



**GREEN ENERGY INTERNATIONAL
LIMITED**



LEKOIL NIGERIA LIMITED



**ACEBEACON GLOBAL ENERGY LIMITED
CONTRACTOR**

PROJECT COMPLETION REPORTS

FOR

**ENGINEERING, PROCUREMENT, CONSTRUCTION, INSTALLATION AND COMMISSIONING OF LPG
PLANT PERIMETER LIGHTING, EARTHING SYSTEM AND LIGHTNING PROTECTION SYSTEM AT
OTAKIKPO MARGINAL FIELD, ANDONI, RIVERS STATE.**

AND

**PROCUREMENT, SUPPLY, AND INSTALLATION OF TEMPORARY (SOLAR LIGHT) PERIMETER
LIGHTING SYSTEM AT OTAKIKPO MARGINAL FIELD, ANDONI, RIVERS STATE.**

07 SEPTEMBER, 2022



**GREEN ENERGY INTERNATIONAL
LIMITED**



LEKOIL NIGERIA LIMITED






**ACEBEACON GLOBAL ENERGY LIMITED
CONTRACTOR**

**SUPPLY AND INSTALLATION OF SOLAR & MAIN PERIMETER LIGHTING AT OTAKIKPO
MARGINAL FIELD, ANDONI, RIVERS STATE.**

PROJECT COMPLETION REPORT

GEIL-LEK-AGEL-PJM-RPT-001

20 JULY 2022

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 2 of 15

ABBREVIATIONS

AGEL	ACEBEACON GLOBAL ENERGY LIMITED
GEIL	GREEN ENERGY INTERNATIONAL LIMITED

DEFINITIONS

COMPANY	GREEN ENERGY INTERNATIONAL LIMITED / LEKOIL NIGERIA LIMITED
CONTRACTOR	ACEBEACON GLOBAL ENERGY LIMITED






	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 3 of 15

TABLE OF CONTENT

1 INTRODUCTION	4
1.1 PROJECT BACKGROUND	4
1.2 SCOPE OF WORK	4
1.3 REPORT DESCRIPTION	4
2 OTAKIKPO LPG FACILITY LIGHTING PHILOSOPHY	5
2.1 MAIN LIGHTING	5
2.2 TEMPORARY/BACK-UP LIGHTING	5
3 EQUIPMENT SPECIFICATIONS	6
3.1 SOLAR LIGHT FITTING	6
3.2 MAIN LIGHT FITTING	6
3.3 LIGHTING CONTROL PANEL	6
3.4 JUNCTION BOX	6
4 TEST RESULTS	7
5 PICTURES	8
6 COMPLETION STATEMENT	13
7 APPENDIX	15
7.1 AS-BUILT DRAWINGS	15

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 4 of 15

1 INTRODUCTION

1.1 Project Background

The Otakikpo LPG Extraction plant project is targeted at removing LPG, Propane & Condensate Products from rich associated gas of Otakikpo Marginal field.

To achieve this project, hence the need for the provision of solar and main perimeter lighting for the entire Otakikpo LPG Extraction plant facility.

1.2 Scope of Work



The scope of this project covers the procurement, construction, installation and commissioning of 41 nos. solar light fittings mounted on 41 nos. poles and 127 nos. main light fittings mounted on 41 nos. poles for the entire Otakikpo LPG Extraction plant facility.

The following components were supplied and installed to achieve the above setup:

1. 6m high galvanized flight poles
2. Solar light fittings
3. Ex-de Light fittings
4. Ex-de Junction boxes
5. Lighting control panel

1.3 Report Description

This Document reports the work done in procurement, construction, installation and commissioning of pole-mounted solar and main light fittings at Otakikpo LPG Extraction plant facility.

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 5 of 15

2 OTAKIKPO LPG FACILITY LIGHTING PHILOSOPHY

2.1 Solar lighting




Temporary lighting with solar is a great alternative to main lighting for many applications, providing perimeter lighting with an even light spread, without the glare, noise, fumes, ongoing fuel costs and maintenance.

The solar-powered perimeter lights at Otakikpo LPG have a fully automatic operation and zero local emissions. During daylight hours solar energy is collected and stored in the batteries. In low light or night-time, the LED light activates automatically. The illumination also increases to 100% when movement is detected within 10m of the light. Once the movement has stopped, after a few minutes the light will dim to 40%. This means that the solar light will only work when needed them to, and hence no need to manually turn lamp off and on.

2.2 Main Lighting


Perimeter security lighting is a vital part of an overall layered security plan. The benefits of lighting are many, but for security lighting system, it must deliver as a minimum the following: Provide a clear view of an area for the purpose of work, allowing movement to be easily detected, deny potential hiding places along frequently traveled foot routes, allow for facial recognition with electronic monitoring systems and on-site security personnel and deter crime against persons and property.

The perimeter main light at Otakikpo consist of 127 nos pole mounted 300kW explosion-proof LED flood lights. The lighting control automatically by the photocell which activated in low light or night-time. The Ex-de lighting panel consists of 7 nos 3pole outgoing circuits and protected by control circuit breakers.


	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 6 of 15

3 EQUIPMENT SPECIFICATIONS


3.1 Solar Light fitting

a	Ingress Protection rating	IP65	
b	Battery Charge time	6-7 hours (Approx.)	
c	Discharge Time	Over 12 hours	
d	Lighting area	15 meters approx.	
e	Unit lifespan	30,000 hours	
f	Beam angle	120°60	
g	Luminous Efficiency	110LN/W	


3.2 Main light fitting




a	Manufacturer	Harvells-EX Atex	
b	Type	Explosion-proof LED light	
c	Power	300W	
d	Input	AC85-265V, 50Hz	
e	CCT	6000-7000K	
f	Ingress Protection rating	IP67	

3.3 Lighting Control Panel

a	IP Rating	IP66	
b	Group, category, type of protection, temperature class	Ex II 2 GD Ex d IIC T6, T5, T4, T3 Gb Ex tb IIIC T85 °C, T100 °C, T135 °C, T200 °C Db	
c	Enclosures	AISI 316L (1.4404) stainless steel	
d	Conformity	EN 60529	
e	System voltage	400V AC	
e	Controls	Breakers, Contactors & Photocell	




3.4 Junction box

a	IP Rating	IP66	
b	Material	Aluminium Die Cast	
c	Feature	Flameproof, Weatherproof	
d	Type	3 Way	
e	Gas Group	IIA, IIB, Ex-d	
f	Shape	Rectangular	

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 7 of 15

4 TEST RESULTS

S/N	Test	Result
1	Continuity Test	Confirmed OK
2	Insulation Resistance	Avg. 5 GΩ @ 1000VDC
3	Photocell By-pass	Available
4	Perimeter Lighting Photocell Functionality	Confirmed OK
5	Earth Leakages on Poles and Junction boxes	No earth leakages
6	Solar Lighting Photocell Functionality	Confirmed OK
7	Power to the Lighting Panel and Junction boxes.	Confirmed OK
8	Line to Line voltages to Lighting Panel and all Junction boxes	400V
9	Line to neutral voltages to lighting fittings	230V
10	Functionality of all Perimeter/Solar Lighting Fittings	Confirmed OK

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 8 of 15

5 PICTURES



Fig 4.1: Perimeter lighting setting out



Fig 4.2: Casting of light pole base



Fig 4.3: Prepared pole pedestal



Fig 4.4: Light fittings prepared and terminated




	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 9 of 15



Fig 4.5: Erected light pole



Fig 4.6: Mounting solar light on erected light pole



Fig 4.7: Erection of light pole with solar and main light fittings



Fig 4.8: Casting of Cable slab




	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 10 of 15



Fig 4.9: Excavation of cable route



Fig 4.10: Pipes for cable road crossing



Fig 4.11: Re-Painting of light poles



Fig 4.12: Casting of cable marker


	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 11 of 15



Fig 4.13: Laying of cable slab on cable way



Fig 4.14: Termination of cabled in lighting JB



Fig 4.15: Light cables in cable tray and extra protection for JB



Fig 4.16: Insulation resistance testing of cables




	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 12 of 15



Fig 4.17: Testing of lighting panel



Fig 4.18: Connected lighting panel



Fig 4.19: Solar lighting illumination



Fig 4.20: Solar lighting illumination



	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 13 of 15



Fig 4.21: Daylight testing of Perimeter light




Fig 4.22: Main lighting illumination

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 14 of 15


6

COMPLETION STATEMENT

This Project has been tested and confirmed to be sufficient for the purpose it was designed for. We hereby report this project as commissioned.


 22/07/2022

Engr. Ohore Utomeno Timipre
Electrical Project Engineer
ACEBEACON GLOBAL ENERGY LIMITED

 22/07/2022




Sign

Name: Anackwe Alathan-I
Designation: Electrical Lead
GREEN ENERGY INTERNATIONAL LIMITED

 22/07/22

Sign

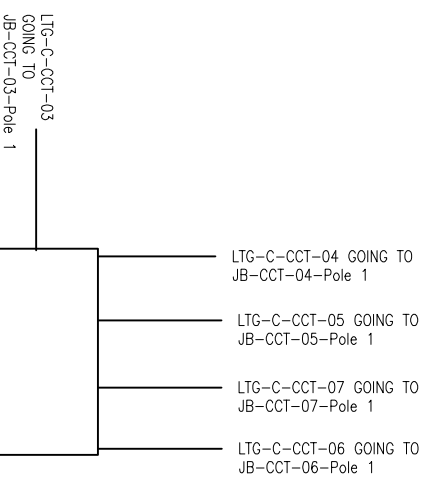
Name: Vitus Ugwu
Designation: Proj. Engr (E&I)
LEKOIL NIGERIA LIMITED

	Document No: GEIL-LEK-AGEL-PJM-RPT-001		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 15 of 15

7 APPENDIX

7.1 As-Built Drawings

- NOTE:
1. CLOUDED AREA DENOTED MODIFICATIONS MADE DUE TO PERMANENT OBSTRUCTIONS ON SITE
 2. ALL MODIFICATIONS WERE APPROVED BY SITE PROJECT ENGINEER

