

BILL OF MATERIALS FOR DAMAKASUWA PHC ELECTRICAL RETROFIT

CLINIC BLOCK				TOILET				DAMAKASUWA TOTAL
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	34	1	Ceiling fan	No.		34
2	18 Watts CFL	No.	283	2	18 Watts CFL	No.	7	290
3	Roof mounted luminaire	No.	133	3	Roof mounted luminaire	No.	5	138
4	Wall mounted luminaire	No.	15	4	Wall mounted luminaire	No.	2	17
5	1 Gang light switch	No.	34	5	1 Gang light switch	No.		34
6	2 Gang light switch	No.	3	6	2 Gang light switch	No.	3	6
7	3 Gang light switch	No.	2	7	3 Gang light switch	No.		2
8	13 Amp socket single	No.	46	8	13 Amp socket single	No.		46
9	13 Amp socket double	No.	68	9	13 Amp socket double	No.		68
10	15 Amp socket	No.		10	15 Amp socket	No.		0
11	Junction box	No.	301	11	Junction box	No.	10	311
12	Single patress box (flush)	No.	85	12	Single patress box (flush)	No.	3	88
13	Double patress box (flush)	No.	68	13	Double patress box (flush)	No.	0	68
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	36	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	1	37
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	2
18	100A distribution board	No.	2	18	100A distribution board	No.		2
19	60A distribution board	No.		19	60A distribution board	No.		0
20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.	2	21	100A consumer unit	No.		2
22	60A consumer unit	No.		22	60A consumer unit	No.		0
23	30A consumer unit	No.		23	30A consumer unit	No.	1	1
24	100A Residual current circuit breaker	No.	4	24	100A Residual current circuit breaker	No.		4
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.	1	1
27	100A change over	No.	2	27	100A change over	No.		2
28	60A change over	No.		28	60A change over	No.		0
29	30A change over	No.		29	30A change over	No.		0
1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)				
30	AL1 (Lighting circuit)	Mts	190	30	AL11 (Lighting circuit)	Mts	110	
31	AL2 (Lighting circuit)	Mts	130	31		Mts		
32	AL3 (Lighting circuit)	Mts	120	32		Mts		
33	AL4 (Lighting circuit)	Mts	200	33		Mts		
34	AL5 (Lighting circuit)	Mts	190	34		Mts		
35	AL6 (Lighting circuit)	Mts	160	35		Mts		
36	AL7 (Ceiling fan circuit)	Mts	150	36		Mts		
37	AL8 (Ceiling fan circuit)	Mts	130	37		Mts		
38	AL9 (Ceiling fan circuit)	Mts	150	38		Mts		
39	AL10 (Ceiling fan circuit)	Mts	130	39		Mts		
40	Total 1.5mm cable	Mts	1550	40	Total 1.5mm cable	Mts	110	1660
2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)				
41	AP1 (Socket circuit)	Mts	80	41				
42	AP2 (Socket circuit)	Mts	70	42				
43	AP3 (Socket circuit)	Mts	70	43				
44	AP4 (Socket circuit)	Mts	80	44				
45	AP5 (Socket circuit)	Mts	70	45				
46	AP6 (Socket circuit)	Mts	80	46				
47	AP7 (Socket circuit)	Mts	60	47				
48	AP8 (Socket circuit)	Mts	60	48				
49	AP9 (Socket circuit)	Mts	70	49				
50	AP10 (Socket circuit)	Mts	70	50				
51	AP11 (Socket circuit)	Mts	70	51				
52	AP12 (Socket circuit)	Mts	70	52				
53	AP13 (Socket circuit)	Mts	70	53				
54	AP14 (Socket circuit)	Mts	80	54				
55	AP15 (Socket circuit)	Mts	80	55				
56	AP16 (Socket circuit)	Mts	70	56				
57	Total 2.5mm cable	Mts	1150	57	Total 2.5mm cable	Mts	0	1150
58	4x16mm PVC/SWA/PVC armoured cable	Mts	100	58	4x16mm PVC/SWA/PVC armoured cable	Mts		100
59	4x10mm PVC/SWA/PVC armoured cable	Mts		59	4x10mm PVC/SWA/PVC armoured cable	Mts		0
60	4x6mm PVC/SWA/PVC armoured cable	Mts		60	4x6mm PVC/SWA/PVC armoured cable	Mts	60	60
61	4x4mm PVC/SWA/PVC armoured cable	Mts		61	4x4mm PVC/SWA/PVC armoured cable	Mts		0
62	Cable terminating lugs	No.	16	62	Cable terminating lugs	No.	16	32
63	Recline cable (25mm)	Mts	60	63	Recline cable (25mm)	Mts		60
64	Earth wire for building (16mm)	Mts	70	64	Earth wire for building (16mm)	Mts	60	130
65	Underground marking tape	Mts	100	65	Underground marking tape	Mts	60	160

DRAWING NO:	KCS/EM/RD/BOM/PHC8	REVISION NO:	2	Rev. DATE:
DESIGN BY:	MARTIN UNUAKHE			
DRAWN BY:	DANIEL MDMOH			
DATE:	OCTOBER			



Kaduna Clinic Solar
BILL OF MATERIAL
FOR DAMAKASUWA PHC

Material quantities required for the electrical installation

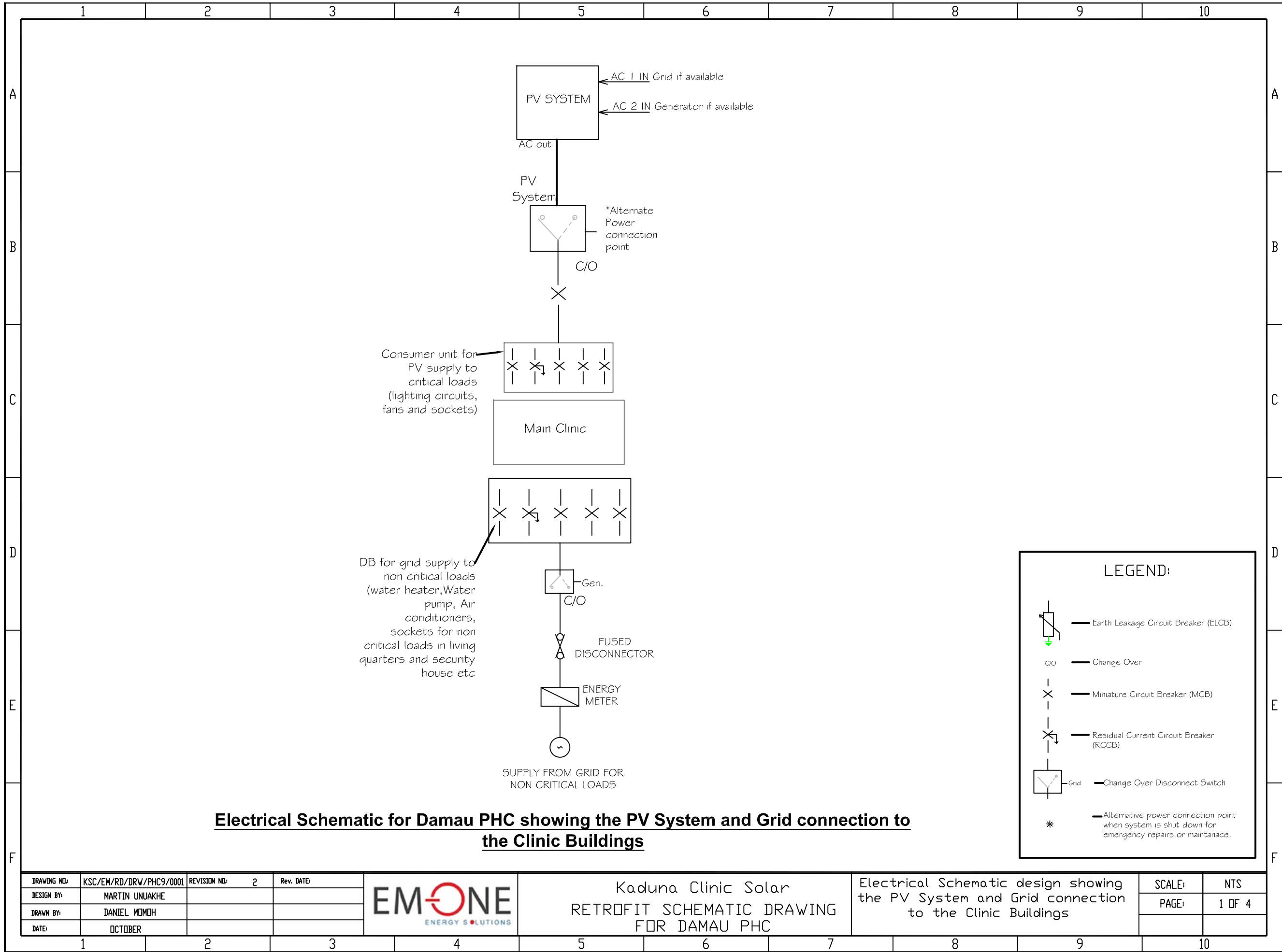
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KADUNA CLINICS PROJECT KCS/EM/RD/DRW/PHC9

Electrical System Design for Damau PHC

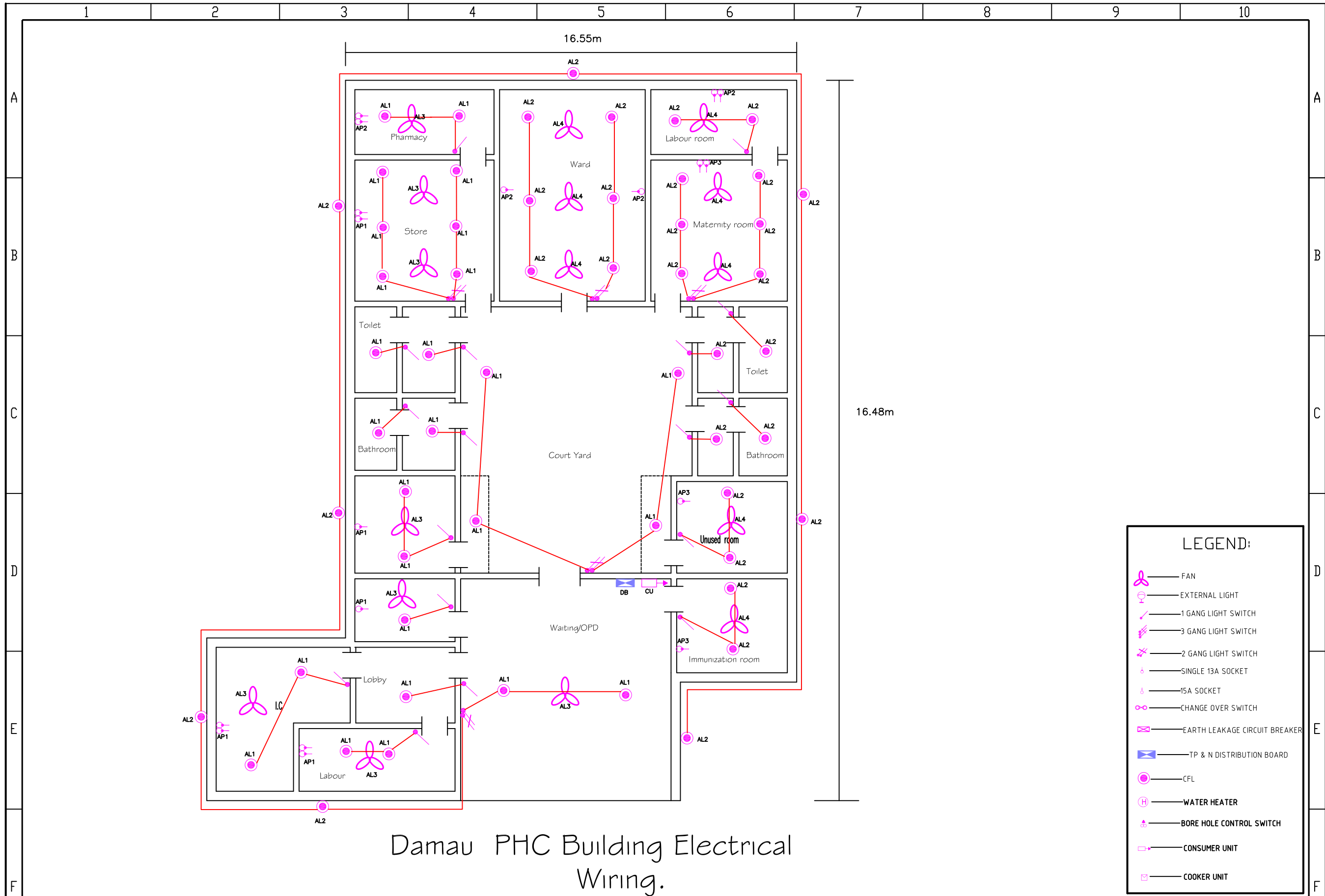
- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
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October 2015



Electrical Schematic for Damau PHC showing the PV System and Grid connection to the Clinic Buildings

DRAWING NO:	KSC/EM/RD/DRW/PHC9/0001	REVISION NO:	2	Rev. DATE:			Kaduna Clinic Solar RETROFIT SCHEMATIC DRAWING FOR DAMAU PHC	Electrical Schematic design showing the PV System and Grid connection to the Clinic Buildings	SCALE:	NTS
DESIGN BY:	MARTIN UNUAKHE				PAGE:				1 OF 4	
DRAWN BY:	DANIEL MOMOH									
DATE:	OCTOBER									



Damau PHC Building Electrical Wiring.

