacture of above referenced models and it does not substitute the design or type-examination procedures, if requested.
2. The certificate remains valid until the manufacturing conditions or the quality systems are changed.
3. The certificate validity is conditioned by positive results or surveillance audits.
4. After fulfilling the relevant EU legislation, the manufacturer shall affix to each device, of the referenced models.
5. The CE mark as shown above can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of conformity and compliance with all relevant EC Directives. The statement is based on a single evaluation of one sample of above mentioned product. It does not imply an assessment of the whole production

Certificate Number : EC02PO632

To Verify this certificate please visit at www.ecscert.co.uk

Initial Date : 01st Oct. 2024

Issue Date : 01st Oct. 2024

Certificate Expiry Date : 30th Sep. 2027



Jerri Deffin

Auth. Signatory
Excellence Certification
Services UK Limited (ECS UK)

Excellence Certification Services UK Limited (Accreditation No. CBM78P)

Suite 30, 78-88 London, ECIN 6PN, UK Email: info@ecscert.co.uk & Website: www.ecscert.co.uk

Validity of the candidate is subject to successful completion of surveillance audit on or before of due days. if surveillance audit is not be conducted, this certificate shall be suspended/cancelled

Certificate is the property of ECS UK and shall be returned immediately when demanded.



Certificate of Registration

This Is To Certify that the Quality Management Systems of

ANANTA EQUIPMENTS

6C FIRST FLOOR, BIPRADAS STREET, WARD NO - 28, KOLKATA - 700009,
WEST BENGAL, INDIA.

*has been assessed and found to be in accordance with the requirements of
standard detailed below*

ISO 9001:2015

This Certificate is valid for the following scope

MANUFACTURING OF SOLAR INBUILT STREET LIGHT, SOLAR LANTERN,
SOLAR HOME LIGHTING SYSTEM, SOLAR FAN AND LITHIUM BATTERY PACK

Certificate Number : EC02AX652

To Verify this certificate please visit at www.ecscert.co.uk

Initial Date : 01st Oct. 2024

Issue Date : 01st Oct. 2024

Certificate Expiry Date : 30th Sep. 2027



Jerri Deffin

Auth. Signatory
Excellence Certification
Services UK Limited (ECS UK)

Excellence Certification Services UK Limited

Suite 30, 78-88 London, ECIN 6PN, UK Email: info@ecscert.co.uk & Website: www.ecscert.co.uk
*Validity of the candidate is subject to successful completion of surveillance audit on or before of
due days. if surveillance audit is not be conducted, this certificate shall be suspended/cancelled*
Certificate is the property of ECS UK and shall be returned immediately when demanded.

■ **SOLAR MAST (10 METER DOUBLE SECTION): -**

The main objective of the high mast pole structure is to provide a strong, stable, and durable mounting arrangement for the solar LED lighting system, ensuring uniform illumination of the roadway/highway corridor as per required safety standards.

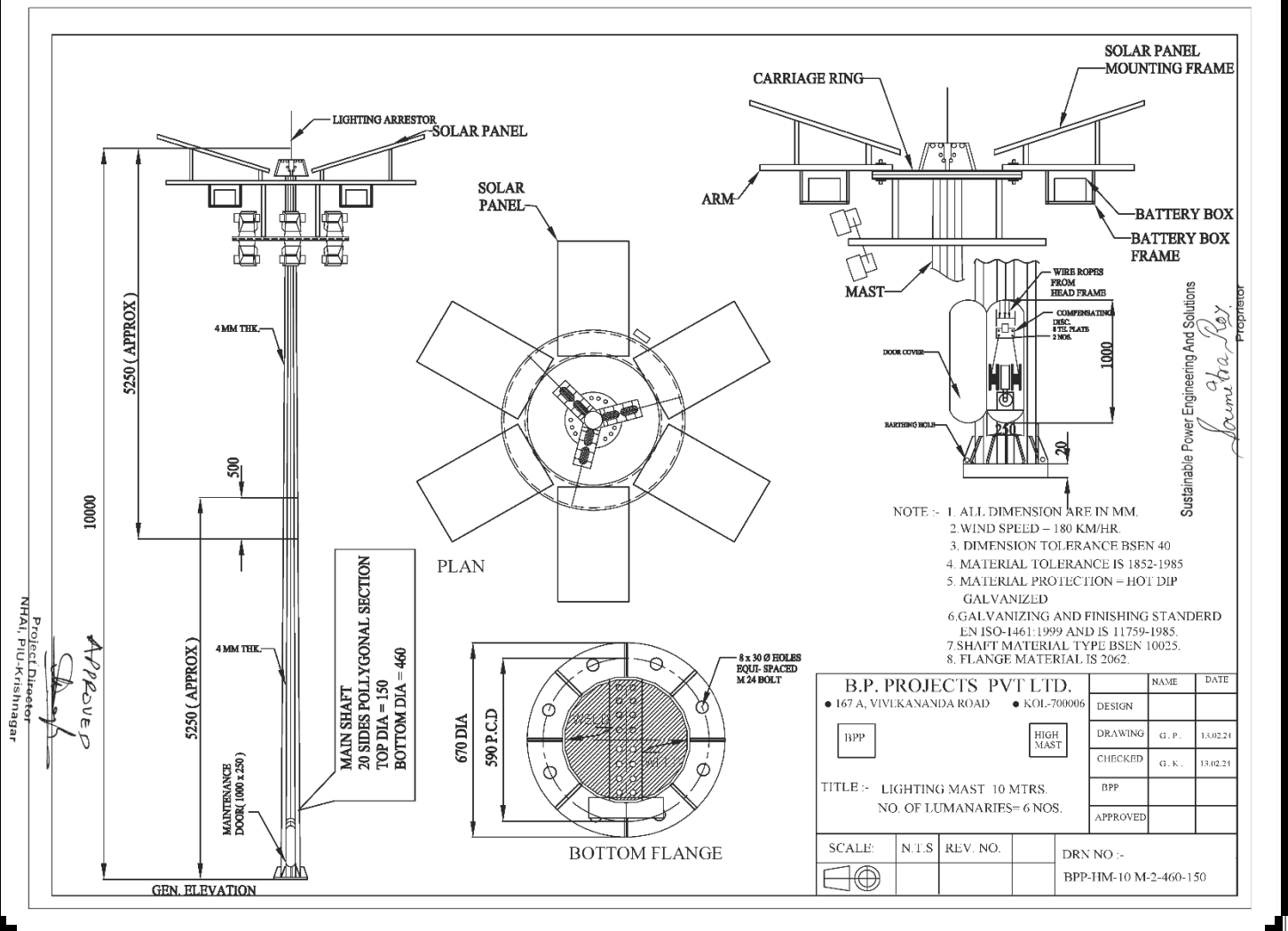
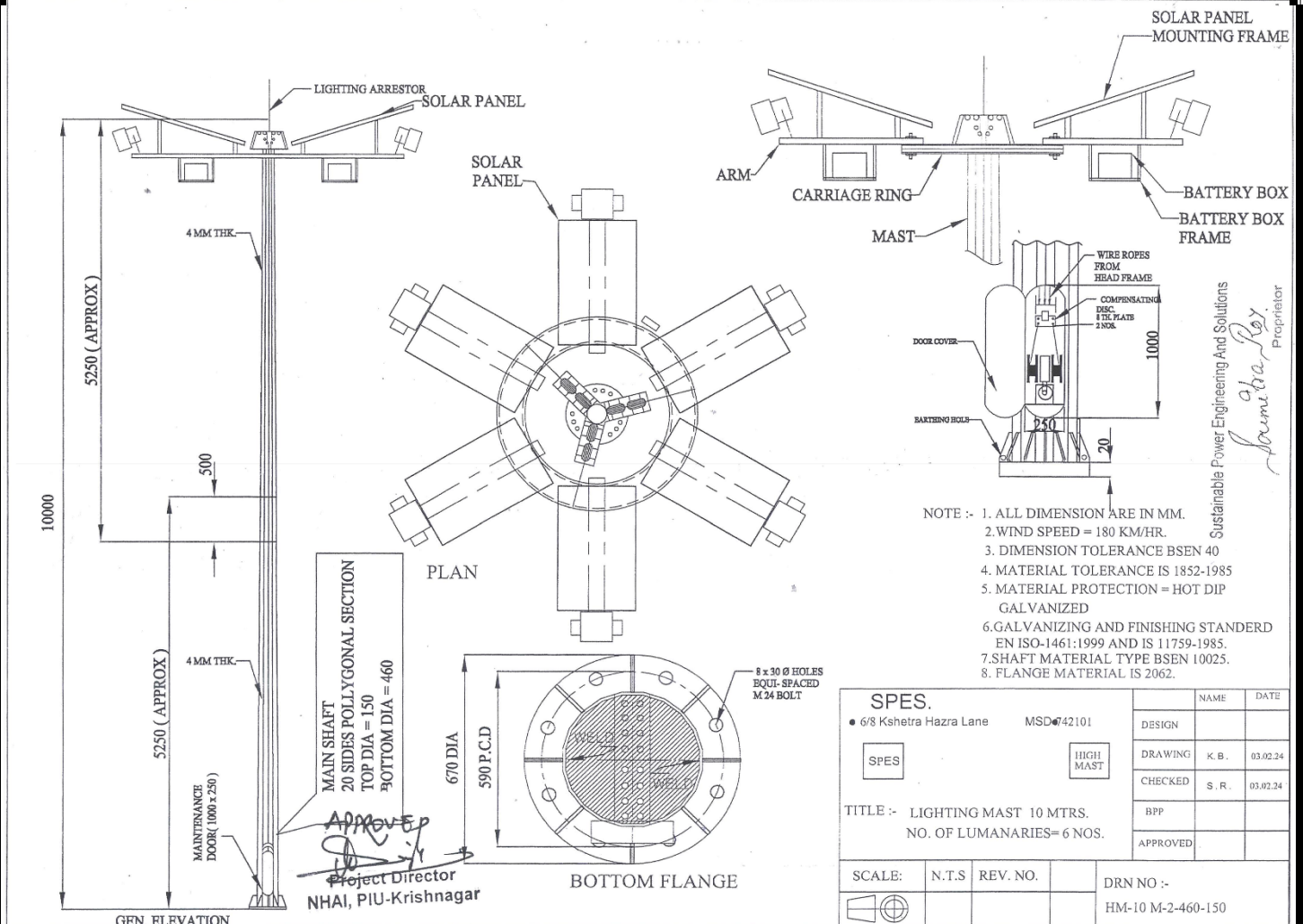
For this installation, a **10-meter-high polygonal solar high mast pole manufactured by BPP Projects Pvt. Ltd., one of the leading high mast pole manufacturers in India**, has been provided. The mast consists of a **two-section tapered steel structure**, with each section having a length of **5.25 meters and an overlap (lapping) length of 0.25 meters**. The pole is fabricated with a **4 mm thickness** to ensure adequate strength and stability against wind loads and environmental conditions.