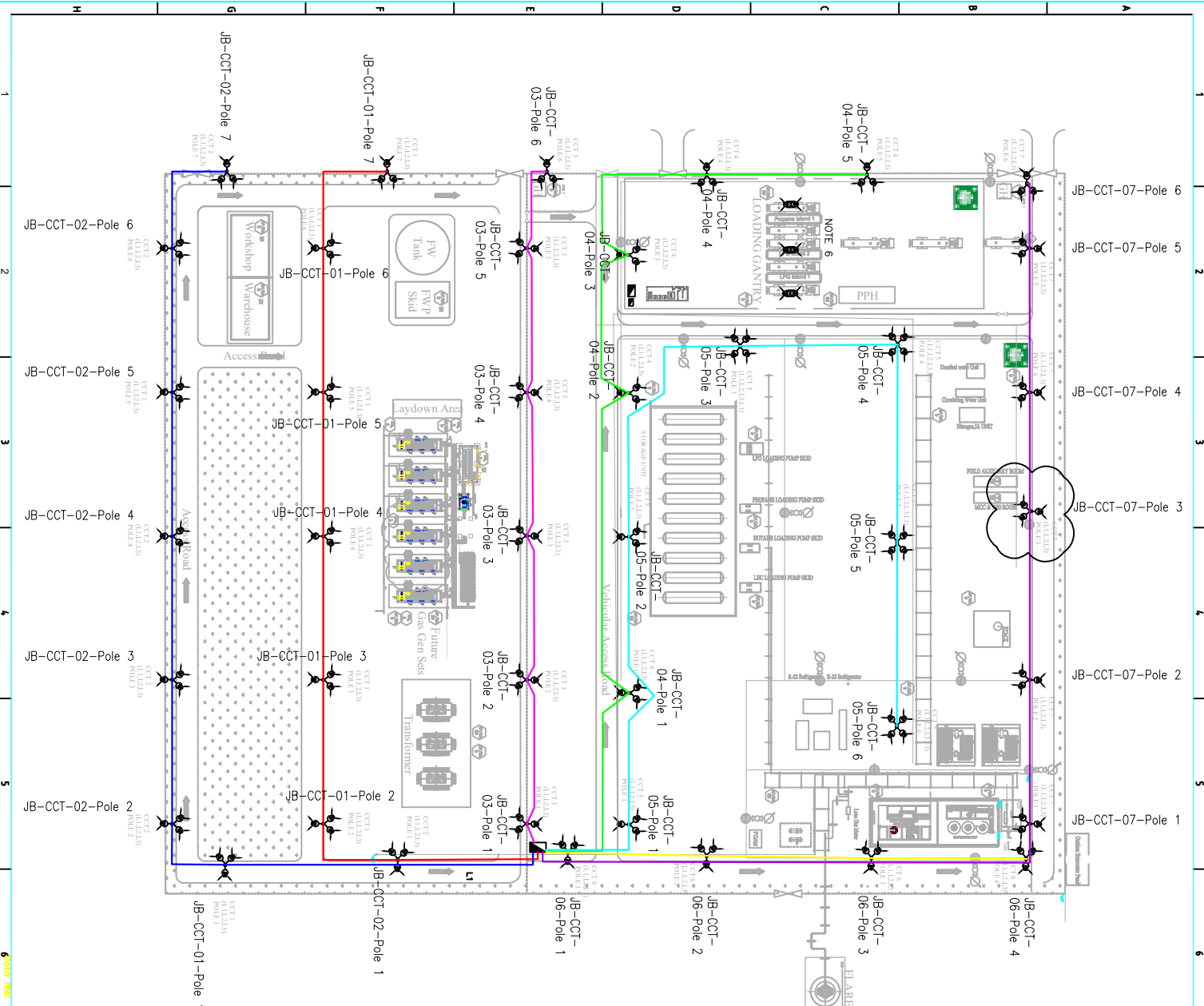


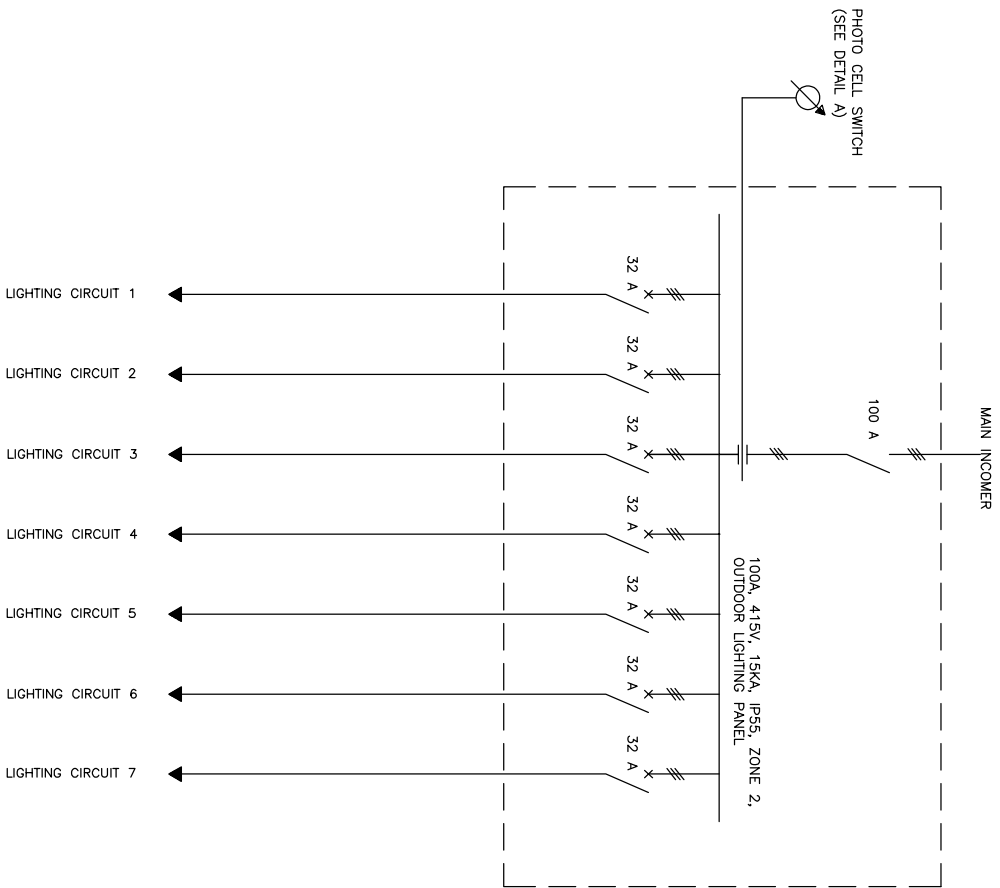
LTG-C-CCT-02 GOING TO JB-CCT-02-Pole 1

LTG-C-CCT-01 GOING TO JB-CCT-01-Pole 1

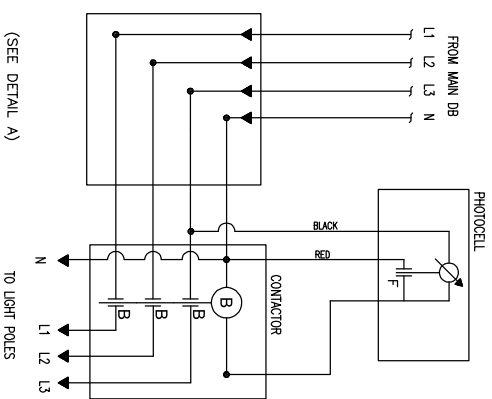
CABLE TAG AT DB

GREEN ENERGY INTERNATIONAL LIMITED				JOB N			
LEKOIL				LEKOIL INTERNATIONAL LIMITED			
CONTRACTOR LOGO AND BUSINESS NAME				CONTRACTOR DOC IDENTIFICATION			
AGREEMENT GLOBAL ENERGY LIMITED				AGEL-DWG-ELE-003			
PROJECT TITLE				CONTRACT N.			
INSULATION OF PERIMETER LIGHTS				RECTOR DOC IDENTIFICATION			
DOCUMENT TITLE				ORDER N.			
PERIMETER LIGHTING LAYOUT				SCALE: SHEET NO. PAPER SIZE: 1 OF 10 A3			
SHEET NO. PAPER SIZE: 1 OF 10 A3				SUPERSEDED BY N			
LOCATION				APPROVED BY N			
DATE				PROJECT NO. CONTRACT VALUE			





CONNECTION DIAGRAM FOR LIGHTING CONTROL PANEL

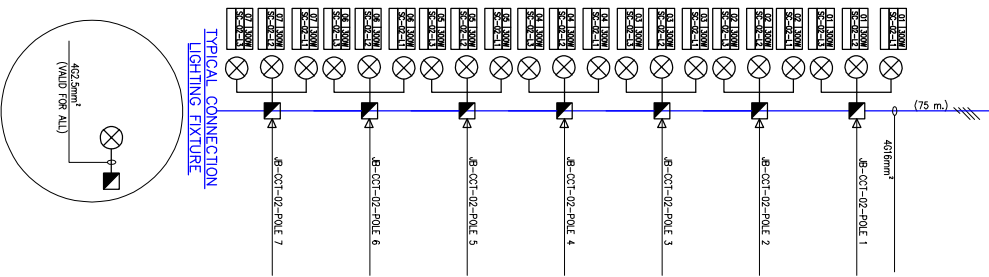
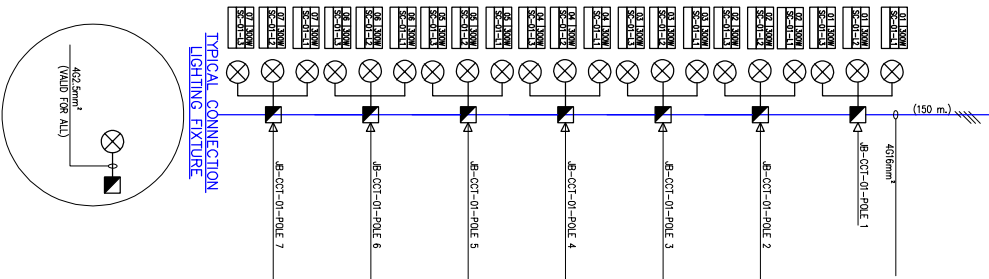


LIGHTING CONTROL PANEL WITH PHOTOCELL
CONNECTION DETAILS

01		07/06/22	APPROVED FOR CONST.	M.I.	C.A.	A.O.			
VALIDATION	STATUS	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION	REV.	DATE
REV. INDEX	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION
GREEN ENERGY INTERNATIONAL LIMITED									
LEKOIL									
LEKOIL NIGERIA LIMITED									
CONTRACTOR LOGO AND BUSINESS NAME									
ACERBACON GLOBAL ENERGY LIMITED									
PROJECT TITLE									
INSTALLATION OF PERIMETER LIGHTS									
DOCUMENT TITLE									
LIGHTING CONTROL PANEL CONNECTION DIAGRAM									
SCALE: SHEET NO/PAPER SIZE									
4 OF 10 A3									
SUPERSEDED BY N									
LOCATION									
PAGES IN DOCUMENT SET									
10									

CIRCUIT BREAKER	CIRCUIT No.		Street Lighting Circuit 1
	300W QUANTITY		21
	CURRENT[A] / POWER[kW]		11.4 / 6.3
	CURRENT[A] / POWER[kW]		11.4 / 6.3
EARTHING LEAKAGE DEVICE	RATED CURRENT		4x20A (3 Single pole breakers)
	SIZE		10KA
	RATED CURRENT		10KA
	EARTHING LEAKAGE DEVICE		0.03A Idn

CIRCUIT BREAKER	CIRCUIT No.		Street Lighting Circuit 2
	300W QUANTITY		21
	CURRENT[A] / POWER[kW]		11.4 / 6.3
	CURRENT[A] / POWER[kW]		11.4 / 6.3
EARTHING LEAKAGE DEVICE	RATED CURRENT		4x20A (3 Single pole breakers)
	SIZE		10KA
	RATED CURRENT		10KA
	EARTHING LEAKAGE DEVICE		0.03A Idn