LEGEND:

- FAN
- EXTERNAL LIGHT
- 1 GANG LIGHT SWITCH
- 3 GANG LIGHT SWITCH
- 2 GANG LIGHT SWITCH
- SINGLE 13A SOCKET
- 15A SOCKET
- CHANGE OVER SWITCH
- EARTH LEAKAGE CIRCUIT BREAKER
- TP & N DISTRIBUTION BOARD
- CFL
- WATER HEATER
- BORE HOLE CONTROL SWITCH
- CONSUMER UNIT
- COOKER UNIT

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Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR DAMAU PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
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LOAD TABLE FOR DAMAU PHC

POWER SOURCE: GRID		MAIN CLINIC- 60A DISTRIBUTION BOARD								TOTAL (W)
CIRCUIT IDENTITY	AAC1									
MCB RATING	20A									
DIVERSITY FACTOR	0.6									
LIGHTING CIRCUIT										
COOLING SYSTEM (CEILING FAN)										
13AMP SOCKET FOR EQUIPMENT POWERING										-
15AMP SOCKET FOR EQUIPMENT POWERING	1,500									1,500
PEAK LOAD (W)										1,500
FINAL SUB-CIRCUIT	13A SOCKET OUTLET		SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	
CABLE SIZES IN mm	3x2.5mm									

POWER SOURCE: PV SYSTEM		MAIN CLINIC- 100A CONSUMER UNIT								TOTAL (W)
		SYSTEM ID: DAMAU SYS 1								
		CAPACITY: 28,080 KWP								
CIRCUIT IDENTITY	AL1	AL2	AL3	AL4	AP1	AP2	AP3			
MCB RATING	10A	10A	10A	10A	20A	20A	20A			
DIVERSITY FACTOR	0.9	0.9	0.9	0.9	0.6	0.6	1.6			
LIGHTING CIRCUIT	468	540								1,008
COOLING SYSTEM (CEILING FAN)			600	600						1,200
13AMP SOCKET FOR EQUIPMENT POWERING										228
PEAK LOAD (W)										2,436
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET			SPARE	SPARE		
CABLE SIZES IN mm	3x1.5mm			3x2.5mm						

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Kaduna Clinic Solar
LOAD DISTRIBUTION TABLE
FOR DAMAU PHC

Analysis of power distribution
within the Clinic buildings

SCALE:	NTS
PAGE:	3 OF 4

BILL OF MATERIALS FOR DAMAU PHC ELECTRICAL RETROFIT

CLINIC BLOCK				DAMAU TOTAL
S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	16	16
2	18 Watts CFL	No.	56	56
3	Roof mounted luminaire	No.	48	48
4	Wall mounted luminaire	No.	8	8
5	1 Gang light switch	No.	17	17
6	2 Gang light switch	No.	5	5
7	3 Gang light switch	No.		0
8	13 Amp socket single	No.	6	6
9	13 Amp socket double	No.	6	6
10	15 Amp socket	No.		0
11	Junction box	No.		0
12	Single patress box (flush)	No.	28	28
13	Double patress box (flush)	No.	6	6
14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	13	13
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	1
18	100A distribution board	No.	1	1
19	60A distribution board	No.		0
20	30A distribution board	No.		0
21	100A consumer unit	No.	1	1
22	60A consumer unit	No.		0
23	30A consumer unit	No.		0
24	100A Residual current circuit breaker	No.	2	2
25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		0
27	100A change over	No.	2	2
28	60A change over	No.		0
29	30A change over	No.		0
1.5mm cable (Twin & Earth)				
30	AL1 (Lighting circuit)	Mts	270	
31	AL2 (Lighting circuit)	Mts	250	
32	AL3 (Ceiling fan circuit)	Mts	120	
32	AL4 (Ceiling fan circuit)	Mts	130	
33	Total 1.5mm cable	Mts	770	770
2.5mm cable (Twin & Earth)				
34	AP1 (Socket circuit)	Mts	80	
35	AP2 (Socket circuit)	Mts	70	
36	AP3 (Socket circuit)	Mts	60	
37	Total 2.5mm cable	Mts	210	210
38	4x16mm PVC/SWA/PVC armoured cable	Mts	50	50
39	4x10mm PVC/SWA/PVC armoured cable	Mts		0
40	4x6mm PVC/SWA/PVC armoured cable	Mts		0
41	4x4mm PVC/SWA/PVC armoured cable	Mts		0
42	Cable terminating lugs	No.	16	16
43	Recline cable (25mm)	Mts	40	40
44	Earth wire for building (16mm)	Mts	50	50
45	Underground marking tape	Mts	50	50

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DRAWN BY:	DANIEL MOMOH			
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Kaduna Clinic Solar
BILL OF MATERIAL
FOR DAMAU PHC

Material quantities required for the
electrical installation

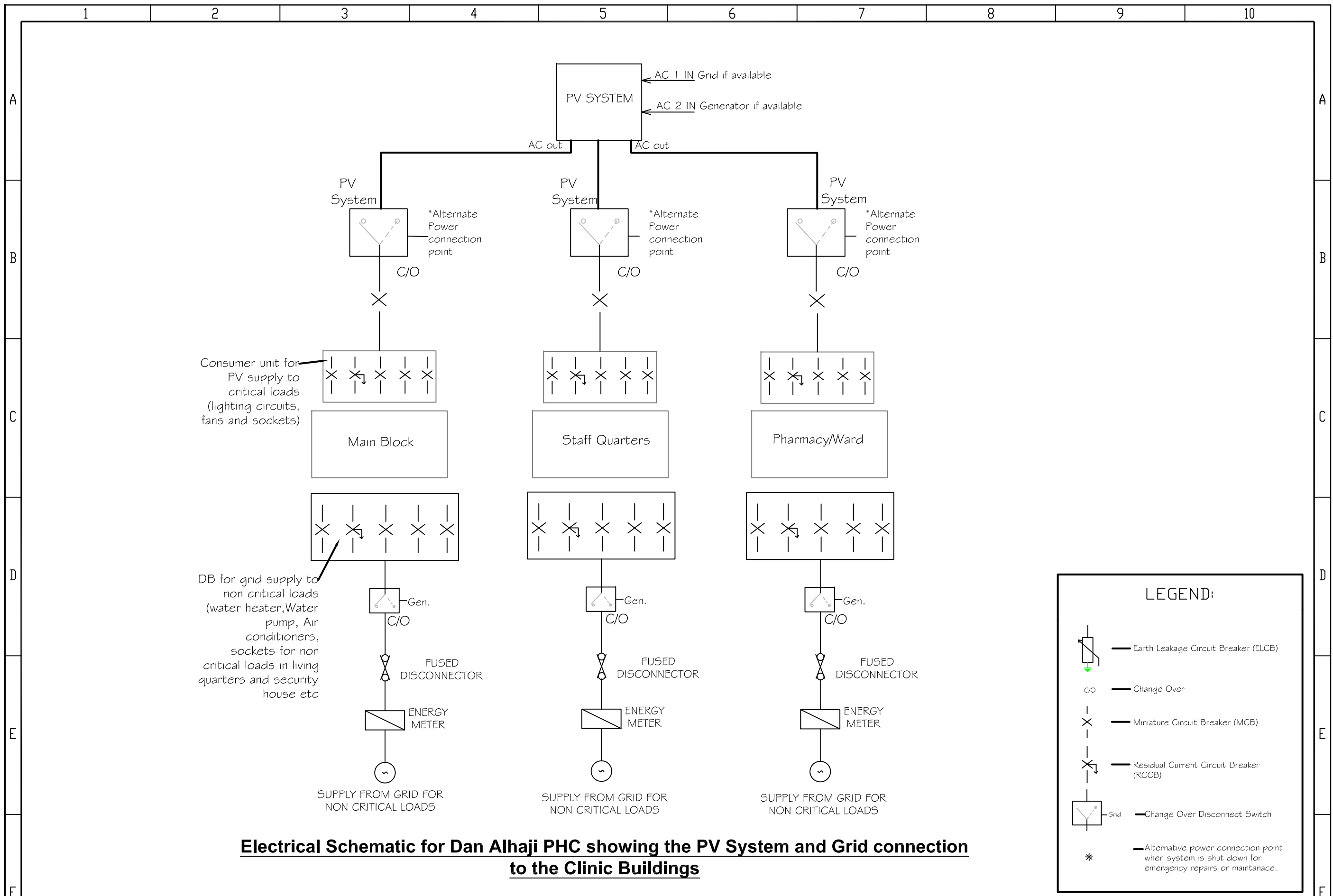
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KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I O

Electrical System Design for Dan Alhaji PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
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October 2015



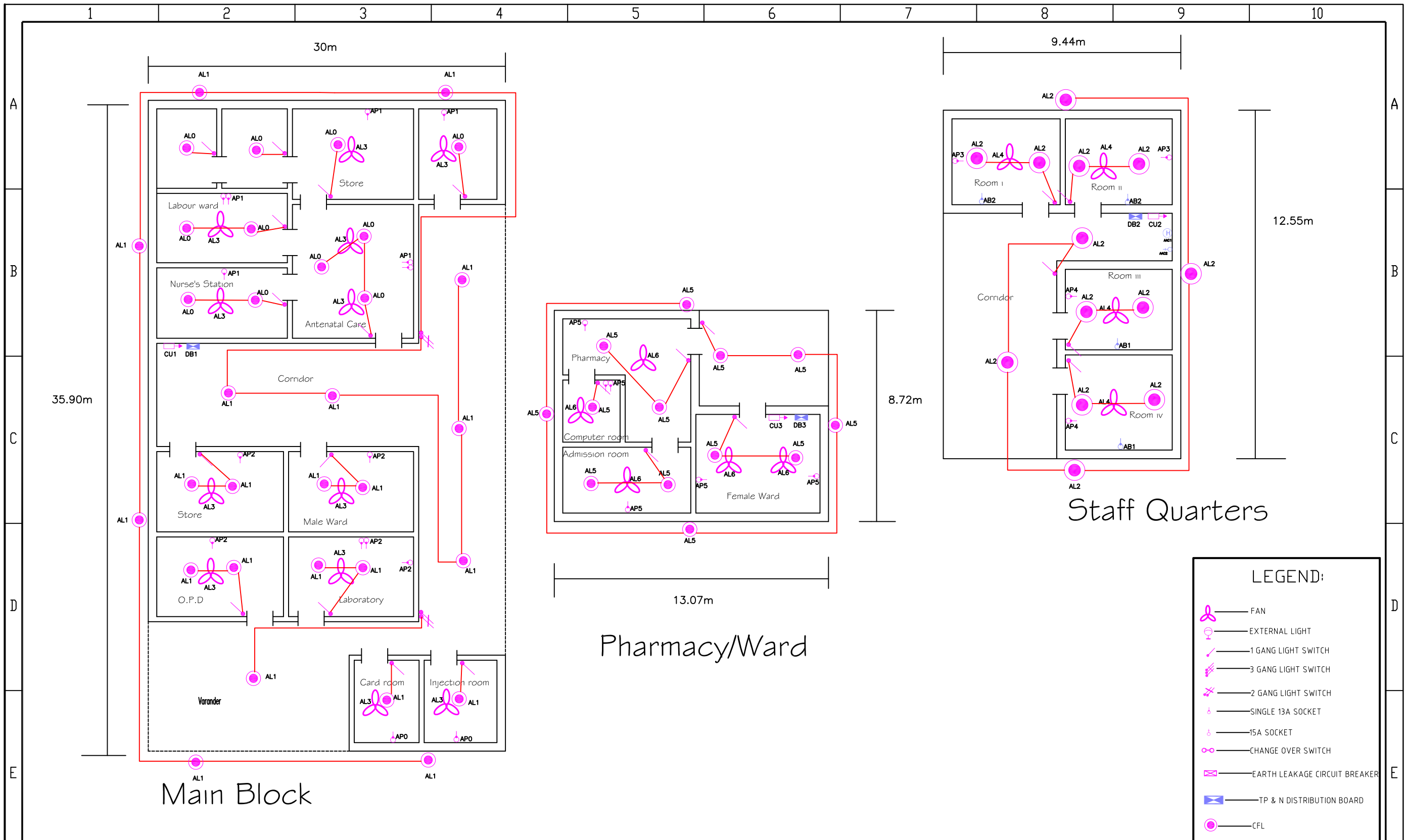
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DRAWN BY:	DANIEL MOMOH				
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Kaduna Clinic Solar
RETROFIT SCHEMATIC DRAWING
FOR DAN ALHAJI PHC

Electrical Schematic design showing
the PV System and Grid connection
to the Clinic Buildings

SCALE:	NTS
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Dan Alhaji PHC Building Electrical Wiring.


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Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR DAN ALHAJI PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
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	1	2	3	4	5	6	7	8	9	10	
A											A
B											B
C											C
D											D
E											E
F											F
DRAWING NO.:	KCS/EM/RD/LT/PHC10	REVISION NO.:	2	Rev. DATE:				Analysis of power distribution within the Clinic buildings		SCALE:	NTS
DESIGN BY:	MARTIN UNUAKHE							Kaduna Clinic Solar LOAD DISTRIBUTION TABLE FOR DAN ALHAJI PHC		PAGE:	3 OF 4
DRAWN BY:	DANIEL MOMOH										
DATE:	OCTOBER										
	1	2	3	4	5	6	7	8	9	10	

LOAD TABLE FOR DAN ALHAJI PHC

POWER SOURCE: GRID																	
	CLINIC BLOCK- 63A DISTRIBUTION BOARD							STAFF QUARTERS- 63A DISTRIBUTION BOARD				FEMALE WARD - 63A DISTRIBUTION BOARD				TOTAL (W)	
CIRCUIT IDENTITY								AB1	AB2	AAC1	AAC2						
MCB RATING								20A	20A	20A	20A						
DIVERSITY FACTOR								0.6	0.6	0.6	0.6						
LIGHTING CIRCUIT																	
COOLING SYSTEM (CEILING FAN)																	
13AMP SOCKET FOR EQUIPMENT POWERING																-	
15AMP SOCKET FOR EQUIPMENT POWERING								2,000	2,000	1,000	1,000					6,000	
PEAK LOAD (W)																6,000	
FINAL SUB-CIRCUIT	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	15A SOCKET OUTLET				SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
CABLE SIZES IN mm								3x2.5mm2 PV/SC									

POWER SOURCE: PV SYSTEM	SYSTEM ID: DAN ALHAJI SYS 1																	
	CAPACITY: 84,240 KWP															TOTAL (W)		
	CLINIC BLOCK- 100A CONSUMER UNIT							STAFF QUARTERS- 63A CONSUMER UNIT				FEMALE WARD - 63A CONSUMER UNIT				TOTAL (W)		
CIRCUIT IDENTITY	AL0	AL1	AL3	AP1	AP2			AL2	AL4	AP3	AP4			AL5	AL6	AP5		
MCB RATING	10A	10A	10A	20A	20A			10A	10A	20A	20A			10A	10A	20A		
DIVERSITY FACTOR	0.9	0.9	0.9	0.6	0.6			0.9	0.9	0.6	0.6			0.9	0.9	0.6		
LIGHTING CIRCUIT	198	396						234						234				1,062
COOLING SYSTEM (CEILING FAN)			825						400					400				1,625
13AMP SOCKET FOR EQUIPMENT POWERING																		4,020
PEAK LOAD (W)																		6,707
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET	SPARE	SPARE		LIGHTING & CEILING FAN CIRCUIT	13A SOCKET OUTLET	SPARE	SPARE		LIGHTING & CEILING FAN CIRCUIT	13A SOCKET OUTLET	SPARE	SPARE		
CABLE SIZES IN mm	3x1.5mm			3x2.5mm				3x1.5mm	3x2.5mm				3x1.5mm	3x2.5mm				

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Kaduna Clinic Solar
LOAD DISTRIBUTION TABLE
FOR DAN ALHAJI PHC