The mast has a tapered design with a **bottom diameter of 460 mm and top diameter of 150 mm**. It is provided with a robust base flange arrangement having a **Pitch Circle Diameter (PCD) of 560 mm** for secure installation on the RCC foundation.

The complete mast structure is protected with **Hot Dip Galvanizing (HDG) coating with a minimum thickness of 80 microns**, providing excellent corrosion resistance and protection against rust, moisture, humidity, and harsh weather conditions, thereby increasing the service life of the structure.

The high mast is equipped with a **manual winch lowering system connected with stainless steel wire rope**, from which the complete solar lighting assembly, including the solar panel structure, LED luminaires, and associated accessories, is suspended. This arrangement allows the entire lighting system to be lowered to ground level whenever required, enabling safe and easy maintenance, inspection, and servicing of the solar system without the need for heavy lifting equipment.

The mast is provided with a top carriage arrangement for mounting the solar LED luminaires and solar panel support structure, along with a dedicated battery box arrangement for safe housing of the solar battery system. The complete assembly is designed to ensure reliable, maintenance-friendly, and long-term operation for highway lighting applications.



B.P.PROJECTS PVT. LTD.

TEST REPORT

PROJECT'S

NATIONAL HIGHWAYS AUTHORITY OF INDIA

10 MTR. SOLAR HIGH MAST

CUSTOMER'S NAME

M/S. SUSTAINABLE POWER ENGINEERING & SOLUTIONS

B.P. PROJECTS PVT. LTD.
174/A, N.T. ROAD. (DELHI ROAD).
BAIDYABATI, HOOGHLY.(W.B).

WORKSHOP INSPECTION REPORT FOR MAST

CUSTOMER'S NAME	: M/S. SUSTAINABLE POWER ENGINEERING & SOLUTIONS
PROJECT	: NATIONAL HIGHWAYS AUTHORITY OF INDIA
REF. MEMO NO.	: 29602/NHAI/PIU-KRISHNAGAR/E-28 DATED -19.09.2025
NAME OF WORK	: INSTALLATION OF 10M. LONG OCTAGONAL HIGH MAST TOWER WITH 6 NOS. OF SOLAR LIGHT FITTINGS INCLUDING BATTERIES, SUPPLY OF MATERIALS, ERECTION WORK, LABOUR COMPLETE AS PER REQUIREMENT IN 32 LOCATIONS AT FOUR LANING OF BARAJAGULI-KRISHNAGAR SECTION AND 19 LOCATIONS IN KRISHNAGAR TO BERHAMPURE SECTION OF NH-12 (OLD NH-34).
FACTORY REPORT NO.	: BPPL/TR/321/25-26
MAST NO.	: 10 MTR. SOLAR HIGH MAST TOTAL QTY :- 76 SETS

DESCRIPTION	DIMENSION Stipulated (mm)	DIMENSION Observed(mm)
-------------	------------------------------	---------------------------

		1	2	3	4	5	6
1.TOTAL HEIGHT	10 MTR.	10 Mtr.	10 Mtr.	10 Mtr.	10 Mtr.	10 Mtr.	10 Mtr.
2.NO OF SECTION	2	2	2	2	2	2	2
3.NO OF SIDES	20	20	20	20	20	20	20
4.FLANGE DIA	670	672	671	670	671	672	671
5.FLANGE THICKNESS	20	20	20	20	20	20	20
6.FLANGE HOLE PCD	590	590	590	590	590	590	590
7.NO OF HOLES	8	8	8	8	8	8	8
8.HOLE DIAMETER	30	30	30	30	30	30	30
9.SIZE OF DOOR OPENING	1000 X 250	1001 X 250	1000 X 250	1001 X 251	1000 X 251	1001 X 250	1000 X 251
10.BOTTOM SECTION LENGTH	5250	5255	5258	5253	5259	5257	5254
11.BOTTOM SECTION THIK.	4	4	4	4	4	4	4
12.BOTTOM SECTION DIA	460	461	462	461	460	462	461
13.TOP SECTION LENGTH	5250	5257	5254	5256	5258	5253	5255
14.TOP SECTION THIK.	4	4	4	4	4	4	4
15.TOP SECTION DIA	150	152	150	151	152	151	152

Prepared by

Authorized Signatory
B. P. PROJECTS (P) LTD
174/A, N. T. Road,
Baidyabati, Hooghly

Date

22/10/2025

B.P. PROJECTS PVT. LTD.
174/A, N.T. ROAD. (DELHI ROAD).
BAIDYABATI, HOOGHLY.(W.B).

D P TEST REPORT

CLIENT'S NAME : M/S. SUSTAINABLE POWER ENGINEERING & SOLUTIONS

PROJECT : NATIONAL HIGHWAYS AUTHORITY OF INDIA

REF. MEMO NO. : 29602/NHAI/PIU-KRISHNAGAR/E-28 DATED -19.09.2025

NAME OF WORK : INSTALLATION OF 10M. LONG OCTAGONAL HIGH MAST TOWER WITH 6 NOS. OF SOLAR LIGHT FITTINGS INCLUDING BATTERIES, SUPPLY OF MATERIALS, ERECTION WORK, LABOUR COMPLETE AS PER REQUIREMENT IN 32 LOCATIONS AT FOUR LANING OF BARAJAGULI-KRISHNAGAR SECTION AND 19 LOCATIONS IN KRISHNAGAR TO BERHAMPURE SECTION OF NH-12 (OLD NH-34).

FACTORY REPORT NO. : BPPL/TR/321/25-26

MAST NO. : 10 MTR. SOLAR HIGH MAST **TOTAL QTY :- 76 SETS**

CODE OF PRACTISE ADOPTED : IS 3658 : 1999

PROCEDURE OF TEST : TEST RESULT

VISUAL EXAMINATION : OK

D P TEST : CHECKED AND FOUND SATISFACTORY

REMARKS : No significant defects are observed after complete Welding job , so the materials Accepted

Prepared by

Authorized Signatory
B. P. PROJECTS (P) LTD
174/A, N. T. Road,
Baidyabati, Hooghly

Date

22/10/2025

B. P. PROJECTS PVT. LTD.
174/A, N. T. ROAD. (DELHI ROAD)
BAIDYABATI, HOOGHLY.

GALVANIZING CERTIFICATE

CUSTOMER'S NAME : M/S. SUSTAINABLE POWER ENGINEERING & SOLUTIONS

MATERIAL TYPE : 10 MTR. SOLAR HIGH MAST

PROJECT : NATIONAL HIGHWAYS AUTHORITY OF INDIA

FACTORY REPORT NO : BPPL/ TR/321/25-26

MAST NO. : 10 MTR. SOLAR HIGH MAST - 76 SETS

OBSERVATIONS

1)	Grade of zinc utilized Zn 98 of IS : 209 - 1979	: 99.95 %
2)	Galvanizing done as per Specification	: IS : 2629 – 1985 and IS : 6745 - 1972 BS ISO 1461
3)	Process Test result as per IS : 2633 of 1986	: 4 dip in CuSO ₄ one minute each No Copper deposition found upon Batch wise sample place the box mounted.
4)	Pivoted Hammer Test	: OK
5)	Mass of Zinc coated Result : As per IS : 6745 – 1972 Coating required as per IS: Specification (IS :-4759–1984)	: 692 gm/m ²
6)	Elcometre Reading (average)	: 90 - 108 MICRONS

INSPECTION REPORT OF PRODUCTS

- 7) Though inspecting, the galvanizing of the produces accords with stipulations
The quality standard. The products are up to standard. Allow to go out from the factory.

Prepare by

Authorized Signatory
B. P. PROJECTS (P) LTD
174/A, N. T. Road,
Baidyabati, Hooghly

Date

23/10/2025



TC-15552

P.P. METALLURGICAL LABORATORY (OPC) PVT. LTD.

NABL Accredited Laboratory (For Chemical & Mechanical)

CIN No. : U71200WB2023OPC267169

Laboratory : 221, Kali Temple Road, P.O. : Balitikuri, Howrah - 711113

Business Office : Makardha Road, Sanpur (N), Howrah - 711105

Mob : 9831188211 * E-mail : pntmondal29@gmail.com * Website : https://pplab.in



Test Report

Sample Received on. : 31.03.2025

Order/Case/ Challan No.: xxx

P.O. No.: xxx / Item: Shaft

Sample Description: One No. Cut Piece of 4mm Thk. Sheet.

Specification: EN 10025-2:2004, Designation: S355J0

Issued to: M/s. B.P. Projects Pvt. Ltd. / 167A, Vivekananda Road, Kolkata-700 006.