⊗	Lighting Fixture
SC	Street Lighting Control
JB	Junction Box
■	Junction Box Symbol

LEGEND

01	07/06/22	APPROVED FOR CONST.	M.I.	C.A.	A.O.				
STATUS	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION
REV. INDEX	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION

GREEN ENERGY INTERNATIONAL LIMITED	CONTRACTOR LOGO AND BUSINESS NAME
LEKOIL	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

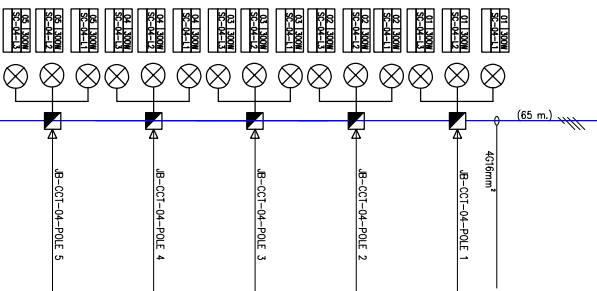
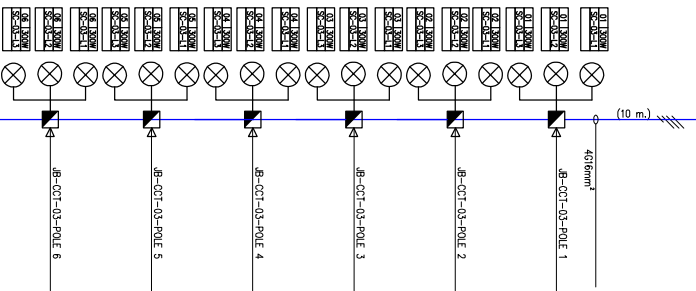
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME
AGEL-DWG-ELE-003	CONTRACTOR LOGO AND BUSINESS NAME

CIRCUIT BREAKER	DATA	
	CIRCUIT No.	Street Lighting Circuit 3
	300W QUANTITY	18
	CURRENT [A] / POWER[kW]	9.7 / 5.4
	SIZE	4x20A (3 Single pole breakers)
EARTHING LEAKAGE DEVICE	RATED CURRENT	10kA
	0.03A Idn	

CIRCUIT BREAKER	DATA	
	CIRCUIT No.	Street Lighting Circuit 4
	300W QUANTITY	15
	CURRENT [A] / POWER[kW]	8.1 / 4.5
	SIZE	4x16A (3 Single pole breakers)
EARTHING LEAKAGE DEVICE	RATED CURRENT	10kA
	0.03A Idn	



LEGEND	
⊗	Lighting Fixture
JB	Street Lighting Circuit
JB	Junction Box
⬢	Junction Box Symbol

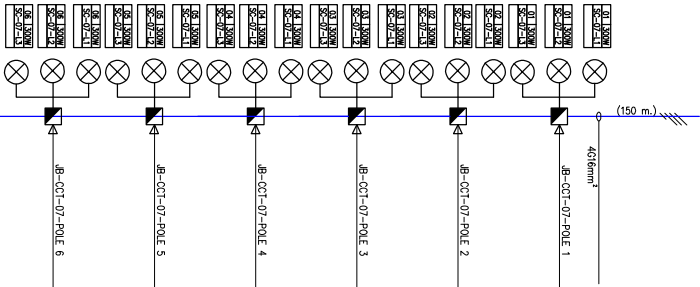
TYPICAL CONNECTION
LIGHTING FIXTURE

TYPICAL CONNECTION
LIGHTING FIXTURE

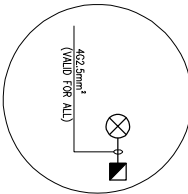
LEGEND

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

DATA		CIRCUIT No.	Street Lighting Circuit 7
300W QUANTITY			18
CURRENT[A] / POWER[kW]	SIZE	4x20A (3 Single pole breakers)	9.7 / 5.4
RATED CURRENT		10kA	
EARTHING LEAKAGE DEVICE		0.03A 1dn	

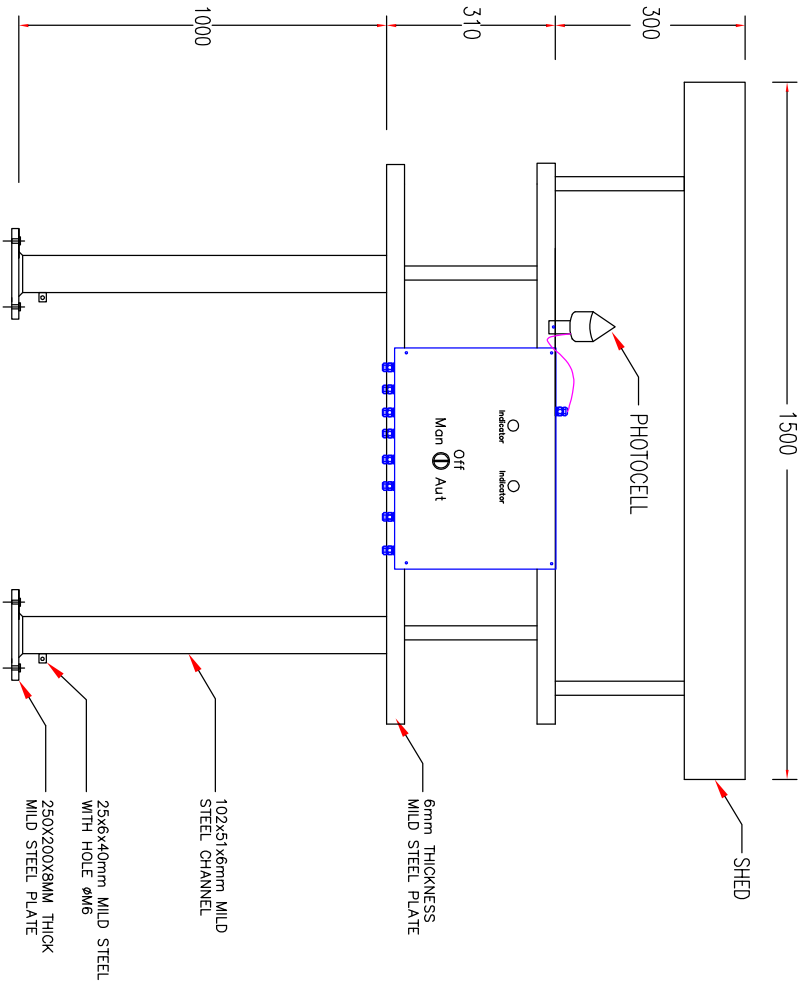


TYPICAL CONNECTION
LIGHTING FIXTURE



LEGEND			
⊗	Lighting Fixture		
JB	Street Lighting Circuit		
JB	Junction Box		
⊗	Junction Box Symbol		

		01		07/06/22		APPROVED FOR CONST.		M.I.		C.A.		A.O.							
VALIDATION		STATUS		REV.		DATE		DESCRIPTION		REV.		DATE		DESCRIPTION		REV.		DATE	
REV. INDEX																			
GREEN ENERGY INTERNATIONAL LIMITED																			
CONTRACTOR LOGO AND BUSINESS NAME																			
LEKOLL																			
LEKOLL NIGERIA LIMITED																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CONTRACTOR LOGO AND BUSINESS NAME																			
CON																			



OUTDOOR LIGHTING CONTROL PANEL MOUNTING WITH SHED

AI	01	07/06/22	APPROVED FOR CONST.	ML	CA	AO			
VALIDATION STATUS	REV.	DATE	DESCRIPTION	REV.	CHK.	APP.	DATE	CHK.	DATE
REV. INDEX					BY	BY			
GREEN ENERGY INTERNATIONAL LIMITED									
CONTRACTOR LOGO AND BUSINESS NAME									
CONTRACT N.									
VENDOR DOC. IDENTIFICATION									
ORDER N.									
PROJECT TITLE									
INSTALLATION OF PRIMER LIGHTS									
SCALE:									
9 OF 10 A3									
SUPERSEDED BY N									
LOCATION									
ISSUED BY									
DATE									



**GREEN ENERGY INTERNATIONAL
LIMITED**



LEKOIL NIGERIA LIMITED






**ACEBEACON GLOBAL ENERGY LIMITED
CONTRACTOR**

**SUPPLY AND INSTALLATION OF LIGHTNING PROTECTION SYSTEM AT OTAKIKPO
MARGINAL FIELD, ANDONI, RIVERS STATE.**

PROJECT COMPLETION REPORT

GEIL-LEK-AGEL-PJM-RPT-002

20 JULY 2022




	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 2 of 15

ABBREVIATIONS




AGEL	ACEBEACON GLOBAL ENERGY LIMITED
GEIL	GREEN ENERGY INTERNATIONAL LIMITED

DEFINITIONS

COMPANY	GREEN ENERGY INTERNATIONAL LIMITED / LEKOIL NIGERIA LIMITED
CONTRACTOR	ACEBEACON GLOBAL ENERGY LIMITED

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 3 of 15

1 INTRODUCTION	4
1.1 PROJECT BACKGROUND	4
1.2 SCOPE OF WORK	4
1.3 REPORT DESCRIPTION	4
2 LIGHTNING PROTECTION EQUIPMENT	5
2.1 LIGHTNING ARRESTOR	5
2.2 PREVECTRON 3® S60 STANDARD COMPLIANCE AND TECHNICAL VALIDATION	5
3 EQUIPMENT SPECIFICATIONS	6
3.1 LIGHTNING ARRESTOR	6
3.2 BARE COPPER TAPE	6
3.3 INSPECTION PIT CHAMBER	6
3.4 EARTH ROD	7
3.5 EARTH RESISTANCE TESTER	7
4 TEST RESULTS	8
4.1 LIGHTNING MAST 001	8
4.2 LIGHTNING MAST 002	8
4.3 LIGHTNING MAST 003	8
5 LIGHTNING ARRESTOR MONITORING	9
5.1 LOGIN INFORMATION	9
5.2 REMOTELY MONITORED PARAMETERS	9
5.3 MONITORING INTERFACE	9
5.4 TEST PARAMETERS	10
6 PICTURES	11
7 COMPLETION STATEMENT	14
8 APPENDIX	15
8.1 AS-BUILT LAYOUT DRAWINGS	15
8.2 INDELEC ARRESTORS CERTIFICATES	15

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 4 of 15

1 INTRODUCTION

1.1 Project Background

The Otakikpo LPG Extraction plant project is targeted at removing LPG, Propane & Condensate Products from rich associated gas of Otakikpo Marginal field.

To achieve this project, hence the need for the mast-mounted plant wide lightning protection system for the entire Otakikpo LPG Extraction plant facility.

1.2 Scope of Work




The scope of this project covers the construction, installation and commissioning of a mast-mounted plant wide lightning protection system for the entire Otakikpo LPG Extraction plant facility.

