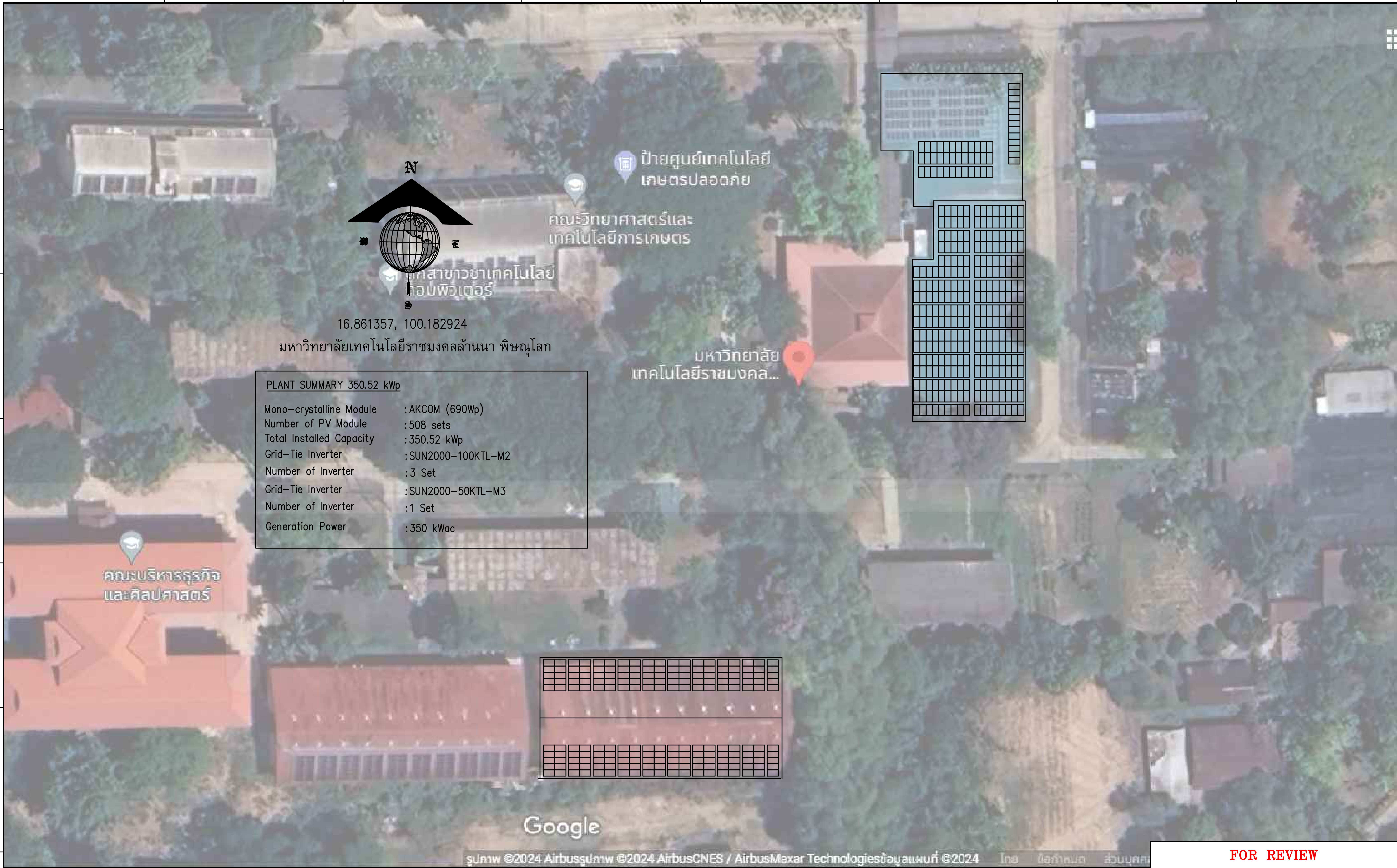

PLANT SUMMARY 350.52 kWp

Mono-crystalline Module	: AKCOM (690Wp)
Number of PV Module	: 508 sets
Total Installed Capacity	: 350.52 kWp
Grid-Tie Inverter	: SUN2000-100KTL-M2
Number of Inverter	: 3 Set
Grid-Tie Inverter	: SUN2000-50KTL-M3
Number of Inverter	: 1 Set
Generation Power	: 350 kWac

CLIENT:

มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา พิษณุโลก
52 หมู่ 7 ต.บ้านกร่าง อ.เมือง จ.พิษณุโลก 65000

CONTRACTOR:

วันชัยการไฟฟ้า

REV.	DATE	DISCRIPTION	DRAWN	CHECKED	APPROVED
A	28/01/2024	For-Review	Ms. Wanmai K.	Ms. Wanmai K.	Ms. Wanmai K.