ULR TC No.: TC155522500007855F

TC No : CP/7855-4

Date of Analysis : 01.04.2025

Report Date: 02.04.2025

Stamped: xxx

This is to certify that the above sample(s) has/have been tested within the following results

Environmental Condition→	Temperature : 22.0°±2° C	Humidity: 52±3 %	
CHEMICAL TEST			
Test Parameter	Result Obtained	Required Value	Test Method
C %	0.1874 %	0.23 % Max	IS:8811/98, RA-2018
Mn %	0.9206 %	1.70 % Max	
Si %	0.0518 %	0.60 % Max	
S %	0.0174 %	0.040 % Max	
P %	0.0206 %	0.040 % Max	
Cu %	0.1802 %	0.60 % Max	
MECHANICAL TEST			
Test Parameter	Result Obtained	Required Value	Test Method
T.S. (MPa)	550	470-630	IS:1608 (Part-1):2022
Y.S. (MPa)	382	355 (Min)	
% of Elongation on 5.65√so	27.10	22.0 (Min)	

Remarks: The above test results obtained conform to the specified value

Tested sample returned

RP

Koner
B. P. PROJECTS (P) LTD
 174/A, N. T. Road,
 Raideyabati, Hooghly

Remarks: When statement of Conformity required by customer to a specification or standard for the test then laboratory's decision rule will be applied for those tests for which statement of conformity has been claimed by customer.

Laboratory's Decision Rule: "When providing statement of conformity" - Measurement uncertainty is taken into account to determine whether a result passes, fails or if indeterminate such as:

Pass : Test results ± measurement Uncertainty (at 95% Confidence Level) is within specification / Standard's requirements.

Fail : Test results ± Measurement Uncertainty (at 95% Confidence Level) exceeds specification / Standard's requirements.

Indeterminate Test results = Measurement Uncertainty (at 95% Confidence Level) overlaps specification/Standard's requirement.

Disclaimer: The test results related to the particular sample are tested, all tests are based on as per standard test method. Sample are not drawn by us : Any discrepancy in this test report should be brought to 'notice within 15 days from the date of report issued'.

ORIGINAL

- TEST REPORT RELATED TO THE SAMPLE ONLY
- SAMPLE WILL BE CEASED IF NOT TAKEN BACK WITHIN 15 DAYS



For P.P. METALLURGICAL LABORATORY (OPC) PVT. LTD.

P. MONDAL
 Quality Manager
 (Authorized Signatory)

THE STATEMENT OF THE REPORT SHALL NOT BE REPRODUCED IN FULL/PART WITHOUT THE PRIOR WRITTEN CONSENT OF THE ISSUING AUTHORITY

END OF REPORT



MANGALAM MATERIALS TESTING & ENGINEERS PRIVATE LIMITED

METAL TESTING LABORATORY

CIN : U71200WB2023PTC263813

P-83, BENARAS ROAD, HOWRAH-711108, WEST BENGAL, INDIA

E-mail : mangalamtestingbureau@gmail.com

Phone No. : 8617765936



TC-12400



TEST REPORT

DATE : 15.01.2025

PAGE : 06 of 11

REPORT NO. : MMTEPL/SR/2025/N/0275

ULR. NO. : TC124002500000275F

NAME AND ADDRESS OF THE CUSTOMER : B.P. PROJECTS PVT. LTD.

174 A, N.T. Road, Delhi Road, Baidyabati,
Hooghly, W.B., India, Pin - 712 222

CUSTOMER'S REFERENCE : Letter

Date : 13.01.2025

JOB PARTICULARS AS STATED : 20 mm Thick Base Plate

RECEIVED : 13.01.2025

SAMPLE DRAWN/NOT DRAWN BY US

DATE OF TESTING : 13.01.2025 to 15.01.2025

SPECIFICATION : IS : 2062/2011, Amend. No.1, Nov'2012, Gr.Desig.E250, Qlty-'BR'

SAMPLE STAMPED AS : NA

WITNESSED BY : NA

This is to certify that the above sample's has/have been tested with the following results :

CHEMICAL ANALYSIS

Elements	Specified	Obtained	Test Method
C %	0.22 Max	0.1661	ASTM E 415
Mn %	1.50 Max	0.8458	
Si %	0.40 Max	0.2112	
S %	0.045 Max	0.0175	
P %	0.045 Max	0.0196	

MECHANICAL TEST

Tensile Test	Parameters	Specified	Obtained		Test Method
			1	2	
	T.S. (MPa)	410 (Min)	492	498	IS : 1608/Pt.1/2022
	Y.S. (MPa)	240 (Min)	306	316	
	% Elg. on G.L. 5.65vSo	23.00 (Min)	29.96	29.46	
Bend Test (180° at 2t)	Observation (02 Nos.) : No crack has been found on bending portion. Remarks : Satisfactory				IS : 1599/2019

CHARPY IMPACT TEST at Room Temperature

Specimen Size : 10 X 10 X 55 mm long, "V" Notch, 2.00mm depth

Sl. No.	Impact Value (Joule)	Avg. Value (Joule)	Test Method
1	70	70	IS : 1757/Pt.1/2020
	76		
	74		
Specified		27J (Min)	

Tested sample returned

Remarks : The above test result obtained conform to the specified value.

Decision Rule Employed : Lower specified Value < Obs. Result < Upper specified Value = PASS

Temperature & Humidity Condition During Testing : 24.4°C & 54% RH (Chem.), 25.8°C & 56% RH (Mech.I)

B. P. PROJECTS (P) LTD
174/A, N. T. Road,
Baidyabati, Hooghly

- CERTIFIED THAT THE ABOVE MENTIONED TESTS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH STANDARD TEST PROCEDURE AS PER IS/BS/ASTM/ REFERENCE BOOK.
- THE RESULT STATED ABOVE RELATED TO THE TESTED ITEM ONLY.
- THE REPORT SHALL NOT BE REPRODUCED IN FULL OR IN PART WITHOUT PRIOR WRITTEN CONSENT FROM THE MANAGEMENT.
- LIABILITY FOR RETURN OF SAMPLES CEASES AFTER 90 DAYS FROM THE DATE OF ISSUE OF THE TEST CERTIFICATE.

ORIGINAL



For MANGALAM MATERIALS TESTING & ENGINEERS PVT. LTD.

Authorized Signatory

S. Ghosh

Chief Chemist

D. Chandra
Sr. Tech. Officer

■ **RCC FOUNDATION: -**

The foundation plays a critical role in ensuring the structural stability and long-term performance of any construction work. For the installation of the solar high mast pole, a specially designed RCC foundation was constructed to withstand the heavy dead load of the pole structure, solar equipment, and external wind forces. A **32 inch × 32 inch RCC column with a height of 7 feet** was constructed along with an **RCC base of size 6 feet × 6 feet × 1 feet**. The foundation was designed to provide adequate load distribution and stability against lateral movement caused by wind forces up to **180 km/h**.

1. Excavation Work

The foundation work was started by excavating the soil to a size of **6 feet × 6 feet × 5 feet** as per the required foundation design. After excavation, the bottom surface was properly levelled and prepared.

2. Base Preparation

After excavation, **Jhama Brick Soling (BFS)** was provided at the foundation bottom to improve the soil bearing capacity and create a stable base.

A **3-inch-thick PCC (Plain Cement Concrete) layer** was then laid over the brick soling. The PCC layer provided a levelled and firm surface for reinforcement placement and RCC concreting work.

3. Reinforcement Work

After completion of PCC work, reinforcement binding was carried out as per structural requirements.

12 mm TMT bars were used for the top and bottom reinforcement cage.

The reinforcement spacing was maintained at **5.5 inch × 5.5 inch**.

16 mm TMT bars were used for the RCC column reinforcement.

The column reinforcement consisted of **8 vertical rebars arranged in a circular pattern**.

8 mm TMT bars were used for stirrups.

Stirrups were provided with proper hooks to enhance structural strength and prevent reinforcement displacement.

Hook positioning was staggered at alternate locations for improved structural integrity.

Stirrup's spacing was maintained at **5-inch intervals** for better stability and confinement.

4. Foundation Bolt Installation

The **24 mm foundation bolts** were fixed accurately with the reinforcement cage using a template to maintain proper alignment and positioning for the high mast pole installation.

5. RCC Concreting Work

Concrete was prepared using a mix ratio of: **Cement: Sand: Aggregate = 1: 1.5: 3**

The concrete was designed to achieve **M20 grade strength**.

The concreting work was completed in two stages:

Stage 1: The RCC base was cast first to form a tapered foundation base. This taper helps in uniform distribution of the column load and improves foundation stability.

Stage 2: After completion of base concreting, shuttering work was carried out for the column portion. RCC concrete was then poured into the column shuttering and properly compacted.