The following components below were supplied and installed to achieve the above setup:

1. 30m high mast fit with guyed wires.
2. Lightning Arrestors
3. Copper earth rods, earth mats, chambers and accessories
4. Bare copper tapes
5. Earth cables

1.3 Report Description

This Document reports the work done in construction, installation and commissioning of 3nos mast-mounted lightning protection system at Otakikpo LPG Extraction plant facility

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 5 of 15

2 LIGHTNING PROTECTION EQUIPMENT

2.1 Lightning Arrestor

A lightning arrestor (also called lightning isolator) is a device used on electric power transmission and telecommunication systems to protect the insulation and conductors of the system from the damaging effects of lightning. The typical lightning arrestor has a high-voltage terminal and a ground terminal. When a lightning surge (or switching surge, which is very similar) travels along the power line to the arrestor, the current from the surge is diverted through the arrestor, in most cases to earth.




If protection fails or is absent, lightning that strikes the electrical system introduces thousands of kilovolts that may damage the transmission lines, and can also cause severe damage to transformers and other electrical or electronic devices. Lightning-produced extreme voltage spikes in incoming power lines can damage electrical home appliances or even cause death.

2.2 PREVECTRON 3® S60 Standard Compliance and Technical Validation

Lightning is a natural phenomenon. Lightning air terminals are exposed to a very large range of events: extreme climatic conditions (temperatures, humidity etc), high intensity electrical shocks up to several hundreds of thousands of Amperes and unpredictable lightning frequency.


Lightning Protection standards such as NF-C 17-102, UNE 21 186 or NP4426 include detailed testing procedures that covers such extraordinary tough conditions. The PREVECTRON 3® Connect successfully passed these series of tests. Its integrated Lightning Counter was also tested according to the IEC 62 561 – 6 Edition 2 standard, confirming its full compliance to all relevant standards in the industry.

Lastly, the IoT connected system requires specific attention to work in severe electro-magnetic lightning conditions and meet the CE marking requirements. INDELEC develops dedicated testing processes, both in the LiRi Lab and in real lightning conditions, to confirm the PREVECTRON 3® Connect compatibility in such environment.


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 6 of 15

3 EQUIPMENT SPECIFICATIONS


3.1 Lightning Arrestor




a	Manufacturer	Indelec	
b	Model	PREVECTRON3® S60 EARLY STREAMER EMISSION AIR TERMINAL (ESE)	
c	Power Supply	High Performance LiFePo4 Battery	
d	Operating Temperature range	-15°C to + 55°C	
e	Ingress Protection	IP 54	
f	Lightning current withstanding test (10/350µs)	1imp 100kA (normative test)	
g	Max. current withstanding test	Imax 230 kA (Unicamp)	
h	Quantity installed	3	

3.2 Bare Copper Tape


a	Manufacturer	Furse	
b	Material	Copper	
c	Model	TC030	
d	Dimension (mm)	25x3	
e	Copper Weight Per Metre	0.67 kg	

3.3 Inspection pit chamber


a	Manufacturer	Furse	
b	Model No.	PT205	
c	Material	Polymer	
d	Description	Lockable High Performance Poly	
e	Accessories	6 mm Allen key	


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 7 of 15

3.4 Earth rod

a	Manufacturer	Furse	
b	Material	Copper	
c	Unit length	1.8m	
d	Interconnection method	Copper coupler	
e	Terminal type	Threaded	
f	Percentage of copper	100%	

3.5 Earth Resistance Tester

a	Manufacturer	Megger	
b	Model	DET3TD	
c	Test method	3Points	
d	Resistance accuracy	2% ±3 digits	
e	Calibration status	Valid	

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 8 of 15


4 TEST RESULTS

4.1 Lightning Mast 001

Arrestor Serial number: P1543014345

Module Serial number: P1587000880

Location Description: Near Heavy Hydrocarbon Separation Unit


Test	Result	
Earth Pit Test 1	0.22Ω	
Earth Pit Test 2	0.22Ω	
Average	0.22Ω	

4.2 Lightning Mast 002

Arrestor Serial number: P1543014088

Module Serial number: P1587000900

Location Description: Near Power Plant


Test	Result	
Earth Pit Test 1	0.17Ω	
Earth Pit Test 2	0.30Ω	
Average	0.23Ω	



4.3 Lightning Mast 003

Arrestor Serial number: P1543014091

Module Serial number: P1587000903

Location Description: Near Loading Gantry

Test	Result	
Earth Pit Test 1	0.27Ω	
Earth Pit Test 2	0.37Ω	
Average	0.32Ω	

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 9 of 15

5 LIGHTNING ARRESTOR MONITORING

The lightning arrestor communicates its information to the user on a dedicated and secured web portal.

5.1 Login Information

Link: <https://bo.indelec-connect.com>

Username: *****

Password: *****

Note: Username and Password has been provided to client.

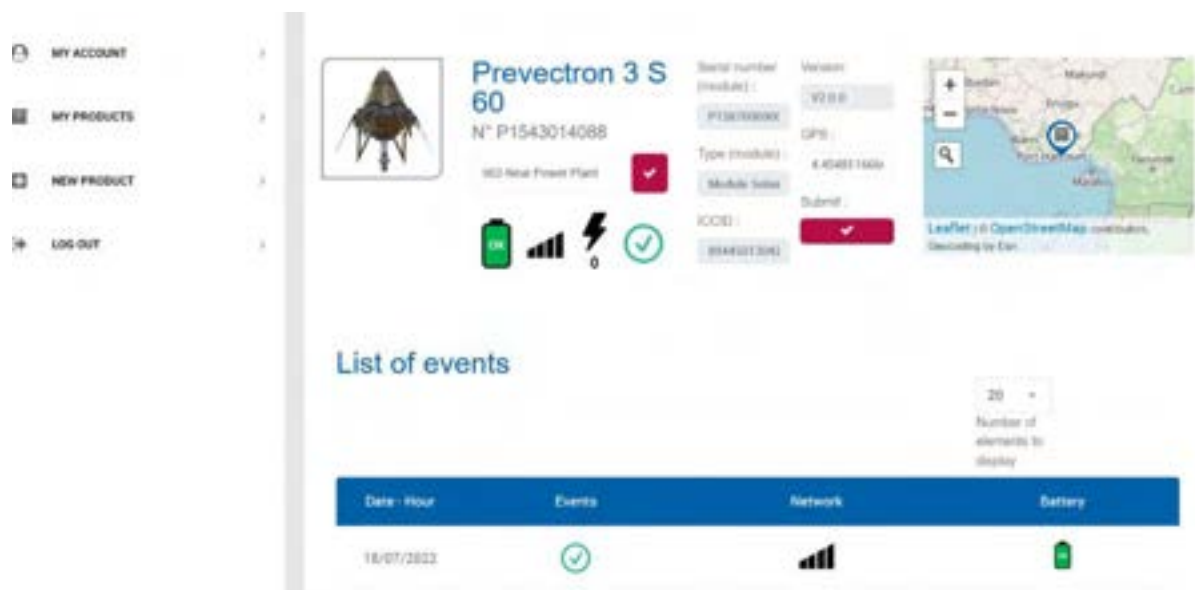
5.2 Remotely Monitored Parameters



The following are information monitored by the Prevectorn®3 Connect program.

- Strike counter
- ESE Lightning rod test status
- Battery level
- GSM signal quality

5.3 Monitoring Interface









Below is a representation of the different parameters as shown in the monitoring interface.





	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 10 of 15

5.4 Test Parameters

The left hand side symbols shows that the test status is faulty and needs some intervention whereas the right hand side symbols shows that the test status is okay and all is functioning well.

01/01/2021	Date de l'évènement Date of the event
 	Initialisation Initialization
 	Etat du paratonnerre Prevector3® Connect Prevector3® Connect Status
 	Qualité du signal Signal quality
 	Niveau de charge batterie Battery charge
 0	Nombre de coups de foudre Lightning discharges number

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 11 of 15

6 PICTURES



Fig 4.1: Mast foundation



Fig 4.2: Mast erection in progress



Fig 4.3: PREVETRON3® S60 ESE connected to mast member



Fig 4.4: Base for guyed wire



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 12 of 15



Fig 4.5: Copper earth mat installation



Fig 4.6: Earth rod installation



Fig 4.7: Earth rod outlet in chamber



Fig 4.8: Megger earth test machine


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 13 of 15



Fig 4.9: Earth resistance test ongoing



Fig 4.10: Aviation light on top of mast



Fig 4.11: Mast guyed wires

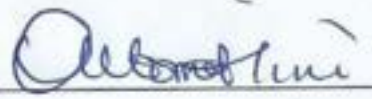


Fig 4.12: Completed mast erection


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 14 of 15

7 COMPLETION STATEMENT

This Project has been tested and confirmed to be sufficient for the purpose it was designed for. We hereby report this project as commissioned.

 22/07/22




Engr. Ohore Utomeno Timipre
Electrical Project Engineer
ACEBEACON GLOBAL ENERGY LIMITED

 22/07/2022
Sign

Name: Anaeke Nathan I.
Designation:
GREEN ENERGY INTERNATIONAL LIMITED

 22/07/22
Sign

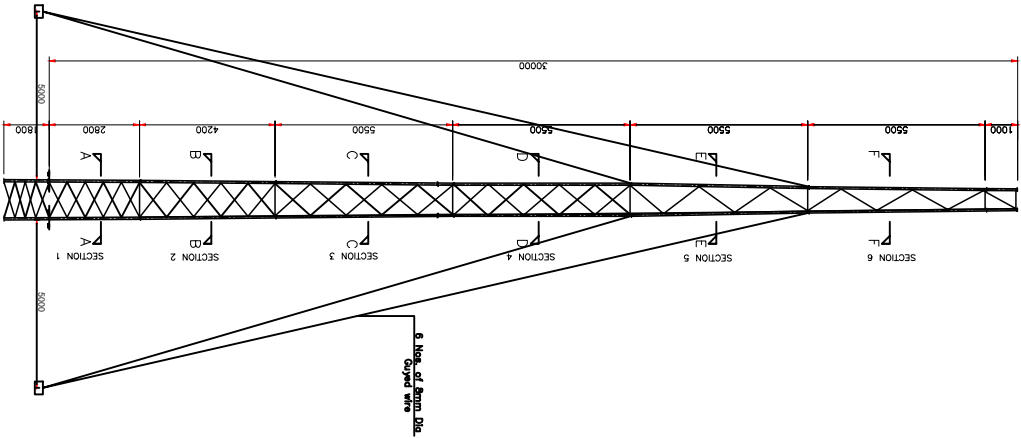
Name: Vitor Ugwu
Designation: Proj. Engr. (E&I)
LEKOIL NIGERIA LIMITED