Analysis of power distribution
within the Clinic buildings

SCALE:	NTS
PAGE:	3 OF 4

BILL OF MATERIALS FOR DAN ALHAJI PHC ELECTRICAL RETROFIT

CLINIC BLOCK				WARD				STAFF QUARTERS				DAN ALHAJI TOTAL
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	12	1	Ceiling fan	No.	5	1	Ceiling fan	No.	4	21
2	18 Watts CFL	No.	33	2	18 Watts CFL	No.	13	2	18 Watts CFL	No.	13	59
3	Roof mounted luminaire	No.	27	3	Roof mounted luminaire	No.	9	3	Roof mounted luminaire	No.	10	46
4	Wall mounted luminaire	No.	6	4	Wall mounted luminaire	No.	4	4	Wall mounted luminaire	No.	3	13
5	1 Gang light switch	No.	13	5	1 Gang light switch	No.	5	5	1 Gang light switch	No.	5	23
6	2 Gang light switch	No.	2	6	2 Gang light switch	No.		6	2 Gang light switch	No.		2
7	3 Gang light switch	No.		7	3 Gang light switch	No.		7	3 Gang light switch	No.		0
8	13 Amp socket single	No.	9	8	13 Amp socket single	No.	4	8	13 Amp socket single	No.	8	21
9	13 Amp socket double	No.	3	9	13 Amp socket double	No.	1	9	13 Amp socket double	No.		4
10	15 Amp socket	No.		10	15 Amp socket	No.		10	15 Amp socket	No.		0
11	Junction box	No.	60	11	Junction box	No.	23	11	Junction box	No.	26	109
12	Single patress box (flush)	No.	24	12	Single patress box (flush)	No.	9	12	Single patress box (flush)	No.	13	46
13	Double patress box (flush)	No.	3	13	Double patress box (flush)	No.	1	13	Double patress box (flush)	No.	0	4
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	9	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	Bundles	4	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	Bundles	4	17
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	Packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	Packs	1	3
18	100A distribution board	No.	1	18	100A distribution board	No.		18	100A distribution board	No.		1
19	60A distribution board	No.		19	60A distribution board	No.	1	19	60A distribution board	No.	1	2
20	30A distribution board	No.		20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.	1	21	100A consumer unit	No.		21	100A consumer unit	No.		1
22	60A consumer unit	No.		22	60A consumer unit	No.	1	22	60A consumer unit	No.	1	2
23	30A consumer unit	No.		23	30A consumer unit	No.		23	30A consumer unit	No.		0
24	100A Residual current circuit breaker	No.	2	24	100A Residual current circuit breaker	No.		24	100A Residual current circuit breaker	No.		2
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.	2	25	60A Residual current circuit breaker	No.	2	4
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.		0
27	100A change over	No.	2	27	100A change over	No.		27	100A change over	No.		2
28	60A change over	No.		28	60A change over	No.	2	28	60A change over	No.	2	4
29	30A change over	No.		29	30A change over	No.		29	30A change over	No.		0
	1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)			
30	AL0 (Lighting circuit)	Mts	130	30	AL5 (Ceiling fan circuit)	Mts	110	30	AL2 (Lighting circuit)	Mts	110	
31	AL1 (Lighting circuit)	Mts	200	31	AL6 (Lighting circuit)	Mts	90	31	AL4 (Ceiling fan circuit)	Mts	70	
32	AL3 (Ceiling fan circuit)	Mts	200	32				32				
33	Total 1.5mm cable	Mts	530	33	Total 1.5mm cable	Mts	200	33	Total 1.5mm cable	Mts	180	910
	2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)			
34	AP0 (Socket circuit)	Mts	30	34	AP5 (Socket circuit)	Mts	80	34	AB1 (Socket)		30	
35	AP1 (Socket circuit)	Mts	80	35				35	AB2 (Socket)		30	
36	AP2 (Socket circuit)	Mts	70	36				36	AP3(Socket)		30	
37		Mts		37				37	AP4 (Socket)		30	
38	Total 2.5mm cable	Mts	180	38	Total 2.5mm cable	Mts	80	38	Total 2.5mm cable	Mts	120	380
39	4x16mm PVC/SWA/PVC armoured cable	Mts	80	39	4x16mm PVC/SWA/PVC armoured cable	Mts	80	39	4x16mm PVC/SWA/PVC armoured cable	Mts	100	260
40	4x10mm PVC/SWA/PVC armoured cable	Mts		40	4x10mm PVC/SWA/PVC armoured cable	Mts		40	4x10mm PVC/SWA/PVC armoured cable	Mts		0
41	4x6mm PVC/SWA/PVC armoured cable	Mts		41	4x6mm PVC/SWA/PVC armoured cable	Mts		41	4x6mm PVC/SWA/PVC armoured cable	Mts		0
42	4x4mm PVC/SWA/PVC armoured cable	Mts		42	4x4mm PVC/SWA/PVC armoured cable	Mts		42	4x4mm PVC/SWA/PVC armoured cable	Mts		0
43	Cable terminating lugs	No.	16	43	Cable terminating lugs	No.	16	43	Cable terminating lugs	No.	16	48
44	Recline cable (25mm)	Mts	50	44	Recline cable (25mm)	Mts	50	44	Recline cable (25mm)	Mts	50	150
45	Earth wire for building (16mm)	Mts	50	45	Earth wire for building (16mm)	Mts	50	45	Earth wire for building (16mm)	Mts	50	150
46	Underground marking tape	Mts	80	46	Underground marking tape	Mts	80	46	Underground marking tape	Mts	100	260

DRAWING NO:	KCS/EM/RD/BOM/PHC10	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNUAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
BILL OF MATERIAL
FOR DAN ALHAJI PHC

Material quantities required for the electrical installation

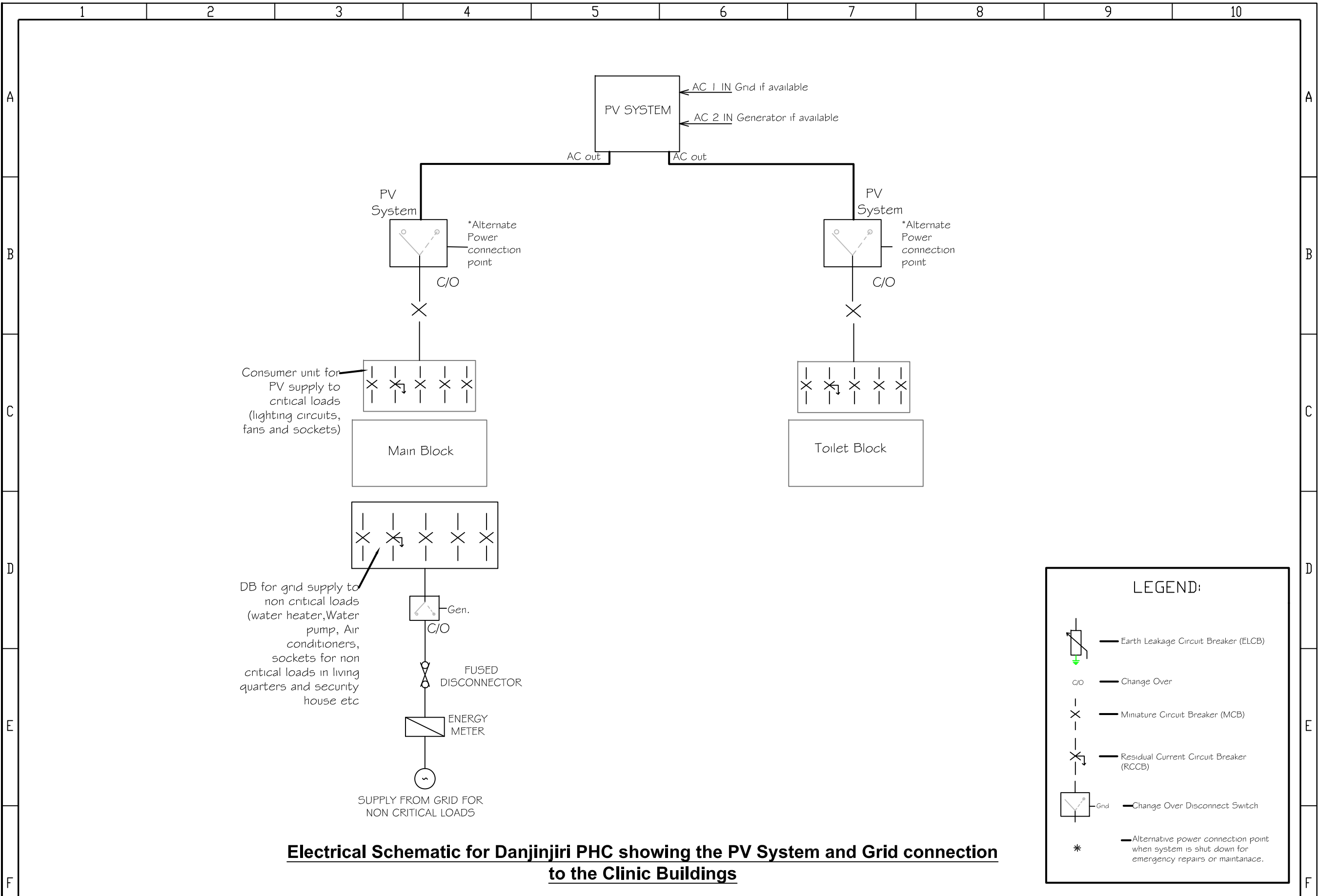
SCALE: NTS
PAGE: 4 OF 4

KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I I

Electrical System Design for Danjinjiri PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015

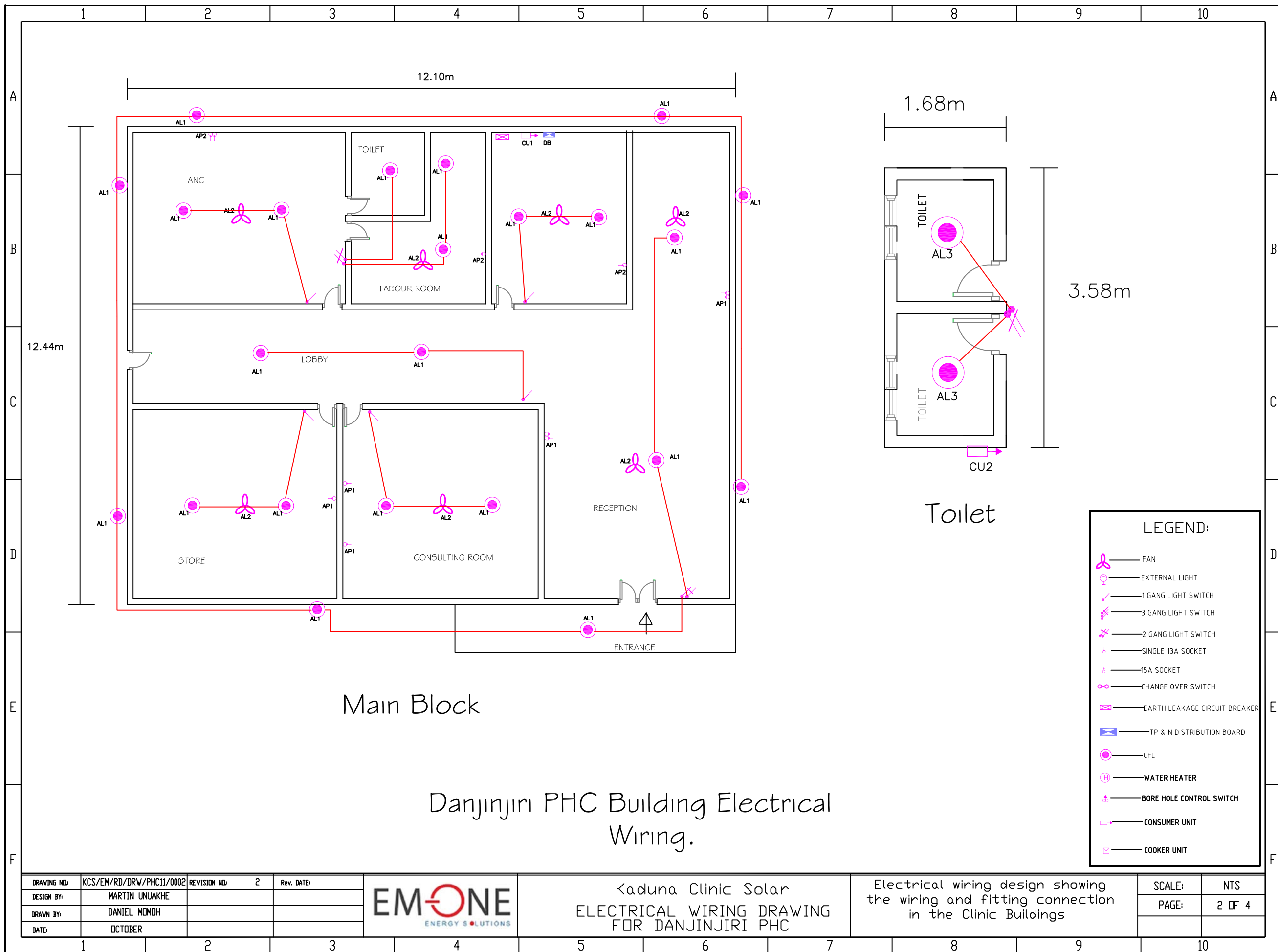


LEGEND:

- Earth Leakage Circuit Breaker (ELCB)
- Change Over
- Miniature Circuit Breaker (MCB)
- Residual Current Circuit Breaker (RCCB)
- Change Over Disconnect Switch
- Alternative power connection point when system is shut down for emergency repairs or maintenance.

Electrical Schematic for Danjinjiri PHC showing the PV System and Grid connection to the Clinic Buildings

DRAWING NO:	KSC/EM/RD/DRW/PHC11/0001	REVISION NO:	2	Rev. DATE:			Kaduna Clinic Solar RETROFIT SCHEMATIC DRAWING FOR DANJINJIRI PHC	Electrical Schematic design showing the PV System and Grid connection to the Clinic Buildings	SCALE:	NTS
DESIGN BY:	MARTIN UNUAKHE				PAGE:				1 OF 4	
DRAWN BY:	DANIEL MOMOH									
DATE:	OCTOBER									



Main Block

Danjinjiri PHC Building Electrical Wiring.

LEGEND:

- FAN
- EXTERNAL LIGHT
- 1 GANG LIGHT SWITCH
- 3 GANG LIGHT SWITCH
- 2 GANG LIGHT SWITCH
- SINGLE 13A SOCKET
- 15A SOCKET
- CHANGE OVER SWITCH
- EARTH LEAKAGE CIRCUIT BREAKER
- TP & N DISTRIBUTION BOARD
- CFL
- WATER HEATER
- BORE HOLE CONTROL SWITCH
- CONSUMER UNIT
- COOKER UNIT

DRAWING NO:	KCS/EM/RD/DRW/PHC11/0002	REVISION NO:	2	Rev. DATE:
DESIGN BY:	MARTIN UNJAKHE			
DRAWN BY:	DANIEL MOMOH			
DATE:	OCTOBER			



Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR DANJINJIRI PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
PAGE:	2 OF 4

LOAD TABLE FOR DANJINJIRI PHC

POWER SOURCE: GRID									
	CLINIC BLOCK- 63A DISTRIBUTION BOARD						TOILET BLOCK- NO DISTRIBUTION BOARD		TOTAL (W)
CIRCUIT IDENTITY									
MCB RATING									
DIVERSITY FACTOR									
LIGHTING CIRCUIT									
COOLING SYSTEM (CEILING FAN)									
13AMP SOCKET FOR EQUIPMENT POWERING									-
15AMP SOCKET FOR EQUIPMENT POWERING									-
PEAK LOAD (W)									-
FINAL SUB-CIRCUIT	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE			
CABLE SIZES IN mm									

POWER SOURCE: PV SYSTEM	SYSTEM ID: DAN JINGIRI 1								
	CAPACITY: 13,260 KWP								
	CLINIC BLOCK- 100A CONSUMER UNIT						TOILET BLOCK- 32A CONSUMER UNIT		TOTAL (W)
CIRCUIT IDENTITY	AL1	AL2	AP1	AP2			AL5		
MCB RATING	10A	10A	20A	20A			10A		
DIVERSITY FACTOR	0.9	0.9	0.6	0.6			0.9		
LIGHTING CIRCUIT	360						36		396
COOLING SYSTEM (CEILING FAN)		525							525
13AMP SOCKET FOR EQUIPMENT POWERING									280
PEAK LOAD (W)									1,201
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT		13A SOCKET OUTLET	SPARE	SPARE	LIGHTING & CEILING FAN CIRCUIT	SPARE	SPARE	
CABLE SIZES IN mm	3x1.5mm		3x2.5mm			3x1.5mm			

DRAWING NO:	KCS/EM/RD/LT/PHC11	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNUAKHE				
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DATE:	OCTOBER				