6. Backfilling and Compaction

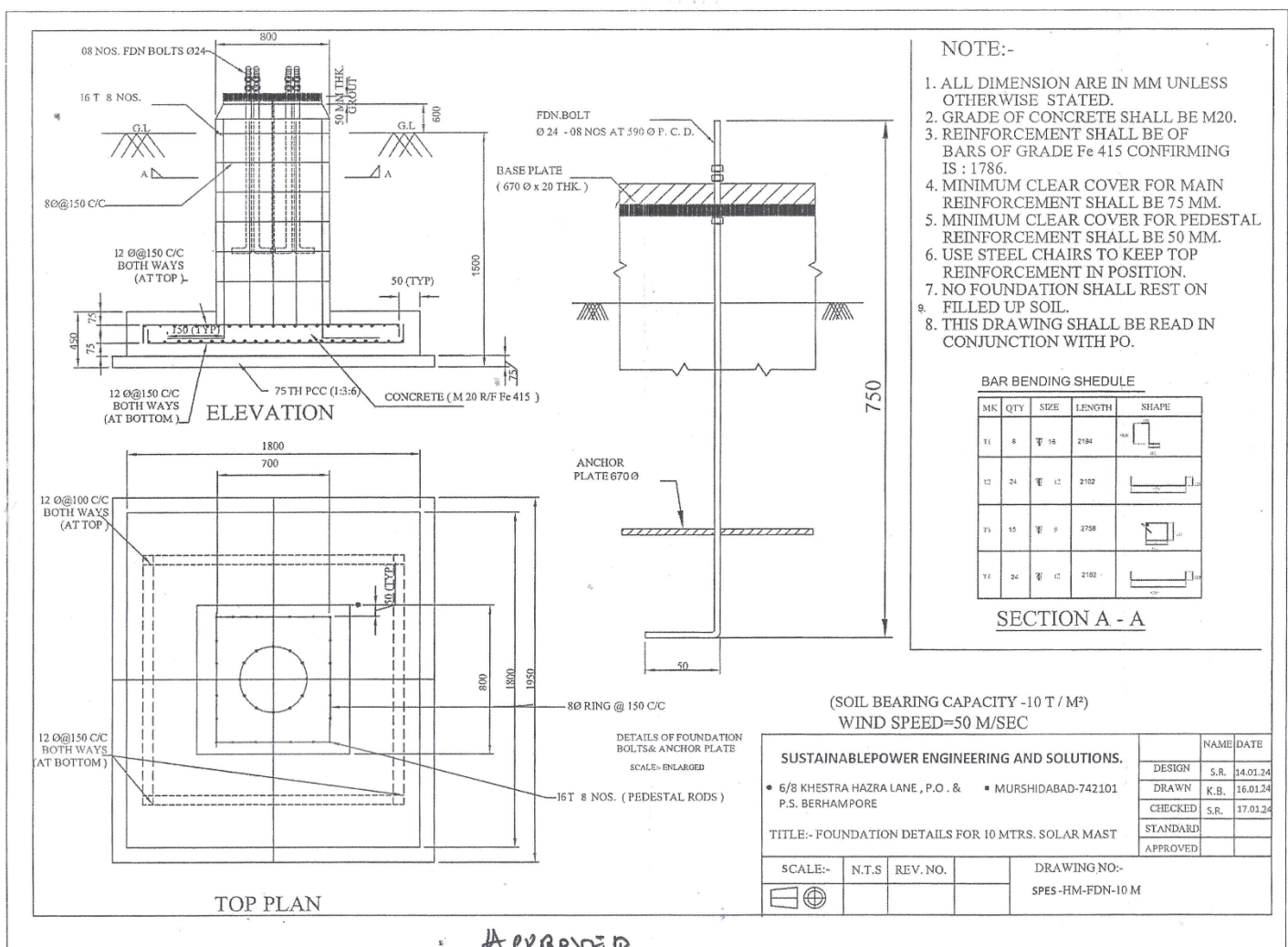
After completion of RCC work and initial setting of concrete, the excavated area was backfilled with soil.

The backfilling was carried out layer by layer with proper water sprinkling and compaction to achieve required soil density and avoid future settlement.

7. Curing Work

Regular water curing was carried out daily to maintain adequate moisture in the concrete and achieve the required strength and durability of the RCC foundation.

The completed RCC foundation provides a strong and stable support system for the solar high mast pole, ensuring safe operation under heavy structural loads and adverse environmental conditions.



Approved

Project Director
NHAI, PIU-Krishnagar

Sustainable Power Engineering And Solutions

Proprietor

TEST CERTIFICATE FOR HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT

IS 1786:2008



CM/L - 6965397

Test Certificate : TMT/25-26/0004158486

To M/S. Sree Narayan Builders
100 (Alias 28) Diamond Harbour Rd
KOLKATA - 700104 Region: 25

Date : 18.04.2025
SO No./ Item : 402723025 / 30
Product : TMTBF
PO No. : snb mix crs 550d

It is certified that the material described below fully conforms to IS 1786:2008. Chemical composition and Mechanical properties of the product, as tested in accordance with the Scheme of Testing & Inspection contained in the BIS certification marks Licence No. CM/L - 6965397 are as indicated below against each order No. Etc.
(PLEASE REFER TO IS 1786:2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Specification: IS1786:2008 FE_550D				QTY (MT)	C %	Mn%	S %	P%	Si%	Cr%	Ni%	N%	Cu %	Mo%	V%	S+P%	CE	YS (Mpa)	UTS (MPa)	EL%	TEL	UTS/YS	RE Bend	Bend		
Heat No.		Bundle No.		Nominal Size (MM)		Min																				
Mother Coil		Length	Dia	Max	0.250	0.040	0.040				0.0120		0.075	0.610				550	600	14.50	5.00	1.08				
A3087731	254BT60961	12,000.0	16.00	3.879	0.216	0.80	0.018	0.026	0.232	0.017	0.009	0.0070	0.005	0.001	0.001	0.044	0.350	600	698	20.80	8.50	1.16	OK	Pass		
A3087731	254BT60963	12,000.0	16.00	3.897	0.216	0.80	0.018	0.026	0.232	0.017	0.009	0.0070	0.005	0.001	0.001	0.044	0.350	600	698	20.80	8.50	1.16	OK	Pass		
A3087731	254BT60965	12,000.0	16.00	3.776	0.216	0.80	0.018	0.026	0.232	0.017	0.009	0.0070	0.005	0.001	0.001	0.044	0.350	600	698	20.80	8.50	1.16	OK	Pass		
A3087731	254BT60976	12,000.0	16.00	3.860	0.216	0.80	0.018	0.026	0.232	0.017	0.009	0.0070	0.005	0.001	0.001	0.044	0.350	600	698	20.80	8.50	1.16	OK	Pass		
Total Weight in Metric Tonnes				15.412	Grand Total of Coils/Pkt/Bundles/Slab								4													

This is to certify that the above mentioned product produced & supplied by us, do not contain any radio active element higher than the natural level and it conforms to Standard Rolling, Dimensional & Weight tolerances. The product or packing material does not contain any hazardous substances as per RoHS norms.

Delivery ID : 718331129	Process Route : RM-BF-BOF-EAF-ZPF-LHF-CCM-BRM
Invoice No. : 7107994472	Legends: BOF = Basic Oxygen Furnace, LHF = Laddle Heating Furnace, CCM = Continuous Casting Machine, RH = RH Degasser, BRM = Bar Rod Mill, #WRM = Wire Rod Mill
GST Invoice No : 25VJ290023958	Chemistry = Laddle sample analysis; 1Mpa= 1N/mm2; CE= [C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15]
Mode of Transport : Normal Trailer	YS= Yield Strength; UTS = Ultimate Tensile Strength, EL= %E Elongation on standard gauge length
Vehicle No. : NL01AB3019	
LC No. :	Remarks :



Authorised Signatory

TEST CERTIFICATE FOR HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT

IS 1786:2008



CM/L - 6965397

Test Certificate : TMT/22-23/0002546204

To M/S. SREE NARAYAN BUILDERS
100 (Alias 28) Diamond Harbour Rd
KOLKATA - 700104 Region: 25

Date : 26.10.2022
SO No./ Item : 401690217 / 10
Product : TMTBF
PO No. : SNB/VJNR/OCT-001

It is certified that the material described below fully conforms to IS 1786:2008. Chemical composition and Mechanical properties of the product, as tested in accordance with the Scheme of Testing & Inspection contained in the BIS certification marks Licence No. CM/L - 6965397 are as indicated below against each order No. Etc.
(PLEASE REFER TO IS 1786:2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Specification: IS1786_2008 FE_550D				QTY (MT)	MECHANICAL PROPERTIES																					
					C %	Mn %	S %	P %	Si %	Cr %	Ni %	N %	Cu %	Mo %	V %	S+P %	CE	YS (Mpa)	UTS (MPa)	EL %	TEL	UTS/YS RAT	RE Bend Test	Bend Test		
Heat No.	Bundle No.	Nominal Size (MM)		Min																						
Mother Coil		Length	Dia	Max	0.250	0.040	0.040					0.0120					0.075	0.610	550	600	14.50	5.00	1.08			
B3061186	22ABT74983	12,000.0	12.00	2.290	0.206	0.83	0.011	0.022	0.279	0.018	0.008	0.0050	0.005	0.001	0.001	0.033	0.344	589	688	21.15	9.00	1.16	OK	Pass		
B3061185	22ABT74954	12,000.0	12.00	2.957	0.210	0.78	0.012	0.026	0.227	0.021	0.008	0.0052	0.005	0.001	0.001	0.038	0.341	606	708	19.93	8.11	1.16	OK	Pass		
B3061185	22ABT74953	12,000.0	12.00	2.947	0.210	0.78	0.012	0.026	0.227	0.021	0.008	0.0052	0.005	0.001	0.001	0.038	0.341	606	708	19.93	8.11	1.16	OK	Pass		
B3061185	22ABT74951	12,000.0	12.00	3.706	0.210	0.78	0.012	0.026	0.227	0.021	0.008	0.0052	0.005	0.001	0.001	0.038	0.341	606	708	19.93	8.11	1.16	OK	Pass		
B3061185	22ABT74948	12,000.0	12.00	3.558	0.210	0.78	0.012	0.026	0.227	0.021	0.008	0.0052	0.005	0.001	0.001	0.038	0.341	606	708	19.93	8.11	1.16	OK	Pass		
B3061185	22ABT74947	12,000.0	12.00	3.519	0.210	0.78	0.012	0.026	0.227	0.021	0.008	0.0052	0.005	0.001	0.001	0.038	0.341	606	708	19.93	8.11	1.16	OK	Pass		
Total Weight in Metric Tonnes				33.459	Grand Total of Coils/Pkt/Bundles/Slab								10													

This is to certify that the above mentioned product produced & supplied by us, do not contain any radio active element higher than the natural level and it conforms to Standard Rolling, Dimensional & Weight tolerances. The product or packing material does not contain any hazardous substances as per RoHS norms.