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 15 of 15

8 APPENDIX

8.1 As-Built Layout Drawings

8.2 Indelec Arrestors Certificates



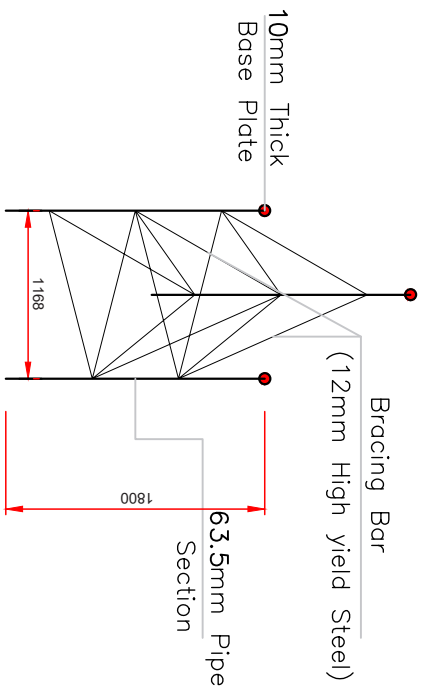
TOWER ELEVATION

AI	01	01/07/20	AS-BUILT	MA	C.A.	A.O.
REVISION	REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
REV. INDEX				BY	BY	BY

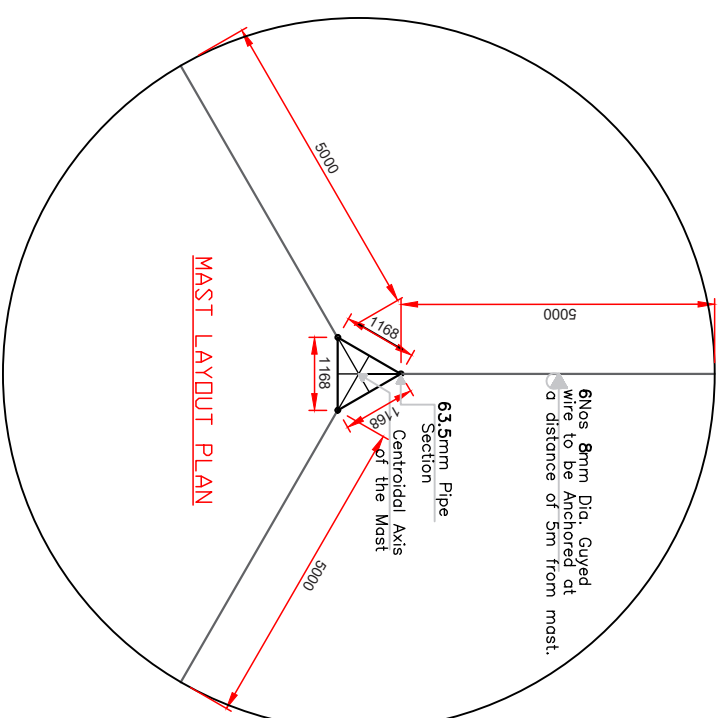
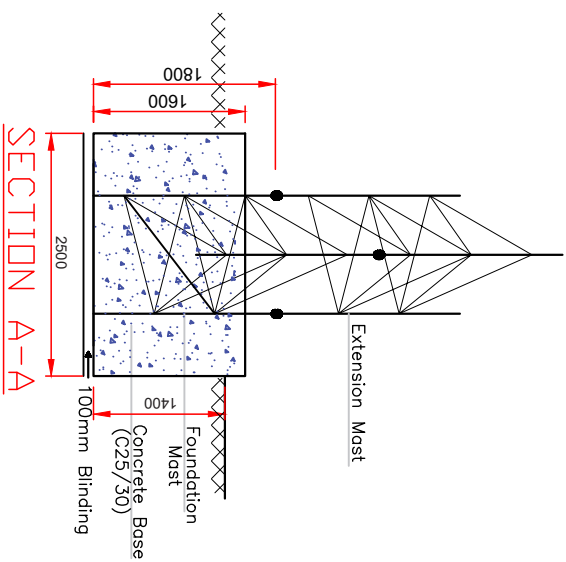
GREEN ENERGY INTERNATIONAL LIMITED	JOB N.
CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR DOC. IDENTIFICATION
LEKOL NIGERIA LIMITED	AGEL-DWG-ELE-001
CONTRACT N.	VERSION DOC. IDENTIFICATION

PROJECT TITLE	ORDER N.
DESIGN & CONSTRUCTION OF LIFTING MAST/PROTECTION SYSTEM	SCALE: 1/3 OF A3
DOCUMENT TITLE	SUPERSEDED BY N.
MAST DIMENSIONS	ISSUED BY N.

CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR DOC. IDENTIFICATION
AGEL-DWG-ELE-001	VERSION DOC. IDENTIFICATION
ORDER N.	SCALE: 1/3 OF A3
SUPERSEDED BY N.	ISSUED BY N.



FOUNDATION MAST
(TO be imbedded in conc. base)

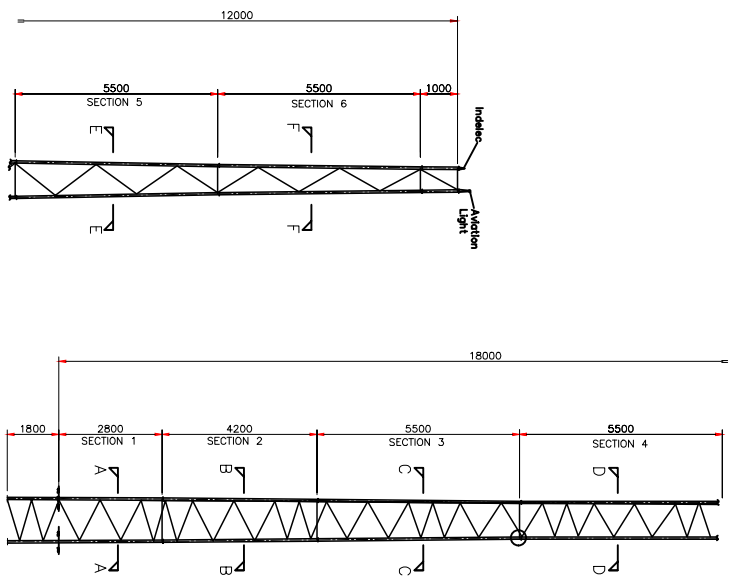
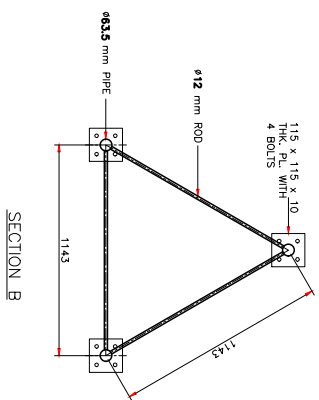


REVISION		DATE	DESCRIPTION	BY	CHK.	APP.	DATE	BY	CHK.	APP.	DATE
01	AS-BUILT	07/07/24									
REVISION		DATE	DESCRIPTION	BY	CHK.	APP.	DATE	BY	CHK.	APP.	DATE
01	AS-BUILT	07/07/24									
REVISION		DATE	DESCRIPTION	BY	CHK.	APP.	DATE	BY	CHK.	APP.	DATE
01	AS-BUILT	07/07/24									

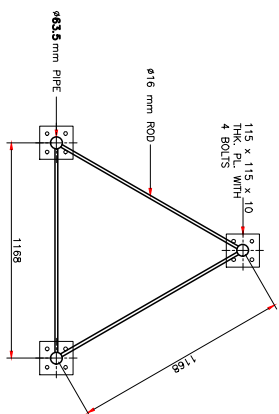
JOB N		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR DOC. IDENTIFICATION	CONTRACT N.	CONTRACTOR DOC. IDENTIFICATION
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001		
ORDER N.		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR DOC. IDENTIFICATION	CONTRACT N.	CONTRACTOR DOC. IDENTIFICATION
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001		
ORDER N.		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR DOC. IDENTIFICATION	CONTRACT N.	CONTRACTOR DOC. IDENTIFICATION
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001		

PROJECT TITLE		SCALE	SHEET NO/PAPER SIZE
DESIGN & CONSTRUCTION OF LIGHTING MAST/PROTECTION SYSTEM		1:50	A3
DOCUMENT TITLE		SUPERSEDED BY N.	
MAST DIMENSIONS			

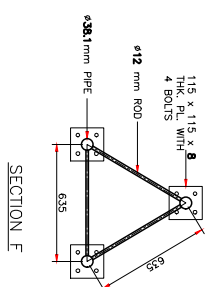
CONTRACTOR LOGO AND BUSINESS NAME		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR LOGO AND BUSINESS NAME
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001
ORDER N.		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR LOGO AND BUSINESS NAME
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001
ORDER N.		CONTRACTOR LOGO AND BUSINESS NAME	CONTRACTOR LOGO AND BUSINESS NAME
GREEN ENERGY INTERNATIONAL LIMITED		LEKOL, NIGERIA LIMITED	ACEI-DWG-ELE-001

TOWER ELEVATION

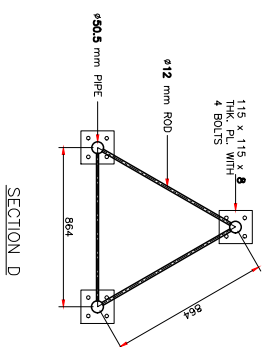
SECTION B



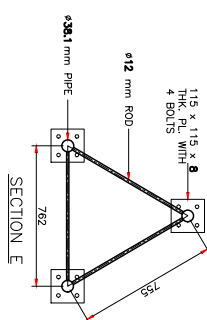
SECTION A



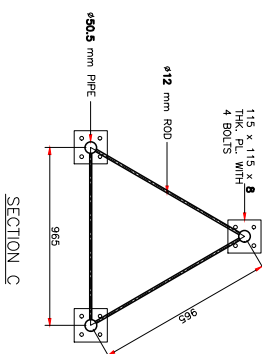
SECTION F



SECTION D



SECTION E




SECTION C

WELDING STATION REF. INDEX	DATE	DESCRIPTION	APP. BY	CHK. BY	APP. BY	COM. BY	APP. BY
A1	01	07/07/22	AS-BUILT	M.I			

GREEN ENERGY INTERNATIONAL LIMITED

COMPANY DOC. IDENTIFICATION

 <p>LEKOL</p> <p>LEKOL NIGERIA LIMITED</p>	<p>JOE N</p> <p>CONTRACTOR DOC. IDENTIFICATION AGEL-DWG-ELE-001 CONTRACT N.</p>
<p>CONTRACTOR LOGO AND BUSINESS NAME</p> <p>ACERBACON GLOBAL ENERGY LIMITED</p> 	<p>VENUE DOC. IDENTIFICATION</p> <p>ORDER N.</p>

PROJECT TITLE	SCALE	SHEET NO. / PAPER SIZE
DESIGN & CONSTRUCTION OF LIGHTNING MAST/PROTECTION SYSTEM	4 OR 6	A3
DOCUMENT TITLE	SUPERSEDED BY N	
MAST DIMENSIONS	LOCATION	
	POWERED LINE EXTENSION PLANT	



Modèle

PREVECTRON® 3 S 60

Numéro de Série

P1543014088

**CERTIFICAT DE TEST, DE GARANTIE ET DE CONFORMITE A LA NORME NF C17-102 : 2011
POUR LES PARATONNERRES A DISPOSITIF D'AMORCAGE PREVECTRON 3®**



Garant : INDELEC SA - 61 Chemin des Postes - 59500 DOUAI - FRANCE

Attention: Ce certificat de garantie s'applique seulement aux paratonnerres à dispositif d'amorçage Prevectron 3® conçus et fabriqués en France par INDELEC SA.