Kaduna Clinic Solar
LOAD DISTRIBUTION TABLE
FOR DANJINJIRI PHC

Analysis of power distribution
within the Clinic buildings

SCALE:	NTS
PAGE:	3 OF 4

BILL OF MATERIALS FOR DAN JINJIRI PHC ELECTRICAL RETROFIT

CLINIC BLOCK				TOILET				DAN JINJIRI TOTAL
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	7	1	Ceiling fan	No.		7
2	18 Watts CFL	No.	22	2	18 Watts CFL	No.	2	24
3	Roof mounted luminaire	No.	16	3	Roof mounted luminaire	No.	2	18
4	Wall mounted luminaire	No.	7	4	Wall mounted luminaire	No.		7
5	1 Gang light switch	No.	5	5	1 Gang light switch	No.		5
6	2 Gang light switch	No.	2	6	2 Gang light switch	No.	1	3
7	3 Gang light switch	No.		7	3 Gang light switch	No.		0
8	13 Amp socket single	No.	5	8	13 Amp socket single	No.		5
9	13 Amp socket double	No.	3	9	13 Amp socket double	No.		3
10	15 Amp socket	No.		10	15 Amp socket	No.		0
11	Junction box	No.	38	11	Junction box	No.	3	41
12	Single patress box (flush)	No.	12	12	Single patress box (flush)	No.	1	13
13	Double patress box (flush)	No.	3	13	Double patress box (flush)	No.	0	3
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	6	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	Bundles	1	7
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs (100 per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	Packs	1	2
18	100A distribution board	No.	1	18	100A distribution board	No.		1
19	60A distribution board	No.		19	60A distribution board	No.		0
20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.	1	21	100A consumer unit	No.		1
22	60A consumer unit	No.		22	60A consumer unit	No.		0
23	30A consumer unit	No.		23	30A consumer unit	No.	1	1
24	100A Residual current circuit breaker	No.	2	24	100A Residual current circuit breaker	No.		2
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.	1	1
27	100A change over	No.	2	27	100A change over	No.		2
28	60A change over	No.		28	60A change over	No.		0
29	30A change over	No.		29	30A change over	No.		0
	1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)			
30	AL1 (Lighting circuit)	Mts	190	30	AL3 (Lighting circuit)	Mts	40	
31	AL2 (Ceiling fan circuit)	Mts	120	31				
32	Total 1.5mm cable	Mts	310	32	Total 1.5mm cable		40	350
	2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)			
33	AP1 (Socket circuit)	Mts	80	33		Mts		
34	AP2 (Socket circuit)	Mts	60	34		Mts		
35	Total 2.5mm cable		140	35	Total 2.5mm cable		0	140
36	4x16mm PVC/SWA/PVC armoured cable	Mts	100	36	4x16mm PVC/SWA/PVC armoured cable	Mts		100
37	4x10mm PVC/SWA/PVC armoured cable	Mts		37	4x10mm PVC/SWA/PVC armoured cable	Mts		0
38	4x6mm PVC/SWA/PVC armoured cable	Mts		38	4x6mm PVC/SWA/PVC armoured cable	Mts	50	50
39	4x4mm PVC/SWA/PVC armoured cable	Mts		39	4x4mm PVC/SWA/PVC armoured cable	Mts		0
40	Cable terminating lugs	No.	16	40	Cable terminating lugs	No.	8	24
41	Recline cable (25mm)	Mts	60	41	Recline cable (25mm)	Mts		60
42	Earth wire for building (16mm)	Mts	60	42	Earth wire for building (16mm)	Mts	60	120
43	Underground marking tape	Mts	100	43	Underground marking tape	Mts	60	160

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DESIGN BY:	MARTIN UNUAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
BILL OF MATERIAL
FOR DANJINJIRI PHC

Material quantities required for the
electrical installation

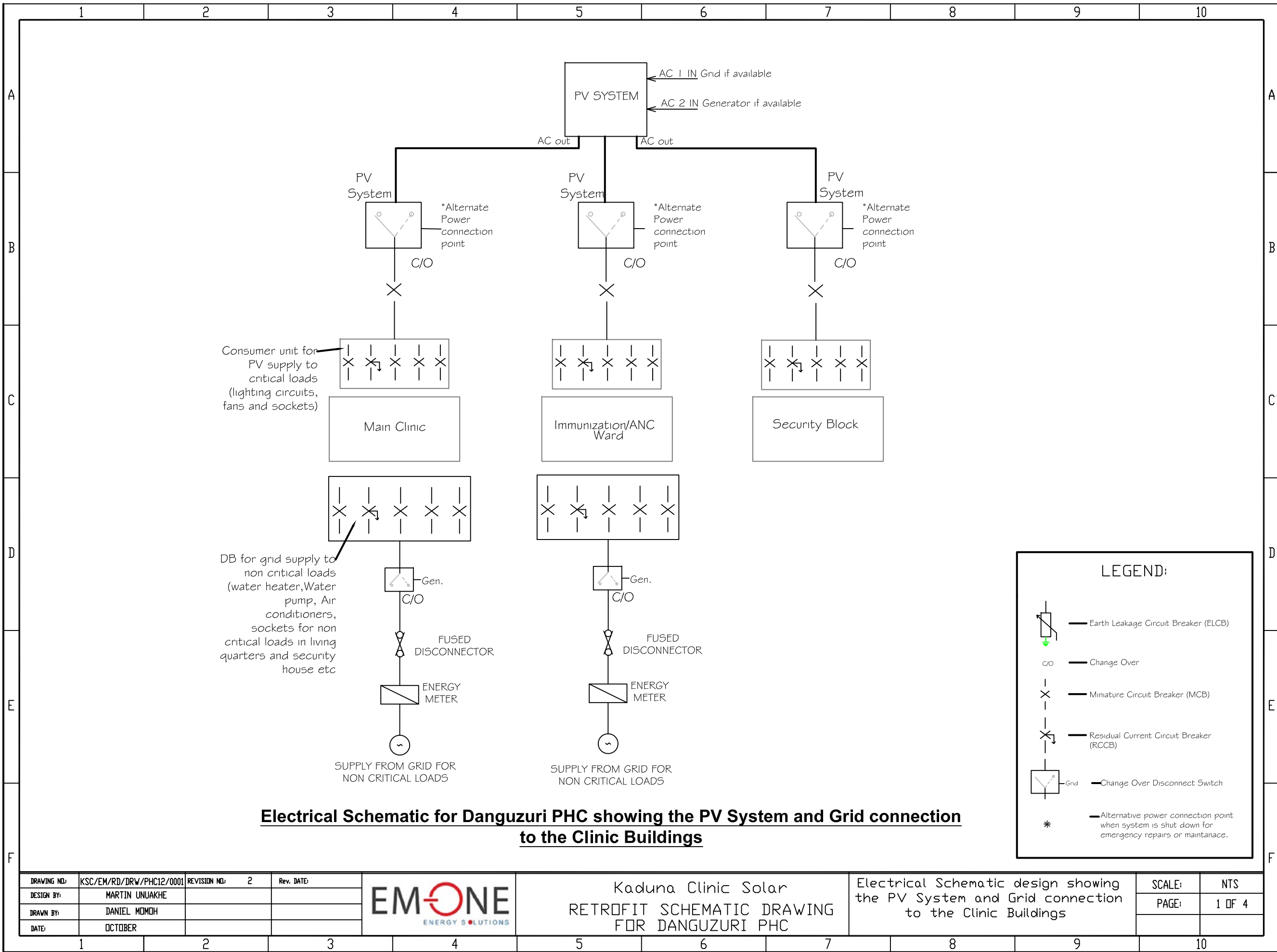
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PAGE:	4 OF 4

KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I 2

Electrical System Design for Danguzuri PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015



Electrical Schematic for Danguzuri PHC showing the PV System and Grid connection to the Clinic Buildings

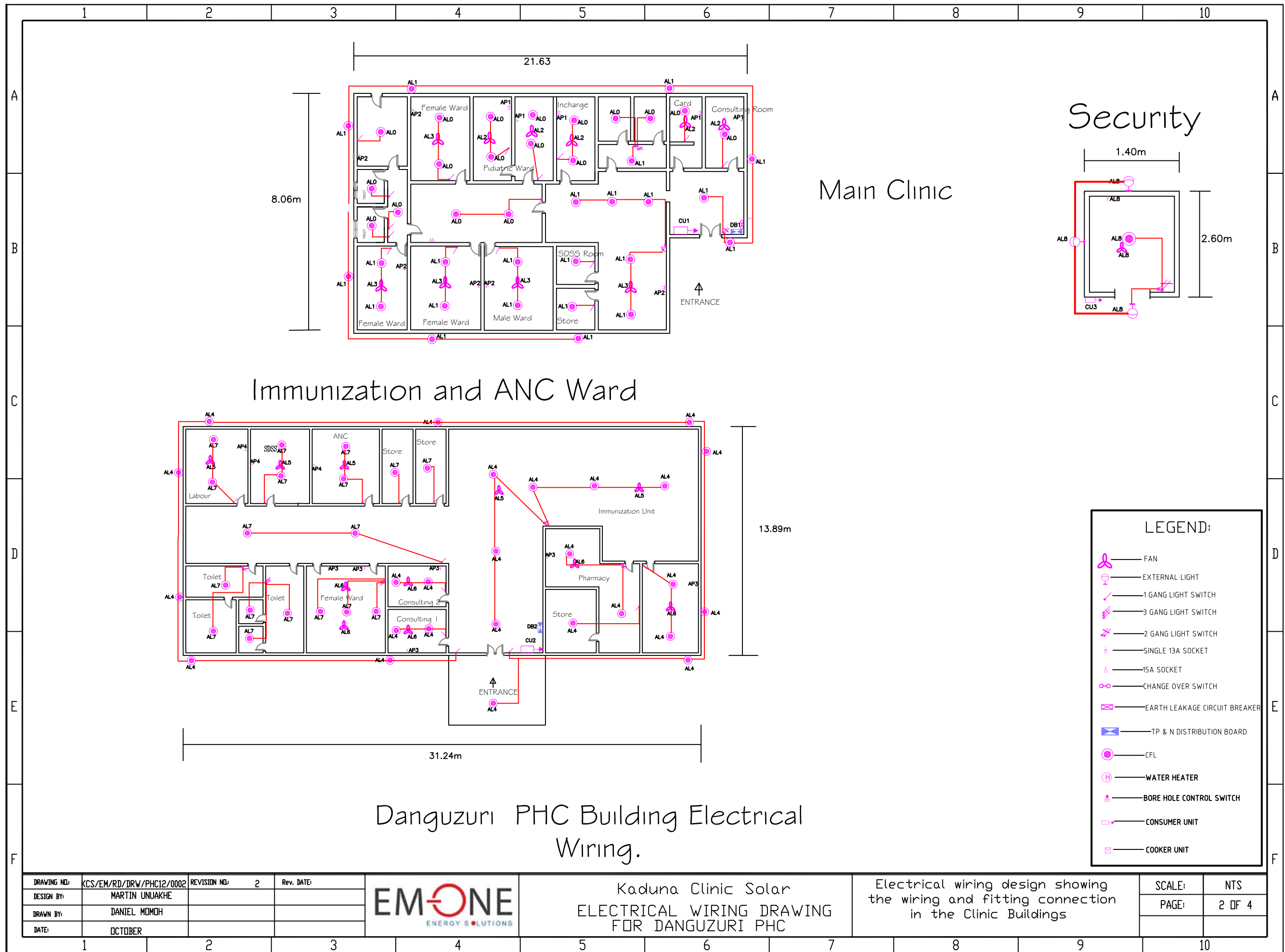
DRAWING NO:	KSC/EM/RD/DRW/PHC12/0001	REVISION NO:	2	Rev. DATE:
DESIGN BY:	MARTIN UNUAKHE			
DRAWN BY:	DANIEL MOMOH			
DATE:	OCTOBER			



Kaduna Clinic Solar
RETROFIT SCHEMATIC DRAWING
FOR DANGUZURI PHC

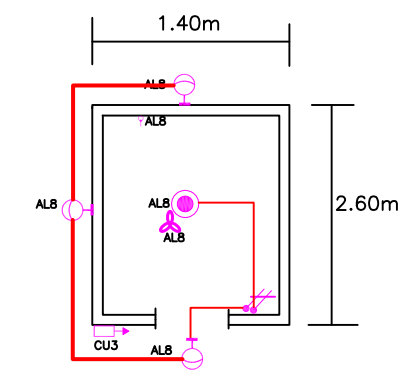
Electrical Schematic design showing
the PV System and Grid connection
to the Clinic Buildings

SCALE:	NTS
PAGE:	1 OF 4

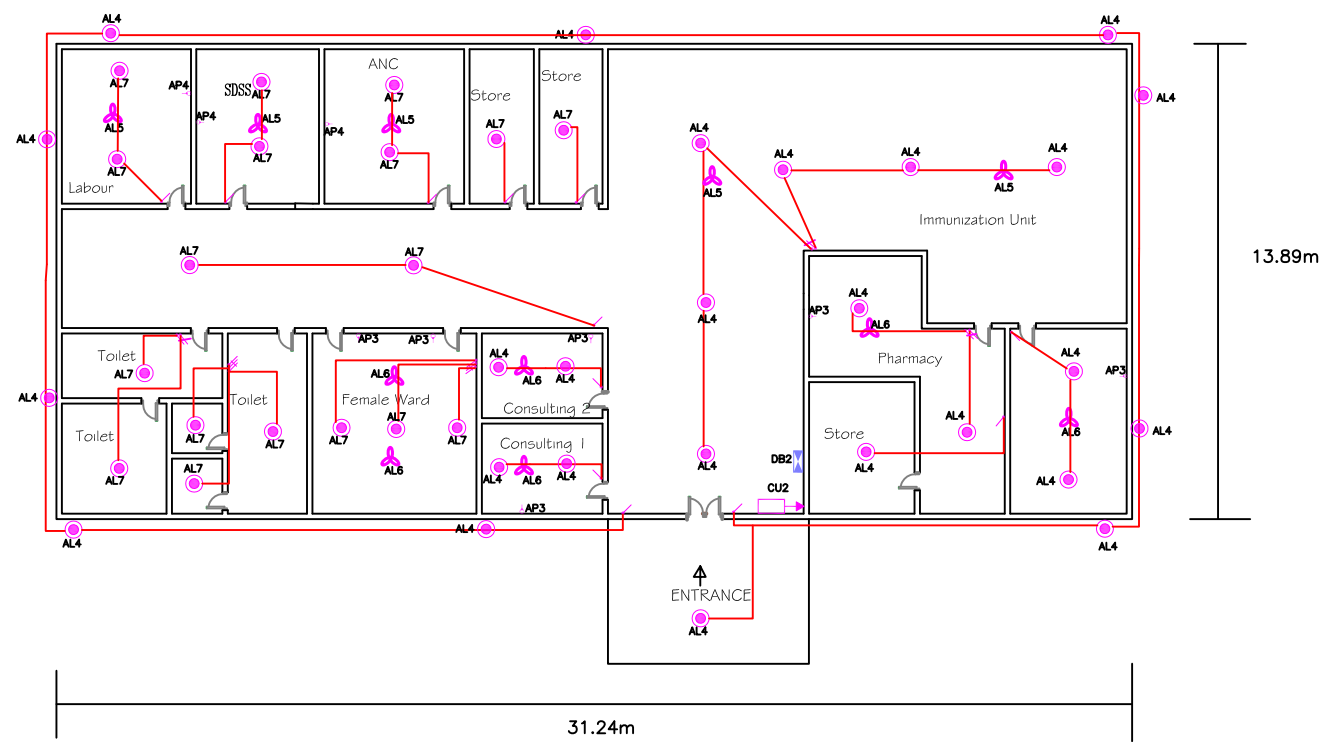


Main Clinic

Security



Immunization and ANC Ward



Danguzuri PHC Building Electrical Wiring.