Delivery ID : 712349414	Process Route : RM-BF-BOF-LHF-CCM-Rolling
Invoice No. : 7104947516	Legends: BOF = Basic Oxygen Furnace, LHF = Laddle Heating Furnace, CCM = Continuous Casting Machine, RH = RH Degasser, BRM = Bar Rod Mill, #WRM = Wire Rod Mill
GST Invoice No : 22VJ2900323881	Chemistry = Laddle sample analysis; 1Mpa= 1N/mm2; CE= [C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15]
Mode of Transport : Normal Trailer	YS= Yield Strength; UTS = Ultimate Tensile Strength, EL= %E Elongation on standard gauge length
Vehicle No. : NL01L1679	
LC No. :	Remarks :



Authorised Signatory



Test Certificate : TMT/24-25/0004077920

To M/S. Sree Narayan Builders
100 (Alias 28) Diamond Harbour Rd
KOLKATA - 700104 Region: 25

Date : 14.03.2025
SO No / Item : 402674611 / 10
Product : TMTBF
PO No. : DMS007009

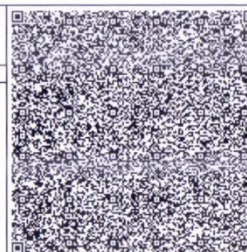
It is certified that the material described below fully conforms to IS 1786:2008. Chemical composition and Mechanical properties of the product, as tested in accordance with the Scheme of Testing & Inspection contained in the BIS certification marks Licence No. CM/L - 6965397 are as indicated below against each order No. Etc.
(PLEASE REFER TO IS 1786:2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Specification: IS1786_2008 FE_550D	QTY (MT)	C %	Mn %	S %	P %	Si %	Cr %	Ni %	N %	Cu %	Mo %	V %	S+P %	CE	YS (Mpa)	UTS (Mpa)	EL %	TEL	UTS/YS RAT	RE Bend Test	Bend Test
Heat No.	Bundle No.	Nominal Size (MM)	Min												550	600	14.50	5.00	1.08		
Mother Coil		Length Dia	Max																		
E997597	253BT06871	12.000 0 8.00	3.994	0.216	0.74	0.010	0.023	0.244	0.022	0.008	0.0040	0.007	0.001	0.001	0.033	0.339	609	685	23.12	8.20	1.12 OK Pass
E997597	253BT06869	12.000 0 8.00	4.008	0.216	0.74	0.010	0.023	0.244	0.022	0.008	0.0040	0.007	0.001	0.001	0.033	0.339	609	685	23.12	8.20	1.12 OK Pass
D997500	253BT06829	12.000 0 8.00	4.015	0.219	0.72	0.008	0.020	0.242	0.021	0.008	0.0036	0.006	0.001	0.001	0.028	0.339	600	675	22.12	7.92	1.12 OK Pass
D997500	253BT06827	12.000 0 8.00	3.048	0.219	0.72	0.008	0.020	0.242	0.021	0.008	0.0036	0.006	0.001	0.001	0.028	0.339	600	675	22.12	7.92	1.12 OK Pass
D997500	253BT06825	12.000 0 8.00	4.023	0.219	0.72	0.008	0.020	0.242	0.021	0.008	0.0036	0.006	0.001	0.001	0.028	0.339	600	675	22.12	7.92	1.12 OK Pass
Total Weight in Metric Tonnes			40.119	Grand Total of Coils/Pkt/Bundles/Slab																	

This is to certify that the above mentioned product produced & supplied by us, do not contain any radio active element higher than the natural level and it confirms to Standard Rolling, Dimensional & Weight tolerances. The product or packing material does not contain any hazardous substances as per RoHS norms.

Delivery ID : 718048642
Invoice No. : 7107869941
GST Invoice No : 24VJ2900601328
Mode of Transport : Normal Trailer
Vehicle No. : NL01AF5319
LC No. :
Process Route : RM-BF-BOF-EAF-ZPF-LHF-CCM-BRM
Legends: BOF = Basic Oxygen Furnace, LHF = Ladle Heating Furnace, CCM = Continuous Casting Machine, RH = RH Degasser, BRM = Bar Rod Mill, WRM = Wire Rod Mill
Chemistry = Ladle sample analysis, 1Mpa= 1N/mm²; CE= [C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15]
YS= Yield Strength; UTS = Ultimate Tensile Strength, EL= %Elongation on standard gauge length



Authorised Signatory

JSW STEEL LTD



TEST CERTIFICATE FOR HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT ACCORDING TO IS 1786 : 2008

TEST CERTIFICATE NO. JSW / TC-TMT / JULY - 25 / 1786 / 102

DATE :- 22.07.2025

To M/S.

SREE NARAYAN BUILDERS

It is certified that the material described below fully conforms to IS-1786 : 2008. Chemical composition and Mechanical properties of the product as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks License No. CM/L - 5245661 are as indicated below against each order No..

(PLEASE REFER TO IS-1786 : 2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order / Invoice No. & Date	Nominal Size (mm)	Cast / Lot No.	Quantity (MT)	Date Of Testing	CHEMICAL ANALYSIS					MECHANICAL PROPERTIES							Grade Of Steel	Remark
					% C (Max)	% S (Max)	% P (Max)	% (S+P) (Max)	% CE	Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation %	Total Elongation %	UTS/YS Ratio	Bend Test	Rebend Test		
25W11900001052	08MM	JSW/07/02 35/2617	8.110	19.07.25	0.22	0.028	0.032	0.060	0.34	592	695	21	8.7	1.17	OK	OK	Fe - 550 D	Satisfactory
	10MM	JSW/07/02 34/2618	10.950	15.07.26	0.21	0.030	0.031	0.061	0.36	590	698	22	8.8	1.18	OK	OK		
	12MM	JSW/07/02 37/2619	4.140	12.07.25	0.23	0.029	0.030	0.059	0.037	588	691	23	8.6	1.18	OK	OK		
	16MM	JSW/07/02 31/2620	4.180	11.06.25	0.22	0.027	0.031	0.058	0.34	602	703	21	8.9	1.17	OK	OK		
	20MM	JSW/07/02 36/2621	4.920	20.07.25	0.21	0.029	0.033	0.062	0.35	601	709	22	8.8	1.18	OK	OK		

The material supplied conforms to the standard rolling and mass tolerances.

Surface defects : a) Piping : Absent / Present b) Other defects : Absent / Present

Remarks : Satisfactory

Shipping Advice No.

Wagon No

Truck No. :- WB 11 B 9574

Inspection Engineer
FOR SGS INDIA PVT. LTD

Quality Manager
JSW STEEL LTD



CM/L - 5775286

TEST CERTIFICATE



FOR PORTLAND POZZOLANA CEMENT (FLY ASH BASED)

Week No. (Year of manufacturing): 28/07/2025				Date: 24/07/2025
Sl.No.	Characteristics	Unit	Actual	Requirement as per IS 1489 (Part 1): 2015
1	Chemical characteristics			
	Magnesia (MgO)	%	4.93	Max. 6.0
	Sulphuric anhydride (SO ₃)	%	1.34	Max. 3.5
	Chloride (Cl)	%	0.048	1. Max. 0.1 2. Max. 0.05 for Prestressed concrete structures
	Insoluble Residue (IR)	%	31.87	Max. $x + (4*(100-x))/100$ and Min. 0.6 x
	Loss on Ignition	%	3.01	Max. 5.0
2	Physical characteristics			
	Normal Consistency	%	31.3	-
	Fineness (by Blaine method)	m ² /kg	387	Min. 300
	Soundness			
	(a) Le Chatelier's method	mm	1.0	Max. 10
	(b) Autoclave test method	%	0.20	Max. 0.8
	Setting Time			
	(a) Initial Setting Time (IST)	Minutes	195	Min. 30
	(a) Final Setting Time (FST)	Minutes	265	Max. 600
	Compressive Strength			
	(a) 3-days	MPa	24.6	Min. 16
	(b) 7-days	MPa	35.0	Min. 22
	(c) 28-days	MPa	RA	Min. 33
	Drying shrinkage	%	RA	Max. 0.15
	Fly ash content	%	35.0	15 to 35

Note: X- is the declared percentage of fly ash in the Portland Pozzolana Cement

Remarks:

The above cement complies with requirements of IS 1489 (Part 1):2015 for Portland Pozzolana Cement (Fly ash based)

RA = Result Awaited

Temperature (°C) and relative humidity (%) during testing shall be maintained as 27± 2°C & ≥ 65 % respectively.

HEAD (QC)



Manufactured By: Dalmia Cement (Bharat) Ltd, Bengal Cement Works, Village: Kulapachuria, PO: Beucha,
Via Godapiasal, PS: Salboni, Dist: Paschim Midnapur, WB-721129



CM/L - 5775286

TEST CERTIFICATE



FOR PORTLAND POZZOLANA CEMENT (FLY ASH BASED)

Week No. (Year of manufacturing): 29/07/2025				Date: 31/07/2025
Sl.No.	Characteristics	Unit	Actual	Requirement as per IS 1489 (Part 1): 2015
1	Chemical characteristics			
	Magnesia (MgO)	%	4.79	Max. 6.0
	Sulphuric anhydride (SO ₃)	%	1.32	Max. 3.5
	Chloride (Cl)	%	0.046	1. Max. 0.1 2. Max. 0.05 for Prestressed concrete structures
	Insoluble Residue (IR)	%	31.90	Max. $x + (4*(100-x))/100$ and Min. 0.6 x
	Loss on Ignition	%	2.93	Max. 5.0
2	Physical characteristics			
	Normal Consistency	%	31.3	-
	Fineness (by Blaine method)	m ² /kg	386	Min. 300
	Soundness			
	(a) Le Chatelier's method	mm	1.0	Max. 10
	(b) Autoclave test method	%	0.21	Max. 0.8
	Setting Time			
	(a) Initial Setting Time (IST)	Minutes	190	Min. 30
	(a) Final Setting Time (FST)	Minutes	265	Max. 600
	Compressive Strength			
	(a) 3-days	MPa	24.5	Min. 16
	(b) 7-days	MPa	34.8	Min. 22
	(c) 28-days	MPa	RA	Min. 33
	Drying shrinkage	%	RA	Max. 0.15
	Fly ash content	%	35.0	15 to 35

Note: X- is the declared percentage of fly ash in the Portland Pozzolana Cement

Remarks:

The above cement complies with requirements of IS 1489 (Part 1):2015 for Portland Pozzolana Cement (Fly ash based)

RA = Result Awaited

Temperature (°C) and relative humidity (%) during testing shall be maintained as 27± 2°C & ≥ 65 % respectively.