Modèle

PREVECTRON® 3 S 60

Numéro de Série

P1543014091

**CERTIFICAT DE TEST, DE GARANTIE ET DE CONFORMITE A LA NORME NF C17-102 : 2011
POUR LES PARATONNERRES A DISPOSITIF D'AMORCAGE PREVECTRON 3®**



Garant : INDELEC SA - 61 Chemin des Postes - 59500 DOUAI - FRANCE

Attention: Ce certificat de garantie s'applique seulement aux paratonnerres à dispositif d'amorçage Prevectron 3® conçus et fabriqués en France par INDELEC SA.



Modèle

PREVECTRON® 3 S 60

Numéro de Série

P1543014345

**CERTIFICAT DE TEST, DE GARANTIE ET DE CONFORMITE A LA NORME NF C17-102 : 2011
POUR LES PARATONNERRES A DISPOSITIF D'AMORCAGE PREVECTRON 3®**



Garant : INDELEC SA - 61 Chemin des Postes - 59500 DOUAI - FRANCE

Attention: Ce certificat de garantie s'applique seulement aux paratonnerres à dispositif d'amorçage Prevectron 3® conçus et fabriqués en France par INDELEC SA.



**GREEN ENERGY INTERNATIONAL
LIMITED**



LEKOIL NIGERIA LIMITED






**ACEBEACON GLOBAL ENERGY LIMITED
CONTRACTOR**

**SUPPLY AND INSTALLATION OF EARTHING PROTECTION SYSTEM AT OTAKIKPO
MARGINAL FIELD, ANDONI, RIVERS STATE.**

PROJECT COMPLETION REPORT

GEIL-LEK-AGEL-PJM-RPT-003

04 SEPTEMBER 2022




	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 2 of 15

ABBREVIATIONS




AGEL	ACEBEACON GLOBAL ENERGY LIMITED
GEIL	GREEN ENERGY INTERNATIONAL LIMITED

DEFINITIONS

COMPANY	GREEN ENERGY INTERNATIONAL LIMITED / LEKOIL NIGERIA LIMITED
CONTRACTOR	ACEBEACON GLOBAL ENERGY LIMITED

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 3 of 15

1 INTRODUCTION	4
1.1 PROJECT BACKGROUND	4
1.2 SCOPE OF WORK	4
1.3 REPORT DESCRIPTION	4
2 EARTHING PROTECTION SYSTEM	5
2.1 GENERAL	5
2.2 PURPOSES OF EARTHING	5
3 EQUIPMENT SPECIFICATIONS	6
3.1 EARTH ENHANCEMENT MIX	6
3.2 INSPECTION PIT CHAMBER	6
3.3 EARTH ROD	6
3.4 EARTH RESISTANCE TESTER	6
4 TEST RESULTS	7
5 PICTURES	9
6 COMPLETION STATEMENT	14
7 APPENDIX	15
7.1 AS-BUILT LAYOUT DRAWINGS	15

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 4 of 15

1 INTRODUCTION

1.1 Project Background

The Otakikpo LPG Extraction plant project is targeted at removing LPG, Propane & Condensate Products from rich associated gas of Otakikpo Marginal field.

To achieve this project, hence the need for the mast-mounted plant wide lightning protection system for the entire Otakikpo LPG Extraction plant facility.

1.2 Scope of Work




The scope of this project covers the construction, installation and commissioning of earthing protection systems for the entire Otakikpo LPG Extraction plant facility.

The following components were supplied and installed to achieve the above setup:

1. Copper earth rods, earth mats, chambers and accessories
2. Earth enhancement chemical
3. Earth cables

1.3 Report Description

This Document reports the work done in construction, installation and commissioning of 60nos. earth pits fully bonded and earthing of 41nos light poles and lighting control panel Otakikpo LPG Extraction plant facility.

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 5 of 15

2 EARTHING PROTECTION SYSTEM

2.1 General

An earthing system connects specific parts of an electric power system with the ground, typically the Earth's conductive surface, for safety and functional purposes. The choice of earthing system can affect the safety and electromagnetic compatibility of the installation. Regulations for earthing systems vary considerably among countries, though most follow the recommendations of the International Electrotechnical Commission (IEC). Regulations may identify special cases for earthing in mines, in patient care areas, or in hazardous areas of industrial plants.

2.2 Purposes of Earthing

There are three main purposes for earthing:

System earthing

System earthing serves a purpose of electrical safety throughout the system that is not caused by an electrical fault. Its main purpose is to prevent static buildup and to protect against power surges caused by nearby lightning strikes or switching. Static buildup, as induced by friction for example, such as when wind blows onto a radio mast, is dissipated to the Earth. In the event of a surge, a lightning arrester, a surge arrester or a SPD will divert the excess current to the Earth before it reaches an appliance.

System earthing also allows for equipotential bonding to all metalworks to prevent potential differences between them. Having Earth as a common reference point also keeps the electrical system's potential difference limited to the supply voltage.

Equipment earthing

Equipment earthing serves a purpose of electrical safety in an electrical fault. Its main purpose is to prevent equipment damage and the risk of an electric shock. This type of earthing is not an earth connection, technically speaking. When current flows from a line conductor to an earth wire, as is the case when a line conductor makes contact with an earthed surface in a Class I appliance, an automatic disconnection of supply (ADS) device such as a circuit breaker or a RCD will automatically open the circuit to clear the fault.


Functional earthing

Functional earthing serves a purpose other than electrical safety. Example purposes include electromagnetic interference (EMI) filtering in an EMI filter, and the use of the Earth as a return path in a single-wire earth return distribution system.


	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 6 of 15

3 EQUIPMENT SPECIFICATIONS


3.1 Earth Enhancement Mix

a	Product	Marconite	
b	Packaging size	25kg	
c	Packaging type	bag	
d	Physical state	Powder	


3.2 Inspection pit chamber




a	Manufacturer	Furse	
b	Model No.	PT205	
c	Material	Polymer	
d	Description	Lockable High Performance Poly	
e	Accessories	6 mm Allen key	

3.3 Earth rod

a	Manufacturer	Furse	
b	Material	Copper	
c	Unit length	1.8m	
d	Interconnection method	Copper coupler	
e	Terminal type	Threaded	
f	Percentage of copper	100%	




3.4 Earth Resistance Tester

a	Manufacturer	Megger	
b	Model	DET3TD	
c	Test method	3Points	
d	Resistance accuracy	2% ±3 digits	
e	Calibration status	Valid	




	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 7 of 15

4 TEST RESULTS

Pit Tag	Results	
	Individual (Ω)	Bonded (Ω)
Earth Pit 1	0.52	0.42
Earth Pit 2	0.63	0.37
Earth Pit 3	0.47	0.25
Earth Pit 4	0.51	0.60
Earth Pit 5	0.55	0.75
Earth Pit 6	0.67	0.12
Earth Pit 7	0.49	0.32
Earth Pit 8	0.71	0.32
Earth Pit 9	0.66	0.25
Earth Pit 10	0.54	0.29
Earth Pit 11	0.69	0.32
Earth Pit 12	0.50	0.30
Earth Pit 13	0.62	0.30
Earth Pit 14	0.46	0.73
Earth Pit 15	0.68	0.40
Earth Pit 16	0.66	0.39
Earth Pit 17	0.64	0.21
Earth Pit 18	0.58	0.60
Earth Pit 19	0.71	0.55
Earth Pit 20	0.53	0.28
Earth Pit 21	0.45	0.75
Earth Pit 22	0.51	0.57
Earth Pit 23	0.64	0.29
Earth Pit 24	0.72	0.71
Earth Pit 25	0.45	0.57
Earth Pit 26	0.31	0.32
Earth Pit 27	0.49	0.23
Earth Pit 28	0.70	0.19
Earth Pit 29	0.36	0.32
Earth Pit 30	0.55	0.34
Earth Pit 31	0.60	0.33
Earth Pit 32	0.67	0.41
Earth Pit 33	0.55	0.31

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 8 of 15

Earth Pit 34	0.67	0.33
Earth Pit 35	0.64	0.46
Earth Pit 36	0.49	0.34
Earth Pit 37	0.56	0.34
Earth Pit 38	0.62	0.34
Earth Pit 39	0.47	0.35
Earth Pit 40	0.62	0.40
Earth Pit 41	0.51	0.11
Earth Pit 42	0.58	0.11
Earth Pit 43	0.63	0.66
Earth Pit 44	0.51	0.61
Earth Pit 45	0.47	0.46
Earth Pit 46	0.55	0.47
Earth Pit 47	0.67	0.46
Earth Pit 48	0.64	0.46
Earth Pit 49	0.49	0.57
Earth Pit 50	0.62	0.56
Earth Pit 51	0.71	0.43
Earth Pit 52	0.66	0.50
Earth Pit 53	0.66	0.47
Earth Pit 54	0.45	0.37
Earth Pit 55	0.54	0.42
Earth Pit 56	0.68	0.20
Earth Pit 57	0.53	0.53
Earth Pit 58	0.69	0.53
Earth Pit 59	0.46	0.25
Earth Pit 60	0.71	0.50

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 9 of 15

5 PICTURES



Fig 5.1: Excavation and cable laying



Fig 5.2: Earth mat installed



Fig 5.3: Copper cables connected to earth rod



Fig 5.4: Earth rod in ground

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 10 of 15



Fig 5.5: Termination of lighting pole to earth



Fig 5.6: Earth chambers



Fig 5.7: Earth rod installation process



Fig 5.8: Driving down earth rod

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 11 of 15



Fig 5.9: Earthing enhancement chemical



Fig 5.10: Cable laying on road crossing



Fig 5.11: Bonding of earth grid with c-clamp



Fig 5.12: Cable bonding ongoing

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 12 of 15



Fig 5.13: Site restoration



Fig 5.14: Earth chamber numbering



Fig 5.15: Test probe on copper rod



Fig 5.16: Test result for earth pit 15

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 13 of 15



Fig 5.17: Test result for earth pit 37



Fig 5.18: Testing result



Fig 5.19: Testing team



Fig 5.20: Testing team


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 14 of 15

6 COMPLETION STATEMENT


This Project has been tested and confirmed to be sufficient for the purpose it was designed for. We hereby report this project as commissioned.