LEGEND:	
	FAN
	EXTERNAL LIGHT
	1 GANG LIGHT SWITCH
	3 GANG LIGHT SWITCH
	2 GANG LIGHT SWITCH
	SINGLE 13A SOCKET
	15A SOCKET
	CHANGE OVER SWITCH
	EARTH LEAKAGE CIRCUIT BREAKER
	TP & N DISTRIBUTION BOARD
	CFL
	WATER HEATER
	BORE HOLE CONTROL SWITCH
	CONSUMER UNIT
	COOKER UNIT

DRAWING NO:	KCS/EM/RD/DRW/PHC12/0002	REVISION NO:	2	Rev. DATE:			Kaduna Clinic Solar ELECTRICAL WIRING DRAWING FOR DANGUZURI PHC	Electrical wiring design showing the wiring and fitting connection in the Clinic Buildings	SCALE:	NTS
DESIGN BY:	MARTIN UNJAKHE								PAGE:	2 OF 4
DRAWN BY:	DANIEL MOMOH									
DATE:	OCTOBER									

LOAD TABLE FOR DANGUZURI PHC

POWER SOURCE: GRID	CLINIC BLOCK- 100A DISTRIBUTION BOARD							IMMUNIZATION & ANC BLOCK- 100A DISTRIBUTION BOARD							SECURITY- NO DISTRIBUTION BOARD			TOTAL (W)	
CIRCUIT IDENTITY																			
MCB RATING																			
DIVERSITY FACTOR																			
LIGHTING CIRCUIT																			
COOLING SYSTEM (CEILING FAN)																			
13AMP SOCKET FOR EQUIPMENT POWERING																			-
15AMP SOCKET FOR EQUIPMENT POWERING																			-
PEAK LOAD (W)																			-
FINAL SUB-CIRCUIT	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE				
CABLE SIZES IN mm																			

POWER SOURCE: PV SYSTEM	SYSTEM ID: DANGUZURI SYS 1 CAPACITY: 28,080 KWP																	TOTAL (W)	
	CLINIC BLOCK- 100A CONSUMER UNIT							IMMUNIZATION & ANC BLOCK- 100A CONSUMER UNIT							SECURITY- 32A CONSUMER UNIT				
CIRCUIT IDENTITY	AL0	AL1	AL2	AL3	AP1	AP2		AL4	AL7	AL5	AL6	AP3	AP4			AL8			
MCB RATING	10A	10A	10A	10A	20A	20A		10A	10A			20A	20A			10A			
DIVERSITY FACTOR	0.9	0.9	0.9	0.9	0.6	0.6		0.9	0.9			0.6	0.6			0.9			
LIGHTING CIRCUIT	324	396						468	324							72			1,584
COOLING SYSTEM (CEILING FAN)			450	375						375	375								1,575
13AMP SOCKET FOR EQUIPMENT POWERING					120							350	70						540
PEAK LOAD (W)																			3,699
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET		SPARE	SPARE	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET		SPARE	SPARE	LIGHTING & CEILING FAN CIRCUIT	SPARE	SPARE		
CABLE SIZES IN mm	3x1.5mm			3x2.5mm				3x1.5mm			3x2.5mm				3x1.5mm				

BILL OF MATERIALS FOR DANGUZURI PHC ELECTRICAL RETROFIT

CLINIC BLOCK				IMMUNIZATION AND ANC BLOCK				SECURITY HOUSE				DANGUZURI TOTAL
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	10	1	Ceiling fan	No.	11	1	Ceiling fan	No.	1	22
2	18 Watts CFL	No.	41	2	18 Watts CFL	No.	43	2	18 Watts CFL	No.	4	88
3	Roof mounted luminaire	No.	33	3	Roof mounted luminaire	No.	33	3	Roof mounted luminaire	No.	1	67
4	Wall mounted luminaire	No.	8	4	Wall mounted luminaire	No.	10	4	Wall mounted luminaire	No.	3	21
5	1 Gang light switch	No.	16	5	1 Gang light switch	No.	12	5	1 Gang light switch	No.		28
6	2 Gang light switch	No.	2	6	2 Gang light switch	No.	3	6	2 Gang light switch	No.	1	6
7	3 Gang light switch	No.	1	7	3 Gang light switch	No.	2	7	3 Gang light switch	No.		3
8	13 Amp socket single	No.	7	8	13 Amp socket single	No.	9	8	13 Amp socket single	No.	1	17
9	13 Amp socket double	No.	5	9	13 Amp socket double	No.		9	13 Amp socket double	No.		5
10	15 Amp socket	No.	1	10	15 Amp socket	No.		10	15 Amp socket	No.		1
11	Junction box	No.	72	11	Junction box	No.	69	11	Junction box	No.	6	147
12	Single patress box (flush)	No.	26	12	Single patress box (flush)	No.	26	12	Single patress box (flush)	No.	2	54
13	Double patress box (flush)	No.	5	13	Double patress box (flush)	No.	0	13	Double patress box (flush)	No.	0	5
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	8	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	Bundles	10	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	Bundles	1	19
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	Packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	Packs	1	3
18	100A distribution board	No.	1	18	100A distribution board	No.	1	18	100A distribution board	No.		2
19	60A distribution board	No.		19	60A distribution board	No.		19	60A distribution board	No.		0
20	30A distribution board	No.		20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.	1	21	100A consumer unit	No.	1	21	100A consumer unit	No.		2
22	60A consumer unit	No.		22	60A consumer unit	No.		22	60A consumer unit	No.		0
23	30A consumer unit	No.		23	30A consumer unit	No.		23	30A consumer unit	No.	1	1
24	100A Residual current circuit breaker	No.	2	24	100A Residual current circuit breaker	No.	2	24	100A Residual current circuit breaker	No.		4
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.	1	1
27	100A change over	No.	2	27	100A change over	No.	2	27	100A change over	No.		4
28	60A change over	No.		28	60A change over	No.		28	60A change over	No.		0
29	30A change over	No.		29	30A change over	No.		29	30A change over	No.		0
	1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)			
30	AL1 & AL0(Lighting circuit)	Mts	380	30	AL4 (Lighting circuit)	Mts	440	30	AL8 (Lighting circuit)	Mts	50	
31	AL2 (Ceiling fan circuit)	Mts	40	31	AL5 (Ceiling fan circuit)	Mts	90	31				
32	AL3 (Ceiling fan circuit)	Mts	40	32	AL6 (Ceiling fan circuit)	Mts	100	32				
33	Total 1.5mm cable	Mts	460	33	Total 1.5mm cable	Mts	630	33	Total 1.5mm cable	Mts	50	1140
	2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)			
34	AP1 (Socket circuit)	Mts	80	34	AP3(Socket)	Mts	90	34		Mts		
35	AP2 (Socket circuit)	Mts	90	35	AP4 (Socket)	Mts	51	35		Mts		
36	Total 2.5mm cable	Mts	170	37	Total 2.5mm cable	Mts	141	37	Total 2.5mm cable	Mts	0	311
37	4x16mm PVC/SWA/PVC armoured cable	Mts	100	38	4x16mm PVC/SWA/PVC armoured cable	Mts	100	38	4x16mm PVC/SWA/PVC armoured cable	Mts		200
38	4x10mm PVC/SWA/PVC armoured cable	Mts		39	4x10mm PVC/SWA/PVC armoured cable	Mts		39	4x10mm PVC/SWA/PVC armoured cable	Mts		0
39	4x6mm PVC/SWA/PVC armoured cable	Mts		40	4x6mm PVC/SWA/PVC armoured cable	Mts		40	4x6mm PVC/SWA/PVC armoured cable	Mts	100	100
40	4x4mm PVC/SWA/PVC armoured cable	Mts		41	4x4mm PVC/SWA/PVC armoured cable	Mts		41	4x4mm PVC/SWA/PVC armoured cable	Mts		0
41	Cable terminating lugs	No.	16	42	Cable terminating lugs	No.	16	42	Cable terminating lugs	No.	8	40
42	Recline cable (25mm)	Mts	50	43	Recline cable (25mm)	Mts	50	43	Recline cable (25mm)	Mts		100
43	Earth wire for building (16mm)	Mts	50	44	Earth wire for building (16mm)	Mts	50	44	Earth wire for building (16mm)	Mts	50	150
44	Underground marking tape	Mts	100	45	Underground marking tape	Mts	100	45	Underground marking tape	Mts	100	300

DRAWING NO:	KCS/EM/RD/BOM/PHC12	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNUAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
BILL OF MATERIAL
FOR DANGUZURI PHC

Material quantities required for the
electrical installation

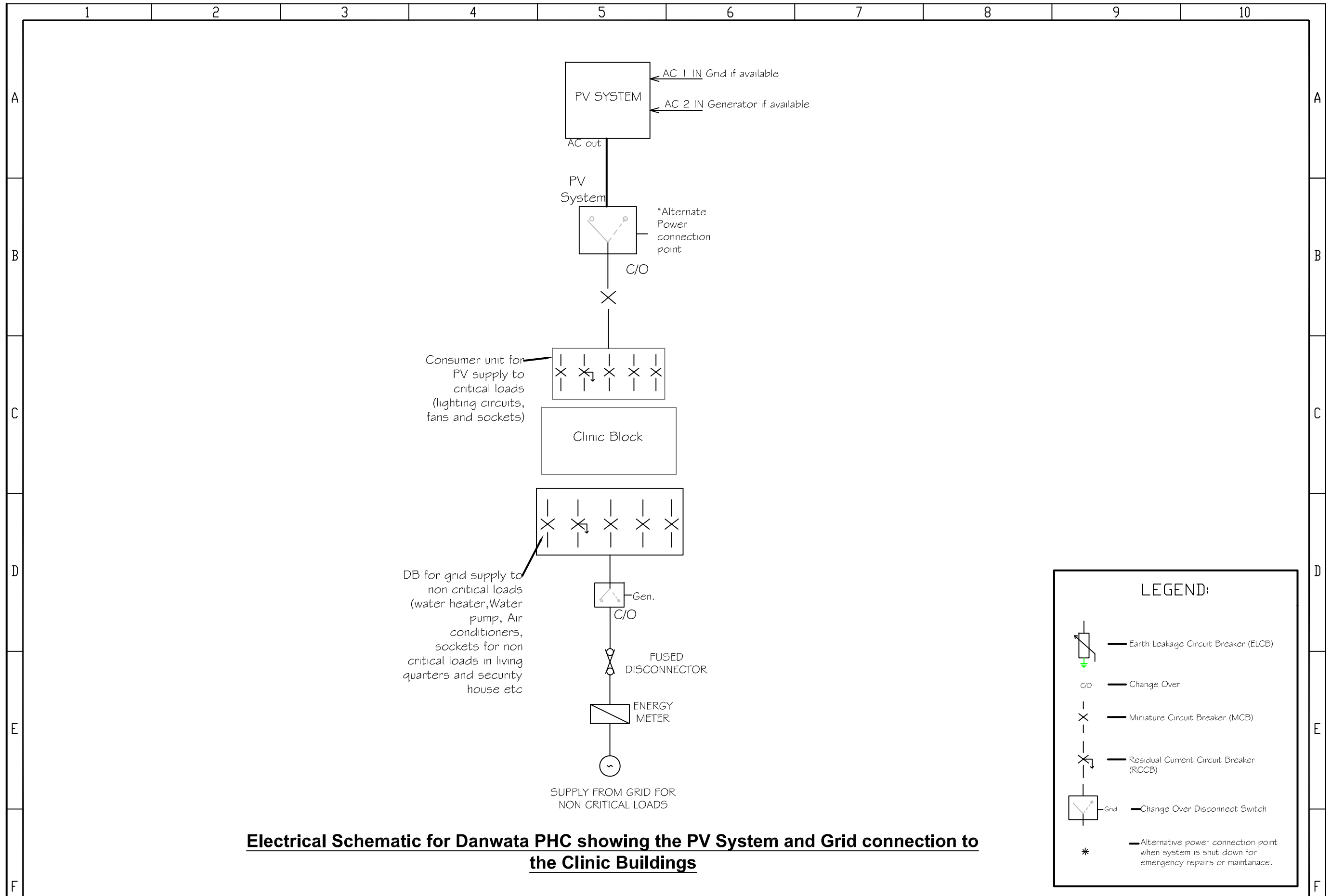
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PAGE:	4 OF 4

KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I 3

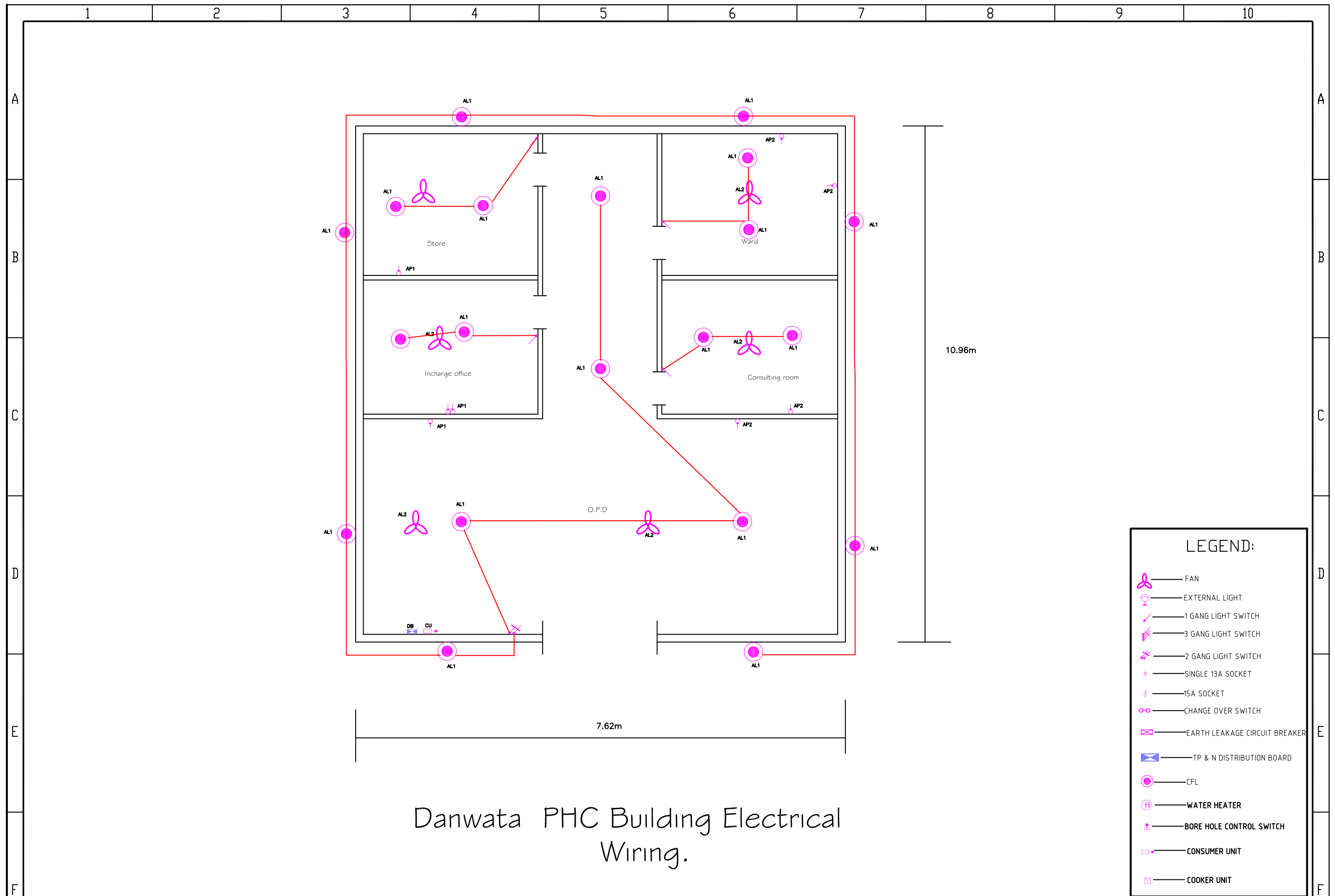
Electrical System Design for Danwata PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015



DRAWING NO.:	KSC/EM/RD/DRW/PHC13/0001	REVISION NO.:	2	Rev. DATE:			Kaduna Clinic Solar RETROFIT SCHEMATIC DRAWING FOR DANWATA PHC	Electrical Schematic design showing the PV System and Grid connection to the Clinic Buildings	SCALE:	NTS
DESIGN BY:	MARTIN UNUAKHE								PAGE:	1 OF 4
DRAWN BY:	DANIEL MOMOH									
DATE:	OCTOBER									



Danwata PHC Building Electrical Wiring.