HEAD (QC)



Manufactured By: Dalmia Cement (Bharat) Ltd, Bengal Cement Works, Village: Kulapachuria, PO: Beucha,
Via Godapiasal, PS: Salboni, Dist: Paschim Midnapur, WB-721129

■ **EARTHING: -**

For a high mast installation, lightning protection earthing is a critical safety equipment. It provides a safe and controlled path for lightning currents to discharge into the ground, protecting the mast structure, electrical equipment, and surrounding area from potential damage.

Here, we used a **50 mm diameter hollow GI pipe electrode with a length of 3 meters**, installed deep into the ground to achieve effective grounding. The electrode is connected to the high mast structure using a **25 × 3 mm GI strip**, ensuring a strong, corrosion-resistant, and low-impedance connection for lightning current flow.

A dedicated **earthing pit with a cover has been provided for easy inspection and maintenance access**. The pit is treated with a **backfilling compound**, which improves soil conductivity, reduces earth resistance, and enhances the overall efficiency and durability of the lightning protection system.

This properly designed earthing arrangement ensures that lightning surges are safely diverted to the earth, providing reliable protection for the high mast structure and its electrical components.



BENEFITS OF SOLAR-POWERED HIGH MAST LIGHTS ON NATIONAL HIGHWAYS

Solar-powered high mast lights have many benefits. They are:

- **ECO-FRIENDLY**

Solar high mast lights generate electricity from sunlight without producing harmful emissions. It reduces carbon footprint and provides a clean and sustainable lighting solution.

- **USEFUL IN REMOTE AREAS**

Solar lighting systems can be installed at remote locations without depending on grid. This reduces the need for electrical infrastructure and save electricity costs.

- **COST SAVING**

Solar energy is free, which Eliminates monthly electricity expenses. After installation, the system requires no operating costs and provides long-term savings.

- **EASY TO MAINTAIN**

With fewer electrical components and efficient LED technology, solar high mast lights require less maintenance and provide reliable service for many years.

- **IMPROVES ROAD SAFETY**

High mast lighting improves visibility on highways, junctions, and accident-prone areas. It helps drivers travel safely during night hours and reduces the chances of accidents.

- **RELIABLE LIGHTING SYSTEM**

Solar high mast lights work independently. Automatic Dusk to dawn sensors help to operate the lights efficiently and prevent unnecessary energy usage.

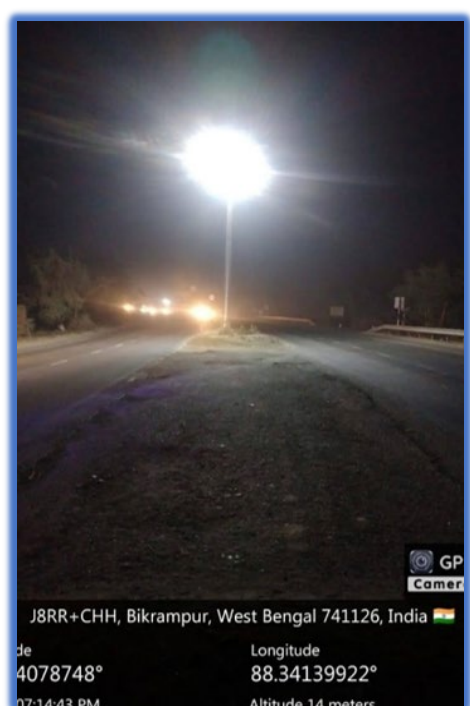
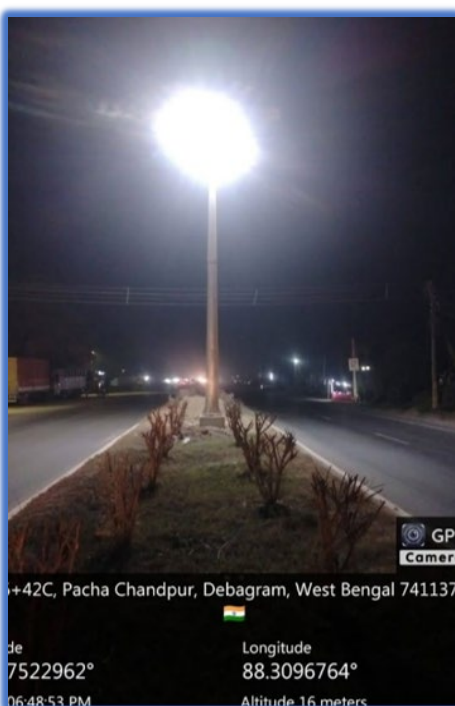
- **ENERGY EFFICIENT**

LED lights provide high brightness with low power consumption. Combined with solar power, they deliver efficient and economical highway lighting.

REMARKS

We have successfully completed 86 No's solar high mast lighting System on multiple locations of NH-12 and NH-26. All Systems are installed with quality components, strong foundations, hot-dip galvanized structure and pole, and Highly efficient solar Modules. These installations are running successfully and providing reliable lighting solutions.

PHOTO GALLERY OF THE PROJECT WORK





Vill Sonadanga Po, Ps, nearby National Highway 12, Nadia, Bikrampur, Nakashipara, West Bengal 741126, India 🇮🇳

Latitude
23.63632719°

Longitude
88.35175187°

Local 06:06:24 PM
GMT 12:36:24 PM

Altitude 18 meters
Sunday, 14.12.2025



Nh34, BAMANDANGA, Baman Danga, West Bengal 741126, India 🇮🇳

Latitude
23.62301145°

Longitude
88.36743216°

Local 07:47:40 PM

Altitude 17 meters



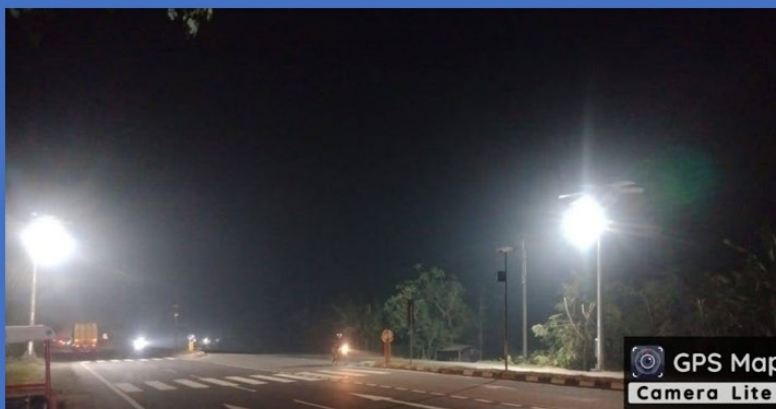
Ps Nakashipara, Bethuafahari, Post, near Cross, Khidirpur, Budhbar, Hattola, Bethuadahari, Nadia, West Bengal 741126, India 🇮🇳

Latitude
23.60685381°

Longitude
88.38785037°

Local 06:28:07 PM

Altitude 19 meters



HC69+6RR, NH 12, Bholadanga, West Bengal 741126, India 🇮🇳

Latitude
23.56067063°

Longitude
88.41949423°

Local 08:20:34 PM
GMT 02:50:34 PM

Altitude 16 meters
Wednesday, 10.12.2025



Gachha Bazar, Gachha, West Bengal 741154, India 🇮🇳

Latitude
23.54271288°

Longitude
88.42746503°

Local 07:45:06 PM

Altitude 13 meters



Vill Dhubulia Bazar, PO Dhubulia, PS, Near Dhubulia Harimondir, Dis, Dhubulia, West Bengal 741139, India 🇮🇳

Latitude
23.49416678°

Longitude
88.45044512°

Local 07:02:55 PM
GMT 01:32:55 PM

Altitude 16 meters
Friday, 12.12.2025



GPS Map
Camera Lite

NH 12, near by NH 12, Ghateswar, West Bengal 741154, India

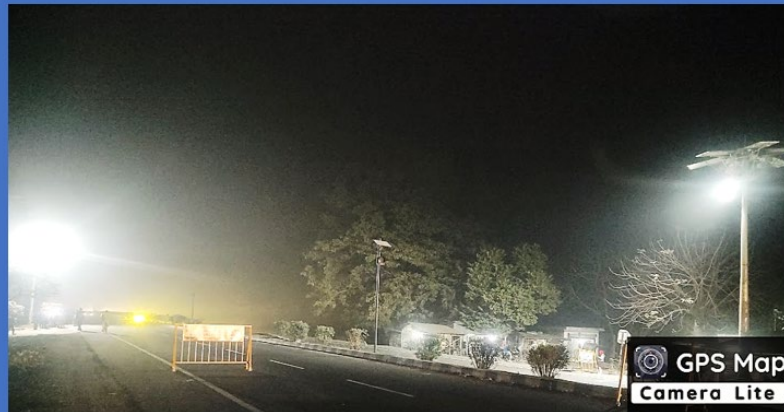
Latitude 23.53000628° Longitude 88.43815638°
Local 07:50:59 PM Altitude 13 meters



GPS Map
Camera Lite

FF63+4R, Chaugachhahansadanga, West Bengal 741140, India

Latitude 23.46003652° Longitude 88.45429827°
Local 07:19:31 PM Altitude 11 meters
GMT 01:49:31 PM Friday, 12.12.2025



GPS Map
Camera Lite

CFM9+V56, Bahadurpur, West Bengal 741125, India

Latitude 23.43454092° Longitude 88.46752333°
Local 06:09:07 PM Altitude 16 meters
GMT 12:39:07 PM Thursday, 11.12.2025