 06/09/22




Engr. Igbinosa Moses
Electrical Project Engineer
ACEBEACON GLOBAL ENERGY LIMITED

 06/09/2022
Sign

Name: Harrison Erasmus
Designation: Assist Elect
GREEN ENERGY INTERNATIONAL LIMITED

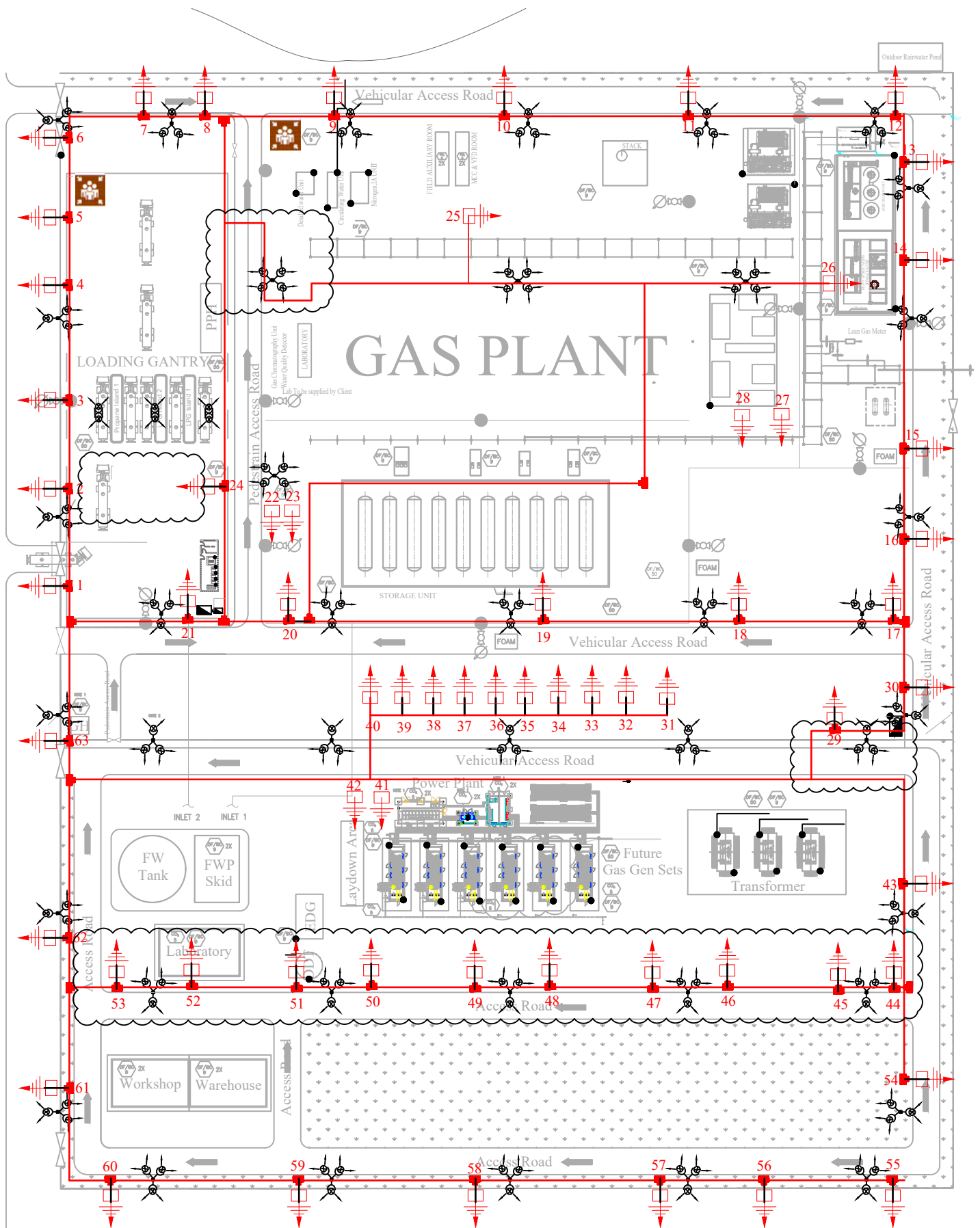
 06/09/2022
Sign

Name: Votus Ugwu
Designation: Proj. Engr.
LEKOIL NIGERIA LIMITED

	Document No: GEIL-LEK-AGEL-PJM-RPT-003		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 15 of 15




7 APPENDIX

7.1 As-Built Layout Drawings



NOTE:

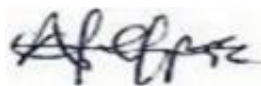
- 1: CLOUDED AREA DENOTES MODIFICATIONS MADE DUE TO EXISTING PERMANENT OBSTRUCTIONS SUCH AS ROADS AND OTHER STRUCTURES
- 2: ALL MODIFICATIONS WERE APPROVED BY SITE PROJECT ENGINEER

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 1 of 35

1 OVERALL PROJECT COMPLETION STATEMENT




I, Engr. Anikpo Chukwuka, Managing Director Acebeacon Global Energy Limited, hereby certifies that:

1. All works has been performed in accordance with the scope of work and terms of the contract.
2. All minor modifications and field adjustments were duly approved by the site checker.
3. As-built drawings has been completed and attached to the appropriate project reports.
4. Site has been restored to its previous state after completion of work.
5. All remaining materials have been handed over to JV.
6. All labourers have been paid in full for all works done.

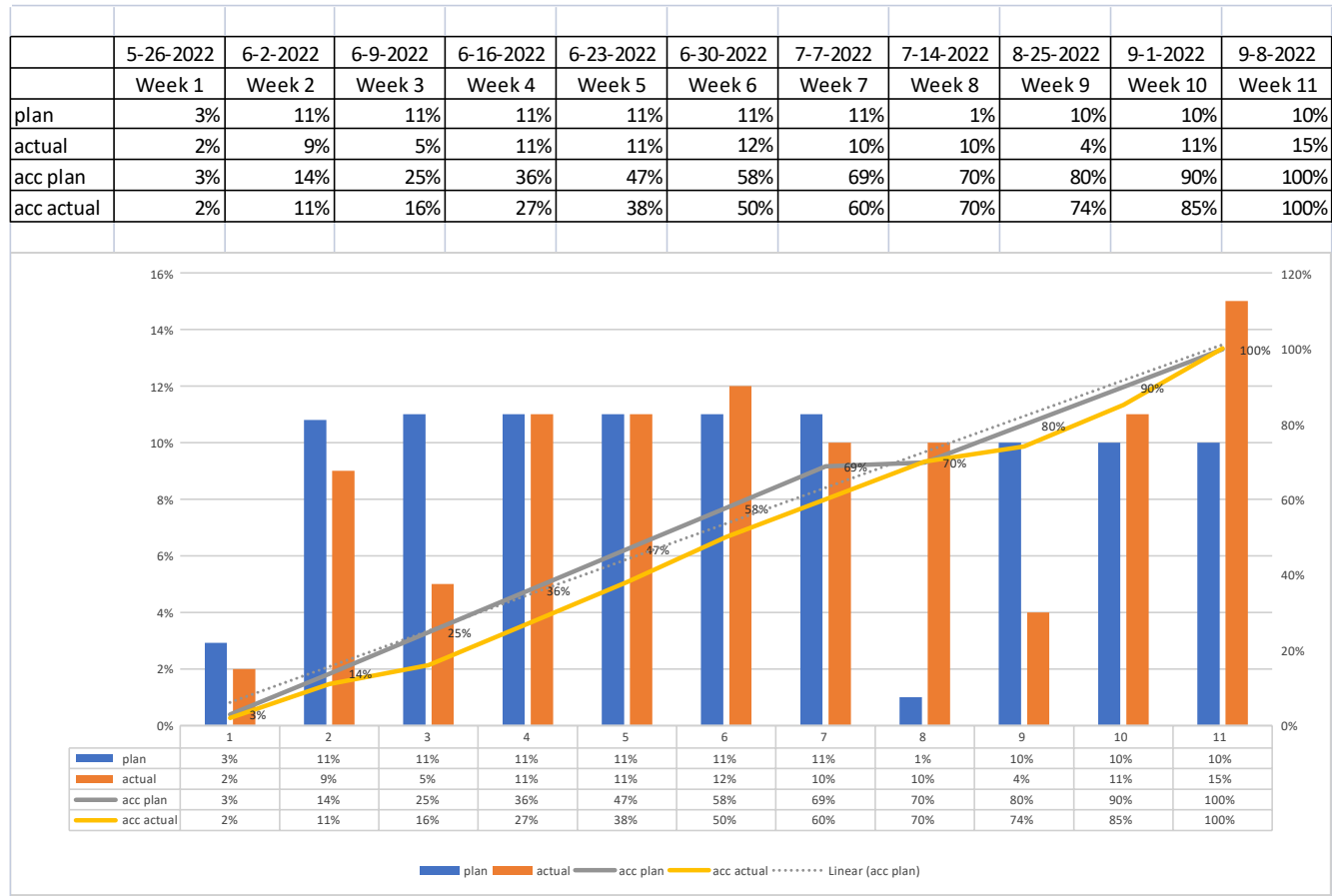


Engr. Anikpo Chukwuka,

Wednesday, 07 September2022,

	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 2 of 35

2 COMPLETED PROJECT S-CURVE




	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 3 of 35

3 PROJECT PHOTO GALLERY

3.1 Solar/Main Perimeter Lighting



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 4 of 35




	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 5 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 6 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 7 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 8 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 9 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 10 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 11 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 12 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 13 of 35



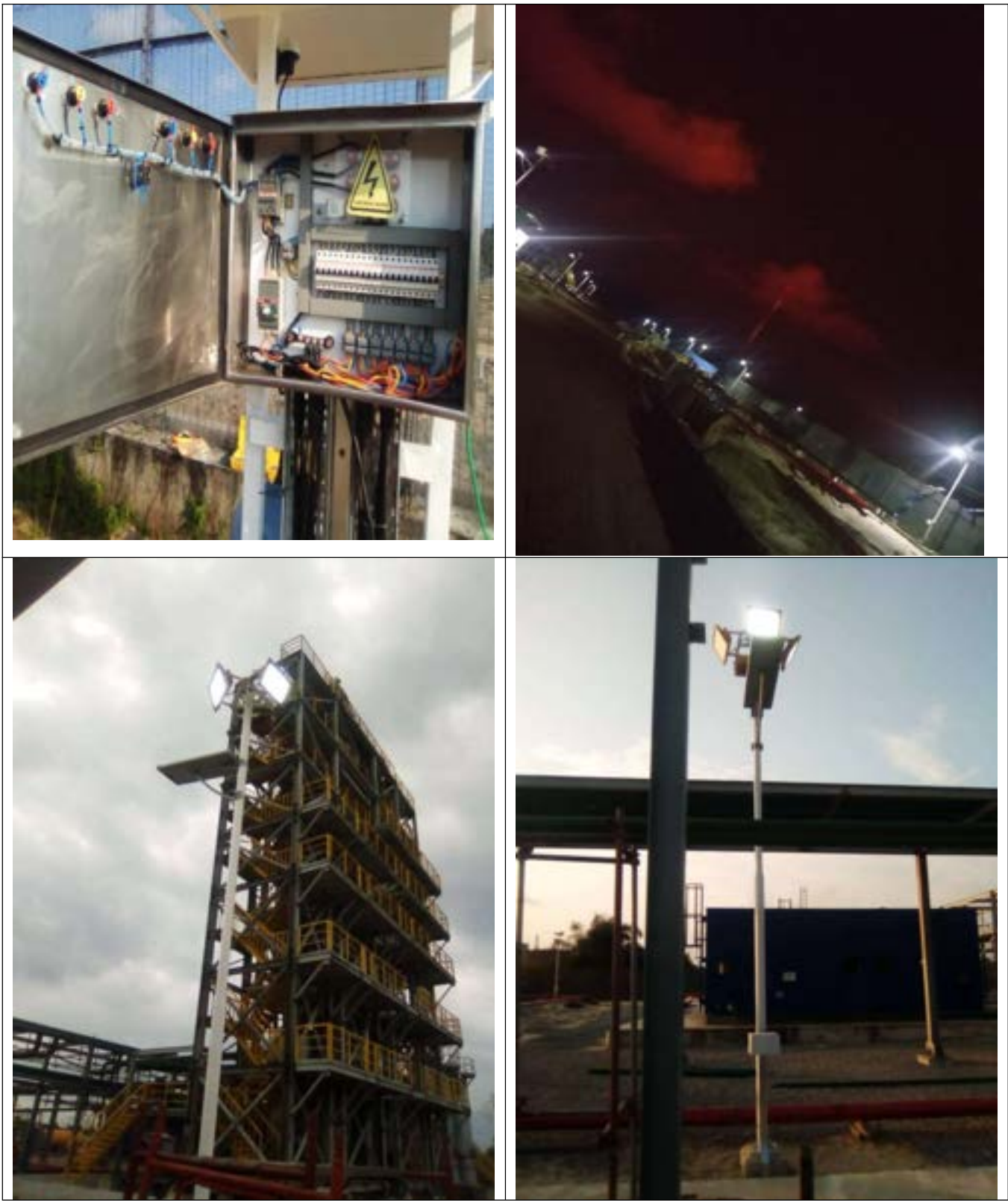
	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 14 of 35