CIVIL ENGINEER		
ELECTRICAL ENGINEER		
MECHANIICAL ENGINEER	-	
PROJECT MANAGER		
DATE	28 Jan 2024	

FOR REVIEW

SOLAR ROOFTOP 350.52 kWp PROJECT

DRAWING NAME: **PV MODULE LAYOUT**

DRAWING NO. –

REV. A

SHEET: 1 Of 1

SCALE: N/A

DESIGNED BY วันชัยการไฟฟ้า

BOQ มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา พิษณุโลก 350.52 kW Rev.1 (2024)

Item	Description	Model / Brand	Quantity	Unit	Price / Unit		Total Price	Remark
					Material	Installation		
1	**Permit Coordination**	**Government**	1	**Set**		120,000.00	**120,000.00**	
2	**Engineering / Design Work**	**Skylink/ PV Syst**	1	**Set**		50,000.00	**50,000.00**	
3	**Procurement / Installation**	**Skylink**	1	**Set**			**-**	
							-	
3.1	**PV Module 690 W**	**AKCOM**	508	**Panel**	3,154,680.00	127,000.00	**3,281,680.00**	
3.2	**String Inverter SUN2000-100KTL-M2**	**Huawei**	3	**ea**	580,470.00	18,000.00	**598,470.00**	
3.3	**String Inverter SUN2000-50KTL-M3**	**Huawei**	1	**ea**	96,030.00	6,000.00	**102,030.00**	
3.3	**Rapid shutdown for comply with EIT standard with Emergency Botton**	**Projoy**	254	**ea**	2,540,000.00	25,400.00	**2,565,400.00**	ตามมาตราฐาน วศท.กำหนดให้ต้องติดตั้ง Rapid shutdown ตั้งแต่วันที่ 1 ก.ค. 2566
3.3	**Controller Box for DC24V กล่องควบคุมไฟฟ้า (Rapid Shutdown Device)**	**Projoy**	7	**ea**	70,000.00	1,400.00	**71,400.00**	
3.3	**สายไฟเลี้ยง Rapit shutdown**	Thai Yazaki	3000	**m**	165,000.00	75,000.00	**240,000.00**	
3.3	**DC Fuse(Inline Fuse)**	**Uriarte**	0	**set**	-	-	**-**	
3.4	**DC Connector**	**Multi Contact**	100	**ea**	20,000.00	5,000.00	**25,000.00**	
3.5	**DC Extension Cable (Solar Cable) FD depends on calculation**	**Helukabel/JJ Lap/Prysmian/Link**	19,300.00	m	694,800.00	115,800.00	**810,600.00**	
3.6	**AC Cable**						**-**	
3.6.1	AC Cable CV Cable size …1C x 70.. Sq.mm.(Inverter to MDB Solar)	Thai Yazaki	150	m	119,400.00	27,000.00	**146,400.00**	
3.6.2	AC Cable CV Cable size …150.. Sq.mm. (MDB Solar to MAIN MDB)	Thai Yazaki	100	m	95,000.00	10,000.00	**105,000.00**	
3.6.4	AC Cable THW Cable size …35.. Sq.mm. (AC Collection Ground)	Thai Yazaki	50	m	11,900.00	4,000.00	**15,900.00**	
3.6.5	AC Cable THW Cable size …16.. Sq.mm. (AC Collection Ground)	Thai Yazaki	600	m	37,800.00	15,000.00	**52,800.00**	
3.6.5	AC Cable THW Cable size …6.. Sq.mm. (DC Ground)	Thai Yazaki	300	m	18,900.00	7,500.00	**26,400.00**	
3.6.6	Acc . AC Cable (cable lag,Terminat lag,support cable grend)	Thai Yazaki	1	Set	15,000.00	7,500.00	**22,500.00**	
3.7	**Main Distribution Board**	**Precise**					**-**	
3.7.1	Main Distribution Board (MDB)	Precise	1	ea	95,000.00	5,000.00	**100,000.00**	
3.8	**Grounding System**	**Kumwell**	1	**Set**	15,000.00	6,000.00	**21,000.00**	
							-	