GPS Map
Camera Lite

Vill Dhubulia 15 No, PO Dhubulia, PS Dhubulia, Dis, Post Office, near Dhubulia, Dhubulia, West Bengal 741139, India

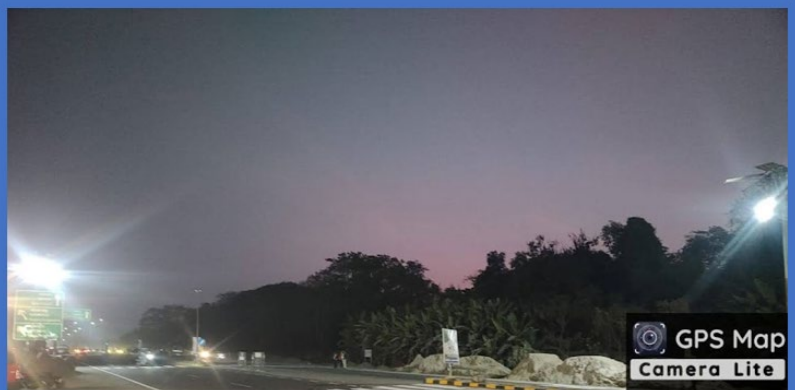
Latitude 23.48907622° Longitude 88.44959523°
Local 07:30:13 PM Altitude 16 meters



GPS Map
Camera Lite

FF82+4XC, NH 12, Dhubulia, Chaugachhahansadanga, West Bengal 741140, India

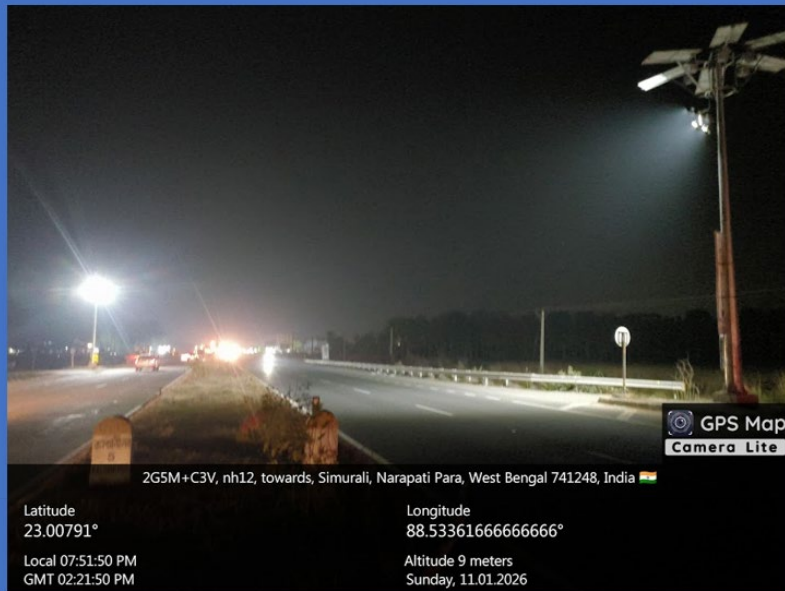
Latitude 23.46549358° Longitude 88.45235338°
Local 07:20:46 PM Altitude 11 meters



GPS Map
Camera Lite

Boro Jaguli Road, Boro, near Kali Mondir, Ghoshpara, Jaguli, Simhat, West Bengal 741221, India

Latitude 22.9538721° Longitude 88.54462433°
Local 05:32:53 PM Altitude 14 meters
GMT 12:02:53 PM Friday, 09.01.2026



2G5M+C3V, nh12, towards, Simurali, Narapati Para, West Bengal 741248, India

Latitude
23.00791°

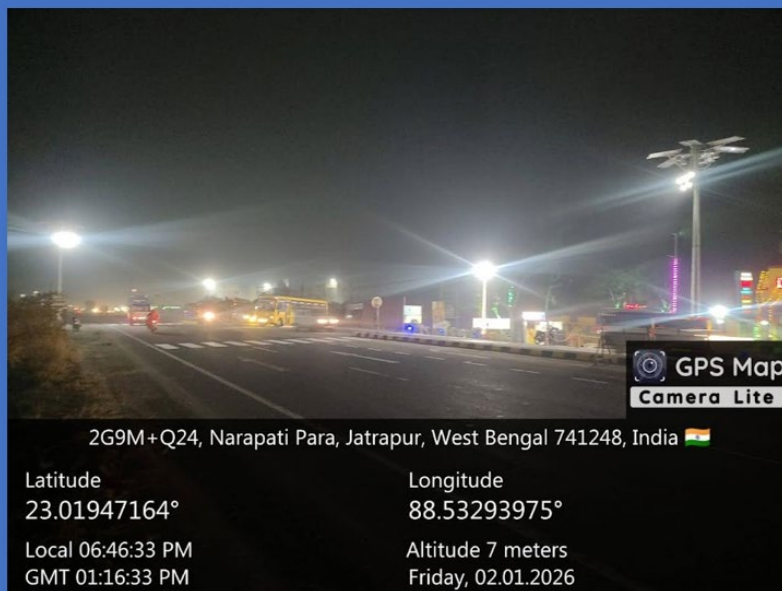
Local 07:51:50 PM
GMT 02:21:50 PM

Longitude
88.53361666666666°
Altitude 9 meters
Sunday, 11.01.2026

GPS Map
Camera Lite



GPS Map
Camera Lite



2G9M+Q24, Narapati Para, Jatrapur, West Bengal 741248, India

Latitude
23.01947164°

Local 06:46:33 PM
GMT 01:16:33 PM

Longitude
88.53293975°

Altitude 7 meters
Friday, 02.01.2026

GPS Map
Camera Lite



3G7V+H2P, Chakdaha, West Bengal 741222, India

Latitude
23.00791°

Longitude
88.54265833333332°

GPS Map
Camera Lite



3GWW+7MG, NH 12, Palagachha, Payradanga, West Bengal 741222, India

Latitude
23.00791°

Longitude
88.54669°

GPS Map
Camera Lite



3GRW+H6Q, Palagachha Rd, Chakdaha, Punglia, West Bengal 741222, India
Longitude: 88.54563166666667°
Latitude: 24.500000000002°



3G5R+FC7, Kugachhi, Chakdaha, West Bengal 741222, India
Longitude: 88.54124333333333°
Latitude: 24.884499999999998°



HV8+9P8, Patuli, Payradanga, West Bengal 741256, India
Longitude: 88.56580327°
Latitude: 24.14353829°



4H76+X2Q, Mahanala, Payradanga, West Bengal 741222, India
Longitude: 88.56067°
Latitude: 24.4395°



4HJ7+FQF, NH 12, Ghatigachha, Payradanga, West Bengal 741256, India
Longitude: 88.56444166666667°
Latitude: 24.312316666666668°



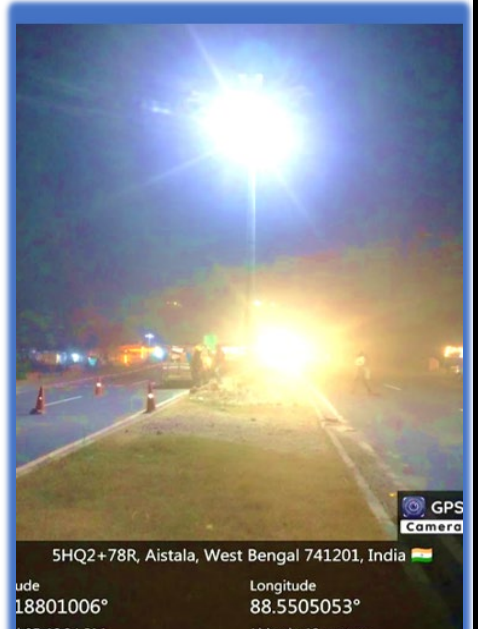
HV8+9P8, Patuli, Payradanga, West Bengal 741256, India
Longitude: 88.56580327°
Latitude: 24.14353829°
Altitude: 14 meters
Time: 12-12-27 PM



4H76+X2Q, Mahanala, Payradanga, West Bengal 741222, India
Longitude: 88.56067°
Latitude: 24.4395°



4HJ7+FQF, NH 12, Ghatigachha, Payradanga, West Bengal 741256, India
Longitude: 88.56444166666667°
Latitude: 24.312316666666668°



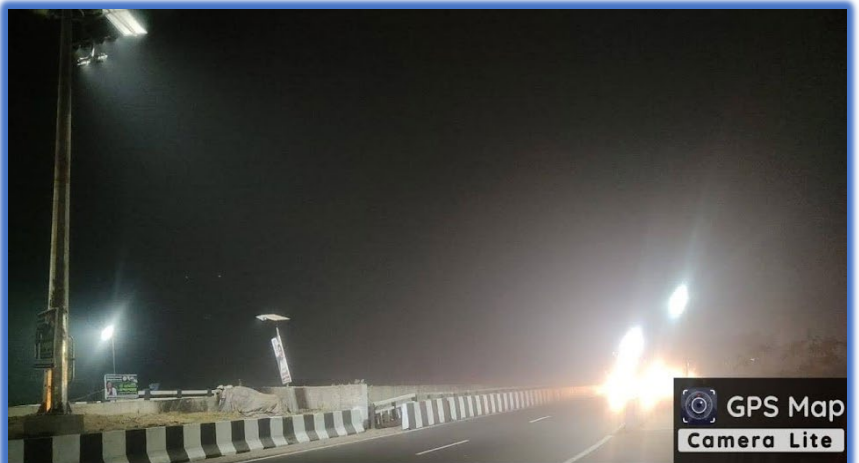
5HQ2+78R, Aistala, West Bengal 741201, India
Longitude: 88.5505053°
Latitude: 24.18801006°
Altitude: 13 meters
Time: 05:46:24 PM