LEGEND:	
	FAN
	EXTERNAL LIGHT
	1 GANG LIGHT SWITCH
	3 GANG LIGHT SWITCH
	2 GANG LIGHT SWITCH
	SINGLE 13A SOCKET
	15A SOCKET
	CHANGE OVER SWITCH
	EARTH LEAKAGE CIRCUIT BREAKER
	TP & N DISTRIBUTION BOARD
	CFL
	WATER HEATER
	BORE HOLE CONTROL SWITCH
	CONSUMER UNIT
	COOKER UNIT

DRAWING NO:	KCS/EM/RD/DRW/PHC13/0002	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNUAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR DANWATA PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
PAGE:	2 OF 4

LOAD TABLE FOR DANWATA PHC

POWER SOURCE: GRID											
MAIN CLINIC- 60A DISTRIBUTION BOARD											TOTAL (W)
CIRCUIT IDENTITY											
MCB RATING											
DIVERSITY FACTOR											
LIGHTING CIRCUIT											
COOLING SYSTEM (CEILING FAN)											
13AMP SOCKET FOR EQUIPMENT POWERING											-
15AMP SOCKET FOR EQUIPMENT POWERING											-
PEAK LOAD (W)											-
FINAL SUB-CIRCUIT	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
CABLE SIZES IN mm											

POWER SOURCE: PV SYSTEM											
SYSTEM ID:		DANWATA SYS 1									
CAPACITY:		13,260 KWP									
MAIN CLINIC- 100A CONSUMER UNIT											TOTAL (W)
CIRCUIT IDENTITY	AL1	AL2		AP1	AP2						
MCB RATING	10A	10A		20A	20A						
DIVERSITY FACTOR	0.9	0.9		0.6	0.6						
LIGHTING CIRCUIT	360										360
COOLING SYSTEM (CEILING FAN)		480									480
13AMP SOCKET FOR EQUIPMENT POWERING											
PEAK LOAD (W)											840
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET		SPARE	SPARE	SPARE	SPARE	SPARE	
CABLE SIZES IN mm	3x1.5mm			3x2.5mm							

BILL OF MATERIALS FOR DAWATA PHC ELECTRICAL RETROFIT

<u>CLINIC BLOCK</u>				<u>DANWATA TOTAL</u>
S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	6	6
2	18 Watts CFL	No.	20	20
3	Roof mounted luminaire	No.	12	12
4	Wall mounted luminaire	No.	8	8
5	1 Gang light switch	No.	4	4
6	2 Gang light switch	No.	1	1
7	3 Gang light switch	No.		0
8	13 Amp socket single	No.	6	6
9	13 Amp socket double	No.	1	1
10	15 Amp socket	No.		0
11	Junction box	No.	32	32
12	Single patress box (flush)	No.	11	11
13	Double patress box (flush)	No.	1	1
14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	5	5
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100 per pack)	packs	1	1
18	100A distribution board	No.	1	1
19	60A distribution board	No.		0
20	30A distribution board	No.		0
21	100A consumer unit	No.	1	1
22	60A consumer unit	No.		0
23	30A consumer unit	No.		0
24	100A Residual current circuit breaker	No.	2	2
25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		0
27	100A change over	No.	2	2
28	60A change over	No.		0
29	30A change over	No.		0
	1.5mm cable (Twin & Earth)			
30	AL1 (Lighting circuit)	Mts	150	
31	AL2 (Ceiling fan circuit)	Mts	100	
32	Total 1.5mm cable	Mts	250	250
	2.5mm cable (Twin & Earth)			
33	AP1 (Socket circuit)	Mts	60	
34	AP2 (Socket circuit)	Mts	70	
35	Total 2.5mm cable	Mts	130	130
36	4x16mm PVC/SWA/PVC armoured cable	Mts	60	60
37	4x10mm PVC/SWA/PVC armoured cable	Mts		0
38	4x6mm PVC/SWA/PVC armoured cable	Mts		0
39	4x4mm PVC/SWA/PVC armoured cable	Mts		0
40	Cable terminating lugs	No.	16	16
41	Recline cable (25mm)	Mts	50	50
42	Earth wire for building (16mm)	Mts	50	50
43	Underground marking tape	Mts	60	60

DRAWING NO:	KCS/EM/RD/BOM/PHC13	REVISION NO:	2	Rev. DATE:
DESIGN BY:	MARTIN UNUAKHE			
DRAWN BY:	DANIEL MOMOH			
DATE:	OCTOBER			



Kaduna Clinic Solar
BILL OF MATERIAL
FOR DANWATA PHC

Material quantities required for the
electrical installation

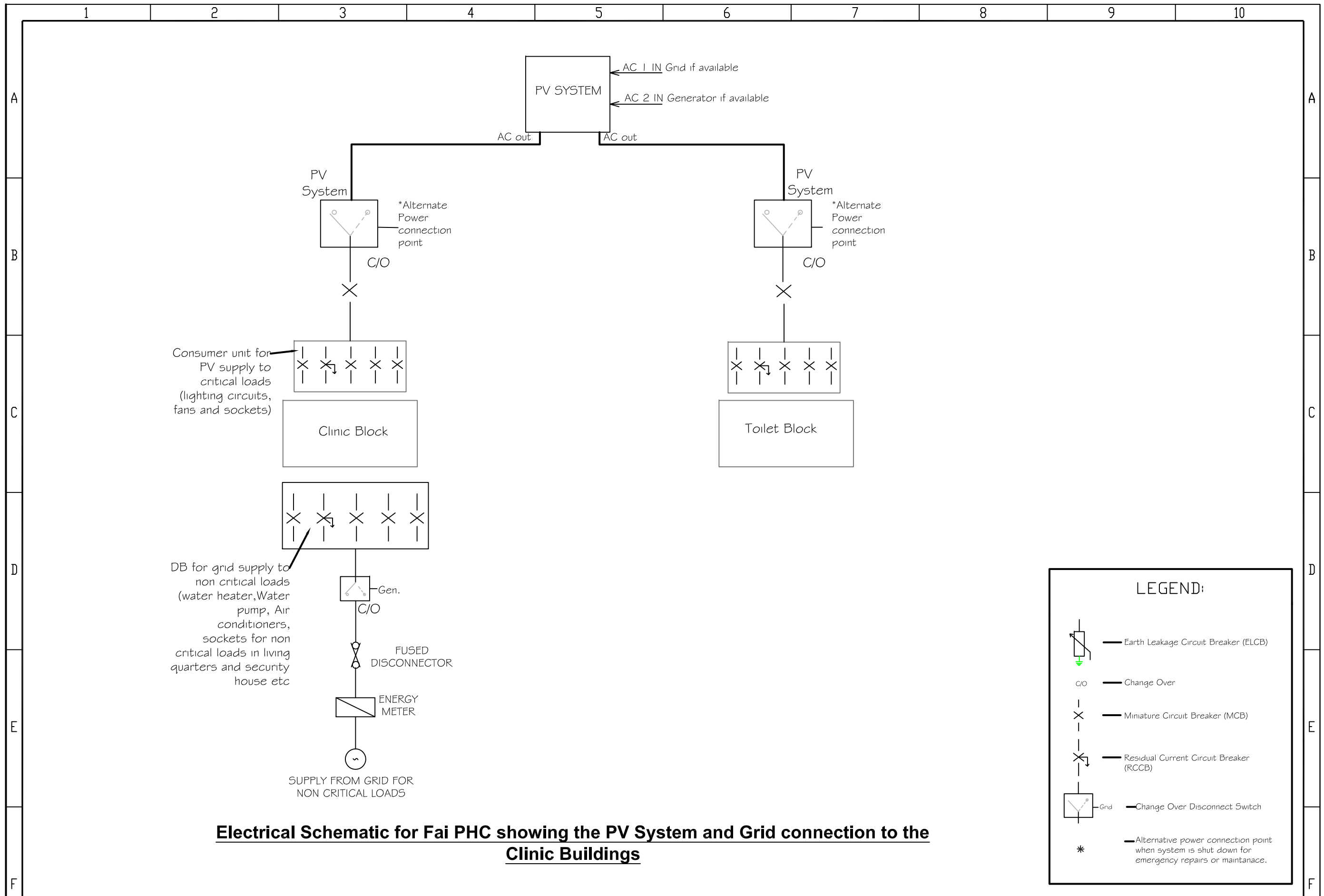
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KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I 4

Electrical System Design for Fai PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015



Electrical Schematic for Fai PHC showing the PV System and Grid connection to the Clinic Buildings

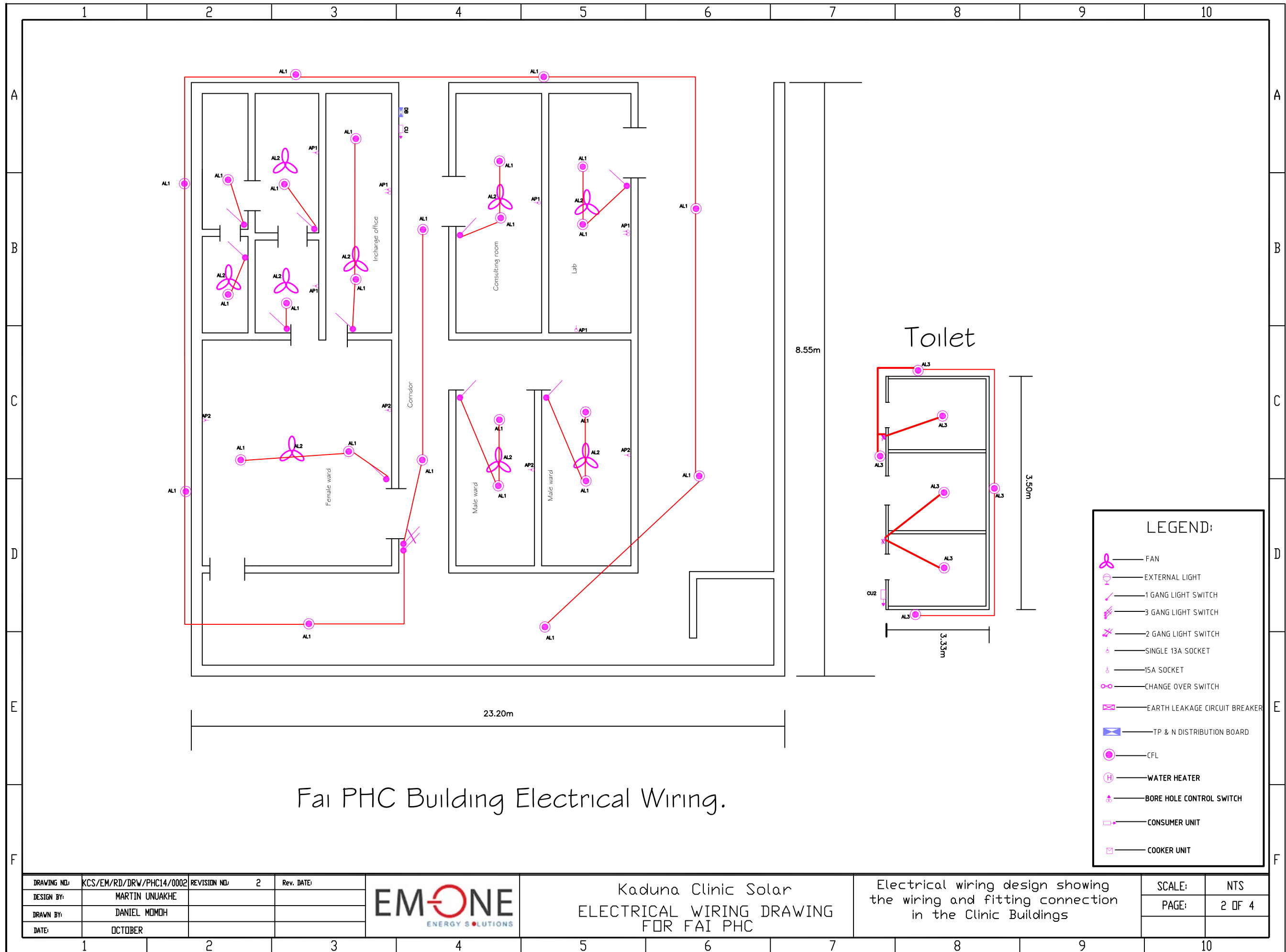
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Kaduna Clinic Solar
RETROFIT SCHEMATIC DRAWING
FOR FAI PHC

Electrical Schematic design showing
the PV System and Grid connection
to the Clinic Buildings

SCALE:	NTS
PAGE:	1 OF 4



Fa1 PHC Building Electrical Wiring.

LEGEND:	
	FAN
	EXTERNAL LIGHT
	1 GANG LIGHT SWITCH
	3 GANG LIGHT SWITCH
	2 GANG LIGHT SWITCH
	SINGLE 13A SOCKET
	15A SOCKET
	CHANGE OVER SWITCH
	EARTH LEAKAGE CIRCUIT BREAKER
	TP & N DISTRIBUTION BOARD
	CFL
	WATER HEATER
	BORE HOLE CONTROL SWITCH
	CONSUMER UNIT
	COOKER UNIT

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Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR FA1 PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
PAGE:	2 OF 4

LOAD TABLE FOR FAI PHC

POWER SOURCE: GRID										
	MAIN CLINIC- 60A DISTRIBUTION BOARD						TOILET- NO DISTRIBUTION BOARD		TOTAL (W)	
CIRCUIT IDENTITY										
MCB RATING										
DIVERSITY FACTOR										
LIGHTING CIRCUIT										
COOLING SYSTEM (CEILING FAN)										
13AMP SOCKET FOR EQUIPMENT POWERING										-
15AMP SOCKET FOR EQUIPMENT POWERING										-
PEAK LOAD (W)										-
FINAL SUB-CIRCUIT	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE				
CABLE SIZES IN mm										

POWER SOURCE: PV SYSTEM										
SYSTEM ID:		FAI SYS 1								
CAPACITY:		13,260 KWP								
	MAIN CLINIC- 100A CONSUMER UNIT						TOILET- 32A CONSUMER UNIT		TOTAL (W)	
CIRCUIT IDENTITY	AL1	AL2	AP1	AP2			AL3			
MCB RATING	10A	10A	20A	20A			10A			
DIVERSITY FACTOR	0.9	0.9	0.6	0.6			0.9			
LIGHTING CIRCUIT	468						126			594
COOLING SYSTEM (CEILING FAN)		675								675
13AMP SOCKET FOR EQUIPMENT POWERING										
PEAK LOAD (W)										1,269
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT		13A SOCKET OUTLET		SPARE	SPARE	LIGHTING & CEILING FAN CIRCUIT	SPARE	SPARE	
CABLE SIZES IN mm	3x1.5mm		3x2.5mm				3x1.5mm			

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Kaduna Clinic Solar
LOAD DISTRIBUTION TABLE
FOR FAI PHC