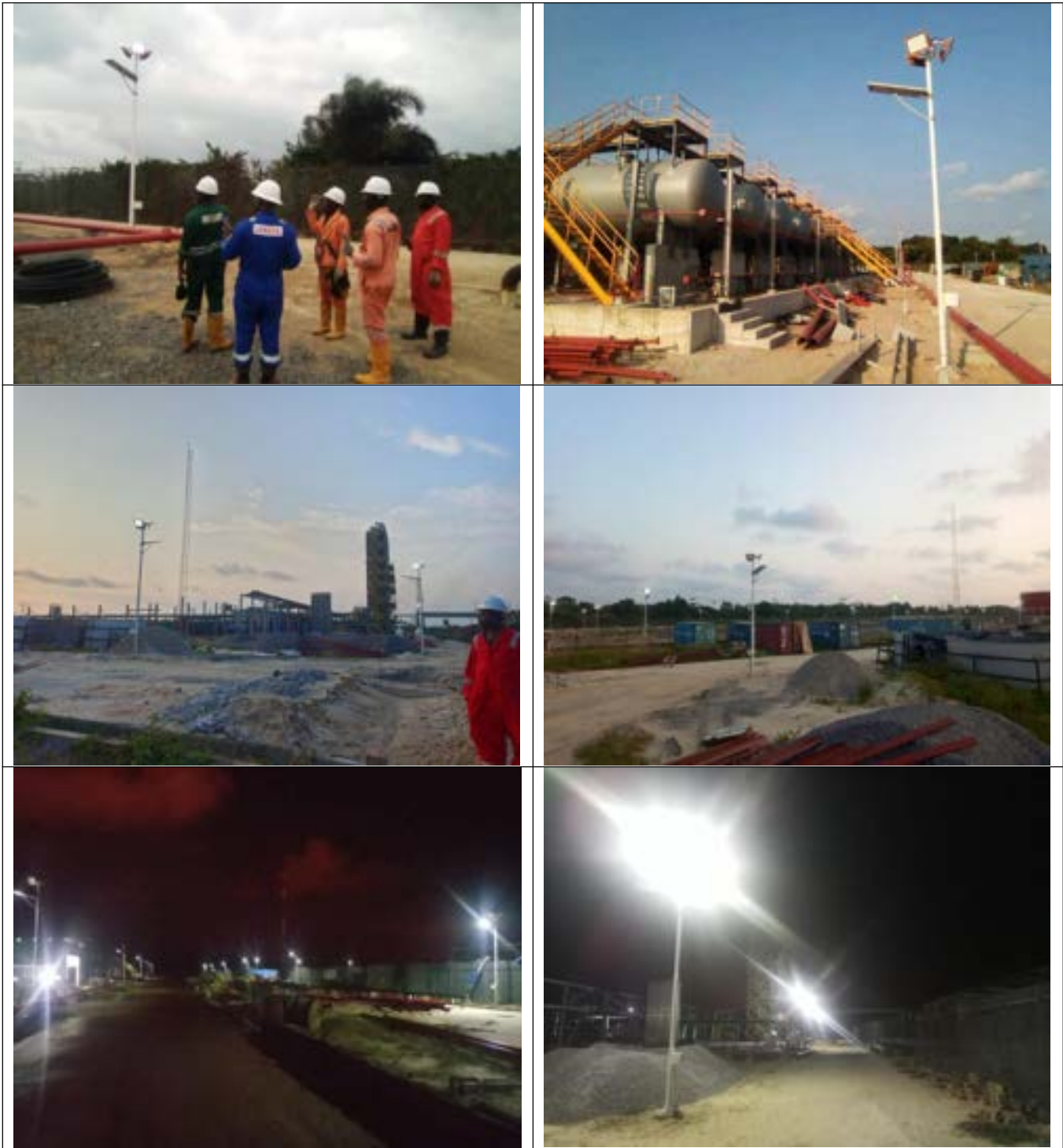
	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 15 of 35



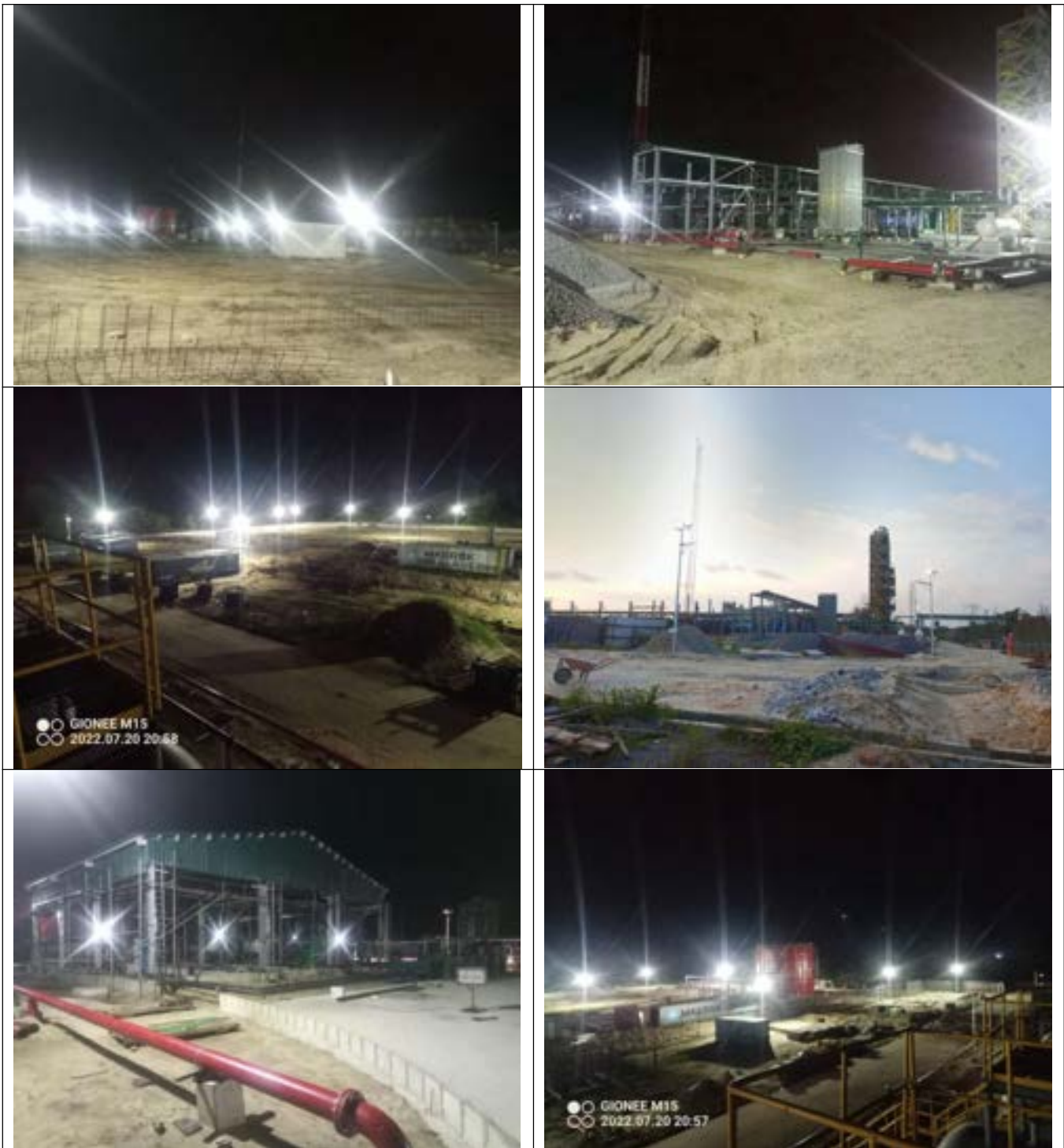
	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 16 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 17 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 18 of 35

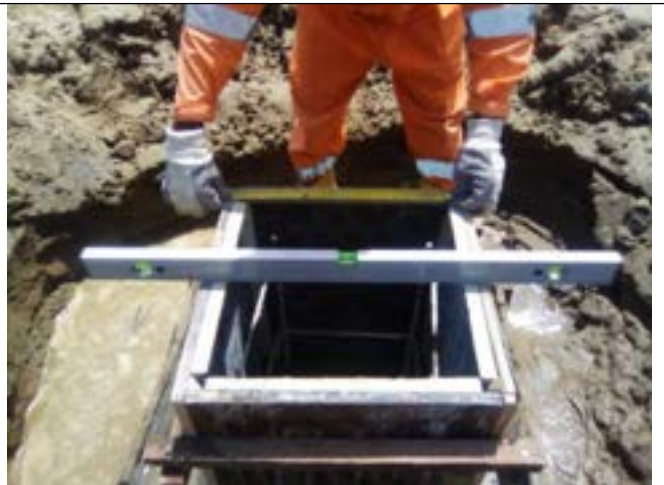


	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 19 of 35

3.2 Lightning Protection System



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 20 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 21 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 22 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 23 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 24 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 25 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 26 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 27 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 28 of 35

3.3 Earthing Protection System



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 29 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 30 of 35




	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 31 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 32 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 33 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 34 of 35



	Document No: GEIL-LEK-AGEL-PJM-RPT-002		Contract No:	
Rev: A1	Document Title: WORK COMPLETION REPORT			Page: 35 of 35