GPS Map
Camera Lite

189, Court Para, Ranaghat, West Bengal 741201, India 🇮🇳

Latitude 23.17699044° Longitude 88.55820293°
Local 06:34:30 PM Altitude 8 meters



GPS Map
Camera Lite

5HH5+37W, Ranaghat, West Bengal 741201, India 🇮🇳

Latitude 23.17748705° Longitude 88.55831725°
Local 07:15:41 PM Altitude 8 meters
GMT 01:45:41 PM Wednesday, 07.01.2026



GPS Map
Camera Lite

5HQ2+78R, Aistala, West Bengal 741201, India 🇮🇳

Latitude 23.18801006° Longitude 88.5505053°
Local 05:46:24 PM Altitude 13 meters



GPS Map
Camera Lite

5GQX+MP, Habibpur, West Bengal 741201, India 🇮🇳

Latitude 23.18860362° Longitude 88.5497854°
Local 05:21:43 PM Altitude 9 meters



GPS Map
Camera Lite

near Hotel Shiv Sagar, Udaypur, Phulia, Goalpur, West Bengal 741402, India 🇮🇳

Latitude 23.21010306° Longitude 88.51908728°
Local 05:39:48 PM Altitude 12 meters
GMT 12:09:48 PM Monday, 29.12.2025



GPS Map
Camera Lite

7F28+4W, Bathna, West Bengal 741404, India 🇮🇳

Latitude 23.25039071° Longitude 88.46691433°
Local 07:40:35 PM Altitude 14 meters



6G85+MGM, Girish Nagar, Nabla, Phulia, West Bengal 741402, India 🇮🇳

Latitude
23.21673271°

Longitude
88.50926452°

Local 07:29:33 PM
GMT 01:59:33 PM

Altitude 11 meters
Saturday, 27.12.2025



7C8V+W8C, Byp, Santipur, Gobindapur, West Bengal 741404, India 🇮🇳

Latitude
23.26659153°
Local 06:44:28 PM

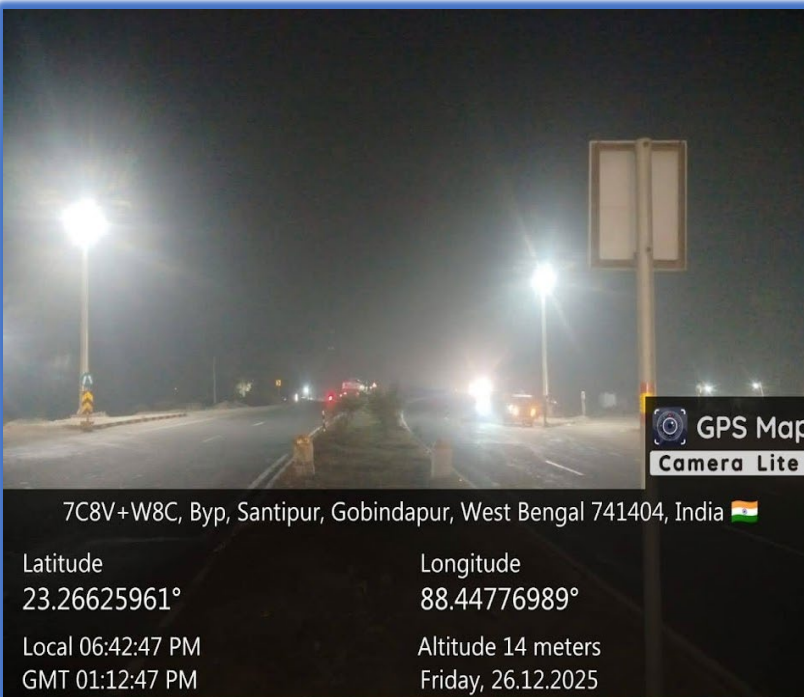
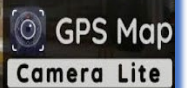
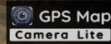
Longitude
88.44674464°
Altitude 14 meters



7C8V+W8C, Shantipur Byp, Gobindapur, West Bengal 741404, India 🇮🇳

Latitude
23.26677177°
Local 06:45:52 PM

Longitude
88.4433681°
Altitude 14 meters



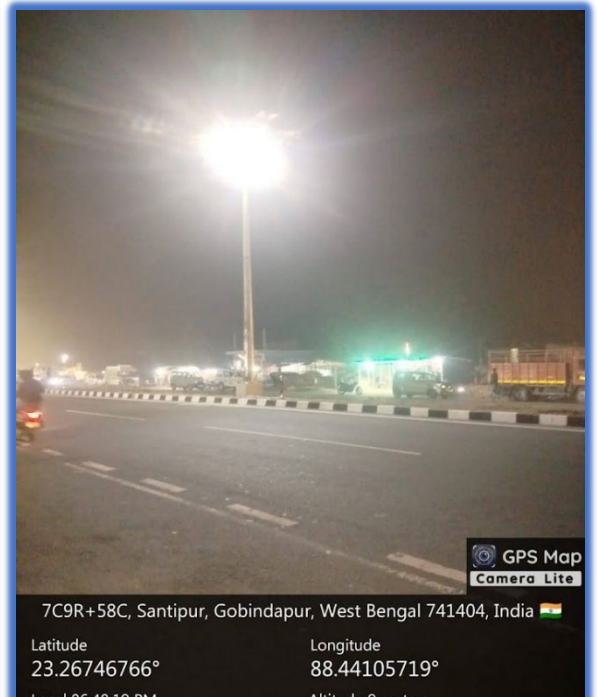
7C8V+W8C, Byp, Santipur, Gobindapur, West Bengal 741404, India 🇮🇳

Latitude
23.26625961°

Longitude
88.44776989°

Local 06:42:47 PM
GMT 01:12:47 PM

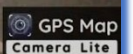
Altitude 14 meters
Friday, 26.12.2025

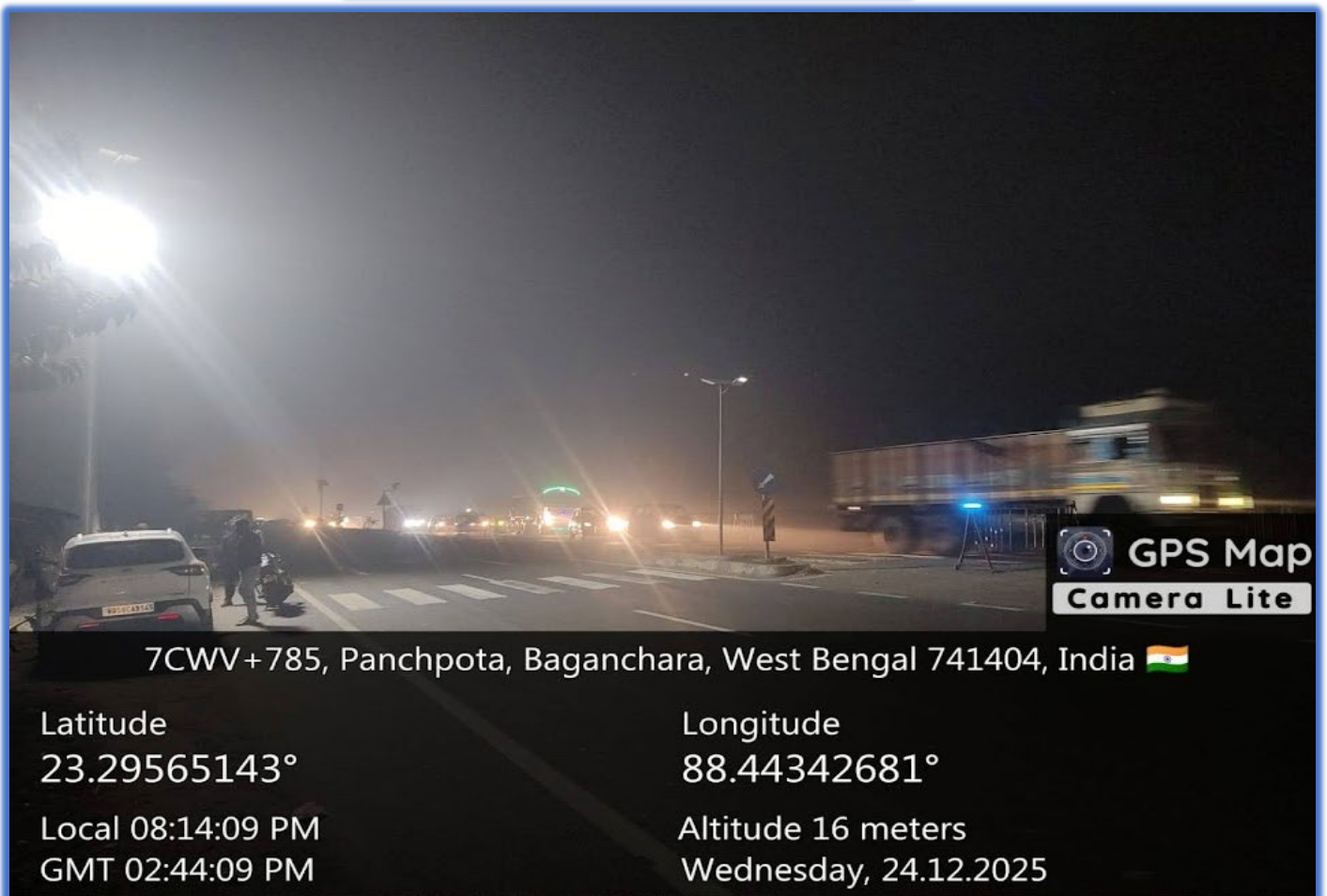


7C9R+58C, Santipur, Gobindapur, West Bengal 741404, India 🇮🇳

Latitude
23.26746766°
Local 06:48:19 PM

Longitude
88.44105719°
Altitude 9 meters





- **Bibliography & references:** - i) www.google.com, ii) www.wikipedia.com, iii) www.inverted.in, iv) www.highmastbpp.com, v) www.hrsolarsolution.com, vii) www.minarindia.in, etc.