Analysis of power distribution
within the Clinic buildings

SCALE:	NTS
PAGE:	3 OF 4

BILL OF MATERIALS FOR FAI PHC ELECTRICAL RETROFIT

CLINIC BLOCK				TOILET				FAI TOTAL
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	Quantity
1	Ceiling fan	No.	9	1	Ceiling fan	No.		9
2	18 Watts CFL	No.	26	2	18 Watts CFL	No.	7	33
3	Roof mounted luminaire	No.	22	3	Roof mounted luminaire	No.	3	25
4	Wall mounted luminaire	No.	4	4	Wall mounted luminaire	No.	4	8
5	1 Gang light switch	No.	10	5	1 Gang light switch	No.		10
6	2 Gang light switch	No.	1	6	2 Gang light switch	No.	2	3
7	3 Gang light switch	No.		7	3 Gang light switch	No.		0
8	13 Amp socket single	No.	8	8	13 Amp socket single	No.		8
9	13 Amp socket double	No.	2	9	13 Amp socket double	No.		2
10	15 Amp socket	No.		10	15 Amp socket	No.		0
11	Junction box	No.	47	11	Junction box	No.	9	56
12	Single patress box (flush)	No.	19	12	Single patress box (flush)	No.	2	21
13	Double patress box (flush)	No.	2	13	Double patress box (flush)	No.	0	2
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	7	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	1	9
17	PVC accessories, male bush, saddle clamp, angle bend, screws and pegs Packs (100 per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend, screws and pegs	packs	1	2
18	100A distribution board	No.	1	18	100A distribution board	No.		1
19	60A distribution board	No.		19	60A distribution board	No.		0
20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.	1	21	100A consumer unit	No.		1
22	60A consumer unit	No.		22	60A consumer unit	No.		0
23	30A consumer unit	No.		23	30A consumer unit	No.	1	1
24	100A Residual current circuit breaker	No.	2	24	100A Residual current circuit breaker	No.		2
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.	1	1
27	100A change over	No.	2	27	100A change over	No.		2
28	60A change over	No.		28	60A change over	No.		0
29	30A change over	No.		29	30A change over	No.		0
	1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)			
30	AL1 (Lighting circuit)	Mts	240	30	AL3 (Lighting circuit)	Mts	80	
31	AL2 (Ceiling fan circuit)	Mts	150	31		Mts		
32	Total 1.5mm cable	Mts	390	32	Total 1.5mm cable	Mts	80	470
	2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)			
33	AP1 (Socket circuit)	Mts	100	33		Mts		
34	AP2 (Socket circuit)	Mts	70	34		Mts		
35	Total 2.5mm cable	Mts	170	35	Total 2.5mm cable	Mts	0	170
36	4x16mm PVC/SWA/PVC armoured cable	Mts	100	36	4x16mm PVC/SWA/PVC armoured cable	Mts		100
37	4x10mm PVC/SWA/PVC armoured cable	Mts		37	4x10mm PVC/SWA/PVC armoured cable	Mts		0
38	4x6mm PVC/SWA/PVC armoured cable	Mts		38	4x6mm PVC/SWA/PVC armoured cable	Mts	50	50
39	4x4mm PVC/SWA/PVC armoured cable	Mts		39	4x4mm PVC/SWA/PVC armoured cable	Mts		0
40	Cable terminating lugs	No.	16	40	Cable terminating lugs	No.	8	24
41	Recline cable (25mm)	Mts	60	41	Recline cable (25mm)	Mts		60
42	Earth wire for building (16mm)	Mts	70	42	Earth wire for building (16mm)	Mts	60	130
43	Underground marking tape	Mts	100	43	Underground marking tape	Mts	60	160

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DATE:	OCTOBER				



Kaduna Clinic Solar
BILL OF MATERIAL
FOR FAI PHC

Material quantities required for the electrical installation

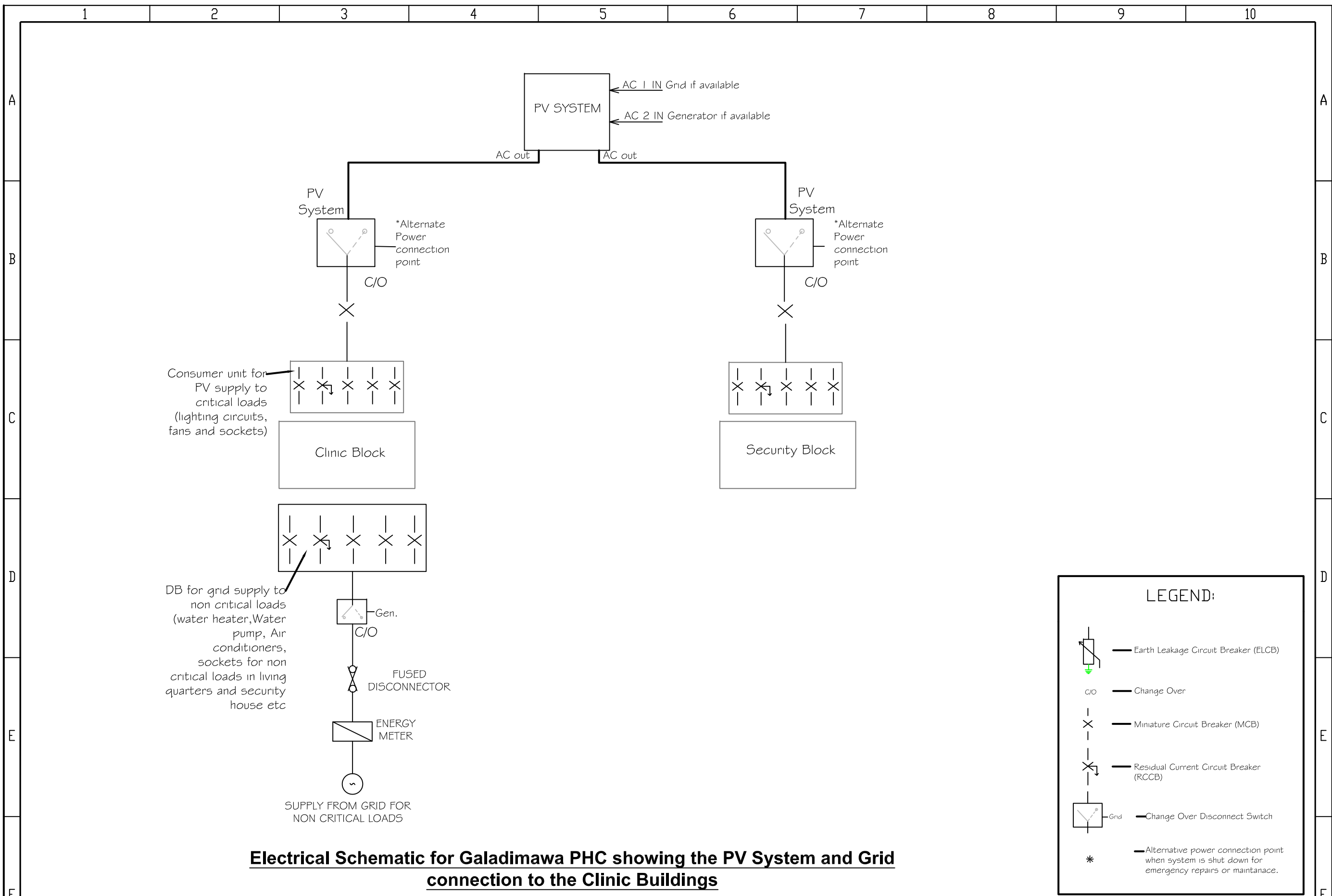
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KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I 5

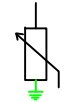





Electrical System Design for Galadimawa PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015

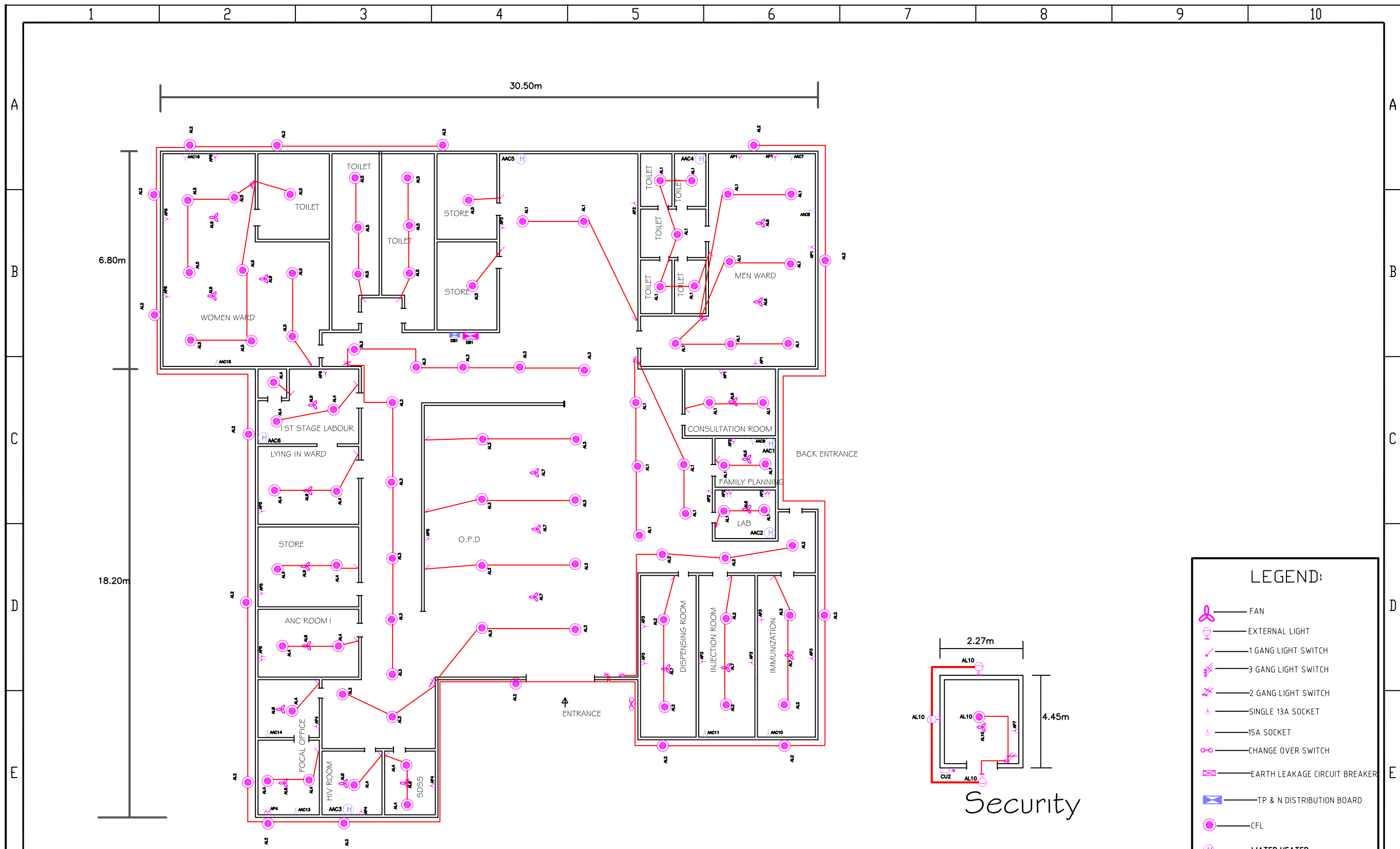


LEGEND:

-  Earth Leakage Circuit Breaker (ELCB)
-  Change Over
-  Miniature Circuit Breaker (MCB)
-  Residual Current Circuit Breaker (RCCB)
-  Change Over Disconnect Switch
-  Alternative power connection point when system is shut down for emergency repairs or maintainace.

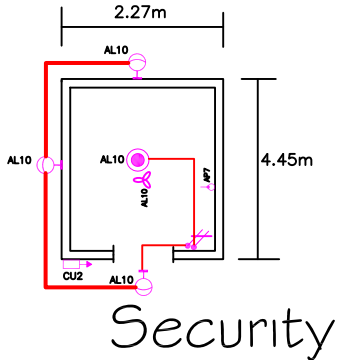
Electrical Schematic for Galadimawa PHC showing the PV System and Grid connection to the Clinic Buildings

DRAWING NO:	KSC/EM/RD/DRW/PHC15/0001	REVISION NO:	2	Rev. DATE:			Kaduna Clinic Solar RETROFIT SCHEMATIC DRAWING FOR GALADIMAWA PHC	Electrical Schematic design showing the PV System and Grid connection to the Clinic Buildings	SCALE:	NTS
DESIGN BY:	MARTIN UNUAKHE								PAGE:	1 OF 4
DRAWN BY:	DANIEL MOMOH									
DATE:	OCTOBER									



LEGEND:

- FAN
- EXTERNAL LIGHT
- 1 GANG LIGHT SWITCH
- 3 GANG LIGHT SWITCH
- 2 GANG LIGHT SWITCH
- SINGLE 13A SOCKET
- 15A SOCKET
- CHANGE OVER SWITCH
- EARTH LEAKAGE CIRCUIT BREAKER
- TP & N DISTRIBUTION BOARD
- CFL
- WATER HEATER
- BORE HOLE CONTROL SWITCH
- CONSUMER UNIT
- COOKER UNIT



Galadimawa PHC Building Electrical Wiring.

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Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR GALADIMAWA PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
PAGE:	2 OF 4

LOAD TABLE FOR GALADIMAWA PHC

POWER SOURCE: GRID	MAIN CLINIC- 100A DISTRIBUTION BOARD 1										MAIN CLINIC- 100A DISTRIBUTION BOARD 2						SECURITY- NO DISTRIBUTION BOARD				TOTAL (W)
CIRCUIT IDENTITY	AAC1	AAC2	AAC3	AAC4	AAC5	AAC7	AAC8	AAC9	AAC13	AAC4	AAC5	AAC10	AAC11	AAC12	AAC13						
MCB RATING	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A						
DIVERSITY FACTOR	1	1	1	1	1	2	3	4	8	1	1	5	6	7	8						
LIGHTING CIRCUIT																					
COOLING SYSTEM (CEILING FAN)																					
13AMP SOCKET FOR EQUIPMENT POWERING																				-	
15AMP SOCKET FOR EQUIPMENT POWERING	1,500	1,500	1,500	1,500	1,500	1,200	1,200	1,200	1,200	1,500	1,500	1,200	1,200	1,200	1,200					20,100	
PEAK LOAD (W)																				20,100	
FINAL SUB-CIRCUIT	15A SOCKET OUTLET					15A SOCKET OUTLET															
CABLE SIZES IN mm	3x2.5mm					3x2.5mm															

POWER SOURCE: PV SYSTEM	SYSTEM ID: GALADIMAWA SYS 1 & SYS 2																				TOTAL (W)				
	CAPACITY: 2x28,080 KWP																				TOTAL (W)				
	MAIN CLINIC- 100A CONSUMER UNIT 1									MAIN CLINIC- 100A CONSUMER UNIT 2							SECURITY- 32A CONSUMER UNIT				TOTAL (W)				
CIRCUIT IDENTITY	AL1	AL2	AL3	AL6	AL7	AP1	AP2	AP3	AL4	AL5	AL8	AL9	AP4	AP5	AP6	AL10	AP7								
MCB RATING	10A	10A	10A	10A	10A	20A	20A	20A	10A	10A	10A	10A	20A	20A	20A	10A	20A								
DIVERSITY FACTOR	0.9	0.9	0.9	0.9	0.9	0.6	0.6	0.6	0.9	0.9	0.9	0.9	0.6	0.6	0.6	0.9	0.6								
LIGHTING CIRCUIT	450	450	360						270	306						147				1,983					
COOLING SYSTEM (CEILING FAN)				375	450						375	450								1,650					
13AMP SOCKET FOR EQUIPMENT POWERING						200	120	240					240	800	120		60			1,780					
PEAK LOAD (W)																				5,413					
FINAL SUB-CIRCUIT	LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET			SPARE			LIGHTING & CEILING FAN CIRCUIT			13A SOCKET OUTLET			SPARE		SPARE		LIGHTING & CEILING FAN	13A SOCKET OUTLET	SPARE		SPARE	
CABLE SIZES IN mm	3x1.5mm			3x2.5mm						3x1.5mm			3x2.5mm							3x1.5mm	3x2.5mm				
RED PHASE	450	450							270	306															1476
YELLOW PHASE			360	375		200	120				375		240												1670
BLUE PHASE					450			240					450		800	120				147	60			2267	
TOTAL (W)																									5413

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Kaduna Clinic Solar
LOAD DISTRIBUTION TABLE
FOR GALADIMAWA PHC

Analysis of power distribution within the Clinic buildings

SCALE:	NTS
PAGE:	3 OF 4

BILL OF MATERIALS FOR GALADIMAWA PHC ELECTRICAL RETROFIT

CLINIC BLOCK				SECURITY HOUSE			GALADIMAWA TOTAL	
S/No.	Material	Unit	Quantity	S/No.	Material	Unit	Quantity	
1	Ceiling fan	No.	22	1	Ceiling fan	No.	1	23
2	18 Watts CFL	No.	102	2	18 Watts CFL	No.	4	106
3	Roof mounted luminaire	No.	86	3	Roof mounted luminaire	No.	1	87
4	Wall mounted luminaire	No.	16	4	Wall mounted luminaire	No.	3	19
5	1 Gang light switch	No.	25	5	1 Gang light switch	No.		25
6	2 Gang light switch	No.	5	6	2 Gang light switch	No.	1	6
7	3 Gang light switch	No.	2	7	3 Gang light switch	No.		2
8	13 Amp socket single	No.	24	8	13 Amp socket single	No.	1	25
9	13 Amp socket double	No.	4	9	13 Amp socket double	No.		4
10	15 Amp socket	No.	9	10	15 Amp socket	No.		9
11	Junction box	No.	162	11	Junction box	No.	6	168
12	Single patress box (flush)	No.	56	12	Single patress box (flush)	No.	2	58
13	Double patress box (flush)	No.	4	13	Double patress box (flush)	No.	0	4
14	Single patress box (surface)	No.		14	Single patress box (surface)	No.		0
15	Double patress box (surface)	No.		15	Double patress box (surface)	No.		0
16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bundle	32	16	25mm PVC pipes (25 numbers of 3Mts pipe per bundle)	bunde	2	34
17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs Packs (100per pack)	packs	1	17	PVC accessories, male bush, saddle clamp, angle bend,screws and pegs	packs	1	2
18	100A distribution board	No.	4	18	100A distribution board	No.		4
19	60A distribution board	No.		19	60A distribution board	No.		0
20	30A distribution board	No.		20	30A distribution board	No.		0
21	100A consumer unit	No.		21	100A consumer unit	No.		0
22	60A consumer unit	No.		22	60A consumer unit	No.		0
23	30A consumer unit	No.		23	30A consumer unit	No.	1	1
24	100A Residual current circuit breaker	No.	4	24	100A Residual current circuit breaker	No.		4
25	60A Residual current circuit breaker	No.		25	60A Residual current circuit breaker	No.		0
26	30A Residual current circuit breaker	No.		26	30A Residual current circuit breaker	No.	1	1
27	100A change over	No.	2	27	100A change over	No.		2
28	60A change over	No.		28	60A change over	No.		0
29	30A change over	No.		29	30A change over	No.		0
1.5mm cable (Twin & Earth)				1.5mm cable (Twin & Earth)				
30	AL1 (Lighting circuit)	Mts	300	30	AL9 (Lighting circuit)	Mts	50	
31	AL2 (Lighting circuit)	Mts	200	31	AL10 (Lighting circuit)	Mts	50	
32	AL3 (Lighting circuit)	Mts	180	32		Mts		
33	AL4 (Lighting circuit)	Mts	190	33		Mts		
34	AL5 (Lighting circuit)	Mts	160	34		Mts		
35	AL6 (Ceiling fan circuit)	Mts	130	35		Mts		
36	AL7 (Ceiling fan circuit)	Mts	120	36		Mts		
37	AL8 (Ceiling fan circuit)	Mts	120	37		Mts		
38	Total 1.5mm cable	Mts	1400	38	Total 1.5mm cable	Mts	100	1500
2.5mm cable (Twin & Earth)				2.5mm cable (Twin & Earth)				
39	AP1 (Socket circuit)	Mts	80	39	AP7 (Socket circuit)	Mts	30	
40	AP2 (Socket circuit)	Mts	80	40				
41	AP3 (Socket circuit)	Mts	100	41				
42	AP4 (Socket circuit)	Mts	70	42				
43	AP5 (Socket circuit)	Mts	70	43				
44	AP6 (Socket circuit)	Mts	70	44				
45	ACC1 (Hearer)	Mts	35	45				
46	ACC2 (Hearer)	Mts	35	46				
47	ACC3 (Hearer)	Mts	35	47				
48	ACC4 (Hearer)	Mts	35	48				
49	ACC5 (Hearer)	Mts	35	49				
50	ACC6 (Hearer)	Mts	35	50				
51	ACC7 (Socket circuit)	Mts	35	51				
52	ACC8 (Socket circuit)	Mts	35	52				
53	ACC9 (Socket circuit)	Mts	35	53				
54	ACC10 (Socket circuit)	Mts	35	54				
55	ACC11 (Socket circuit)	Mts	35	55				
56	ACC12 (Socket circuit)	Mts	35	56				
57	ACC13 (Socket circuit)	Mts	35	57				
58	ACC14 (Socket circuit)	Mts	35	58				
59	ACC15 (Socket circuit)	Mts	35	59				
60	ACC16 (Socket circuit)	Mts	35	60				
61	Total 2.5mm cable	Mts	1030	61	Total 2.5mm cable	Mts	30	1060
62	4x16mm PVC/SWA/PVC armoured cable	Mts	100	62	4x16mm PVC/SWA/PVC armoured cable	Mts		100
63	4x10mm PVC/SWA/PVC armoured cable	Mts		63	4x10mm PVC/SWA/PVC armoured cable	Mts		0
64	4x6mm PVC/SWA/PVC armoured cable	Mts		64	4x6mm PVC/SWA/PVC armoured cable	Mts	50	50
65	4x4mm PVC/SWA/PVC armoured cable	Mts		65	4x4mm PVC/SWA/PVC armoured cable	Mts		0
66	Cable terminating lugs	No.	16	66	Cable terminating lugs	No.	16	32
67	Recline cable (25mm)	Mts	60	67	Recline cable (25mm)	Mts		60
68	Earth wire for building (16mm)	Mts	70	68	Earth wire for building (16mm)	Mts	50	120
69	Underground marking tape	Mts	100	69	Underground marking tape	Mts	50	150

DRAWING NO:	KCS/EM/RD/BOM/PHC15	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNJAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
BILL OF MATERIAL
FOR GALADIMAWA PHC

Material quantities required for the
electrical installation

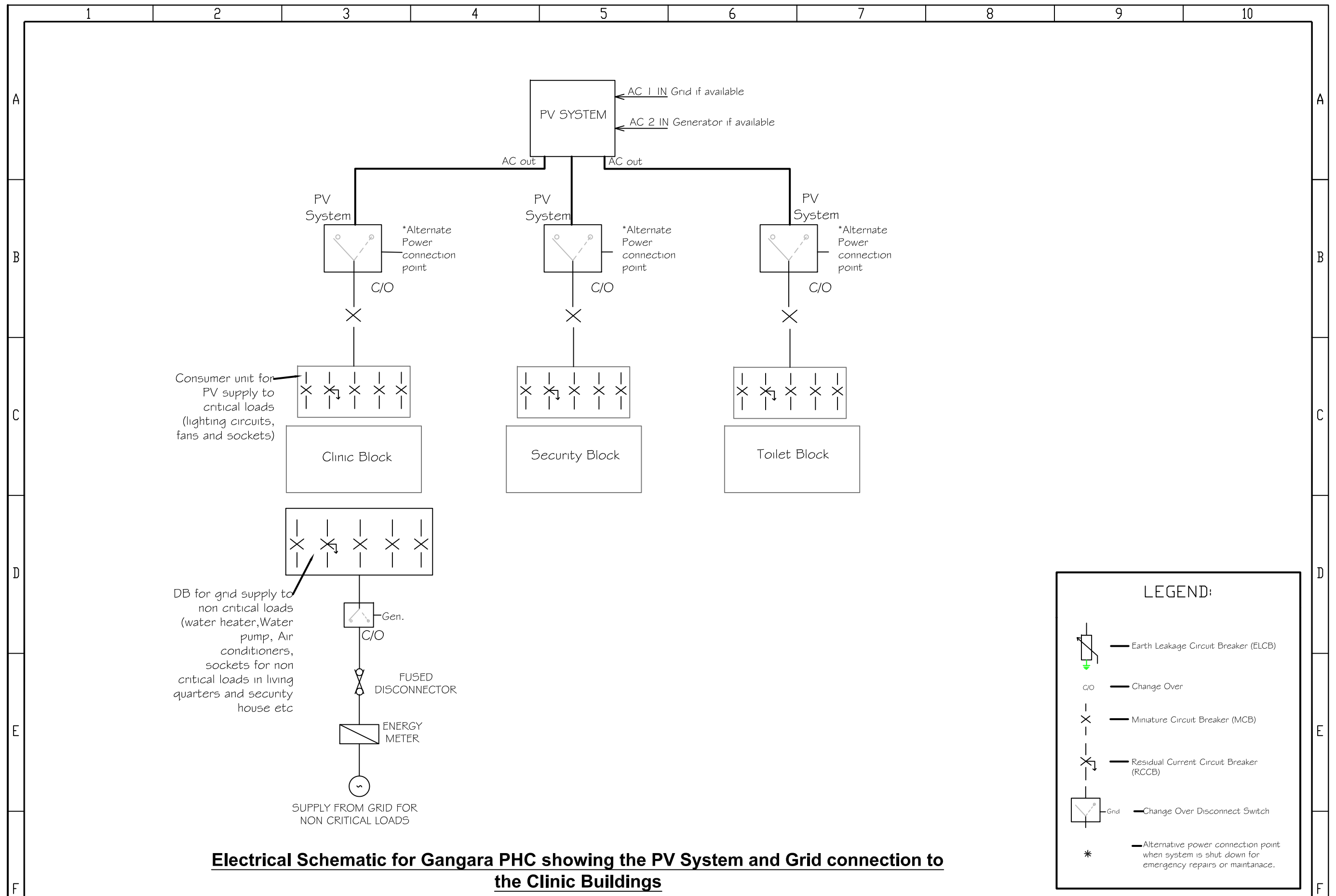
SCALE:	NTS
PAGE:	4 OF 4

KADUNA CLINICS PROJECT
KCS/EM/RD/DRW/PHC I 6

Electrical System Design for Gangara PHC

- Electrical Schematic for PV and Grid connection to PHC
 - Electrical wiring diagram for PHC Buildings.
 - Load Table for PHC Buildings
 - Bill of Materials for electrical retrofit
-

October 2015



Electrical Schematic for Gangara PHC showing the PV System and Grid connection to the Clinic Buildings

LEGEND:

- Earth Leakage Circuit Breaker (ELCB)
- Change Over
- Miniature Circuit Breaker (MCB)
- Residual Current Circuit Breaker (RCCB)
- Change Over Disconnect Switch
- * Alternative power connection point when system is shut down for emergency repairs or maintainance.

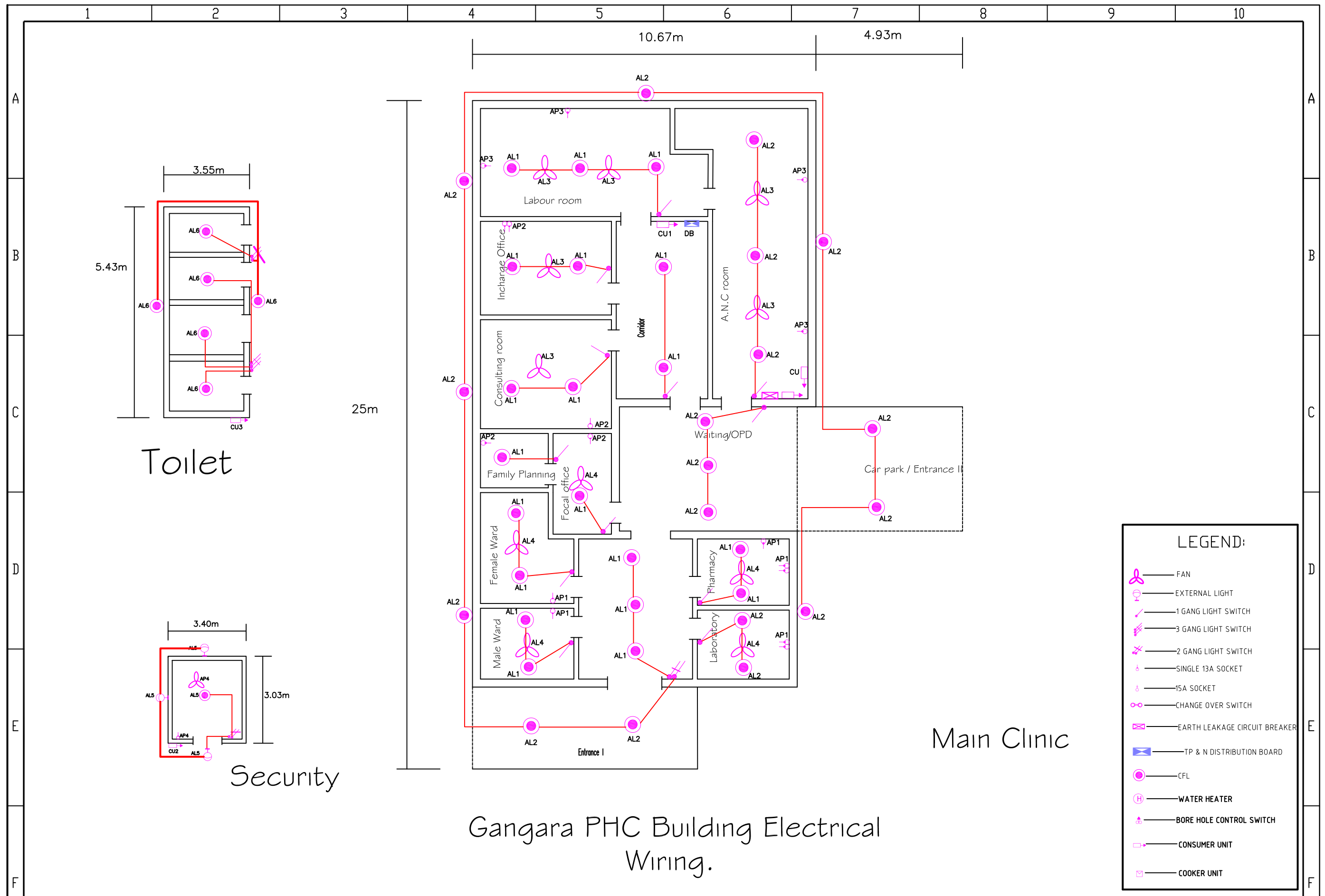
DRAWING NO:	KSC/EM/RD/DRW/PHC16/0001	REVISION NO:	2	Rev. DATE:	
DESIGN BY:	MARTIN UNUAKHE				
DRAWN BY:	DANIEL MOMOH				
DATE:	OCTOBER				



Kaduna Clinic Solar
RETROFIT SCHEMATIC DRAWING
FOR GANGARA PHC

Electrical Schematic design showing
the PV System and Grid connection
to the Clinic Buildings

SCALE:	NTS
PAGE:	1 OF 4



LEGEND:

- FAN
- EXTERNAL LIGHT
- 1 GANG LIGHT SWITCH
- 3 GANG LIGHT SWITCH
- 2 GANG LIGHT SWITCH
- SINGLE 13A SOCKET
- 15A SOCKET
- CHANGE OVER SWITCH
- EARTH LEAKAGE CIRCUIT BREAKER
- TP & N DISTRIBUTION BOARD
- CFL
- WATER HEATER
- BORE HOLE CONTROL SWITCH
- CONSUMER UNIT
- COOKER UNIT

Gangara PHC Building Electrical Wiring.

Main Clinic

DRAWING NO.:	KCS/EM/RD/DRW/PHC16/0002	REVISION NO.:	2	Rev. DATE:
DESIGN BY:	MARTIN UNUAKHE			
DRAWN BY:	DANIEL MOMOH			
DATE:	OCTOBER			



Kaduna Clinic Solar
ELECTRICAL WIRING DRAWING
FOR GANGARA PHC

Electrical wiring design showing
the wiring and fitting connection
in the Clinic Buildings

SCALE:	NTS
PAGE:	2 OF 4