3.9	**Mounting Structure (350.52 kWp)**	**Skylink Solar**	1	**Set**	350,520.00	105,156.00	**455,676.00**	
3.10	**Cable Tray**	**Perforated Tray**					**-**	
3.10.1	Cable Tray 100x100x2400	Perforated Tray	80	ea	123,200.00	12,000.00	**135,200.00**	
3.10.3	Cable Tray 200x100x2400	Perforated Tray	150	ea	202,500.00	30,000.00	**232,500.00**	
3.10.4	Cable Tray 300x100x2400	Perforated Tray	0	ea	-	-	**-**	
3.10.5	Cable ladder 400x100x2400	Perforated Tray	0	ea	-	-	**-**	
3.10.6	Conduit and Flaxible, Support Cable Tray		1	Lot	35,000.00	10,000.00	**45,000.00**	
							-	
3.11	**Metering System**						**-**	
3.11.1	PQM Meter (UMG 96RM)	Janitza	1	ea		20,000.00	**20,000.00**	
3.11.2	Revenue Meter	EDMI ATLAS ,MK10E	0	ea	-	-	**-**	
3.12	**Protection System**						**-**	
3.12.1	Relay Protection System (SEL-751)	SEL-751	0	lot	-	-	**-**	
3.13	**Other Accessories**						**-**	
3.13.1	Transformer 400 kVA Std.Loss	**Ekarat**	1	ea	437,000.00	30,000.00	**467,000.00**	
3.13.2	22kV For Transformer	STC,Precise	1	Set	120,000.00	50,000.00	**170,000.00**	
3.13.3	22 kV Sac Cable		70	m	15,750.00	3,500.00	**19,250.00**	
3.13.4	Current Transformer MV (2Core 50VA CL.0.5&3Ph For Relay)	Precise	0	ea	-	-	**-**	
3.13.5	Potential Transformer MV (2 Core30VA CL 0.5&5P20 For Relay)	Precise	0	ea	-	-	**-**	
3.13.6	Concret Pole and Support CT,VT and Acc.	STC	0	ea	-	-	**-**	
3.13.7	Concret Pole For Riser Pole Incomming + Outgoing	STC	0	ea	-	-	**-**	
3.13.8	Drop Out Fuse	Precise	3	ea	9,000.00	3,000.00	**12,000.00**	
3.13.9	Lightning Arrester 21 kV 10 kA	Precise	3	ea	12,000.00	3,000.00	**15,000.00**	
3.13.10	Electrical Distribution Box	Schneider	0	ea	-	-	**-**	
3.13.11	Electrical System (Lighting Fixture, Receptacle)	Philips	0	Set	-	-	**-**	
3.14	**Monitoring System**						**-**	
3.14.1	Smart Logger 3000A	**Huawei**	1	ea	30,000.00	10,000.00	**40,000.00**	
3.14.2	RS485 for Zero Export	lapp	1	Set	20,000.00	5,000.00	**25,000.00**	
3.14.3	LAN Wiring System	TP Link	1	Set	10,000.00	3,500.00	**13,500.00**	
3.14.4	UPS	Leonic	1	ea	10,000.00	2,500.00	**12,500.00**	
4	**Safety System**						**-**	
4.1	Warning Sign,Fire Extinguisher 1 Sets ,Equipment Name Plate (Acrylic)	**Skylink**	1	Set	10,000.00	3,000.00	**13,000.00**	
4.2	Ladder For Service	**Skylink**	0	**Set**	-	-	**-**	
4.3	Inverter Support Structure and Fence	**Skylink**	1	Set	70,000.00	25,000.00	**95,000.00**	
5	**Test and Comissioning System**						**-**	
5.1	Commissioning Work	**Skylink**	1	Set		35,000.00	**35,000.00**	
6	**Others**						**-**	
6.1	Hand rail Lifegrad	**Skylink**		Set	-	-	**-**	
6.2	Walkway	**Skylink**		Set	-	-	**-**	
6.3	Water Cleaning system	**Skylink**	1	Set	40,000.00	15,000.00	**55,000.00**	
6.4	Mobilization	**Skylink**	1	Set	-	80,000.00	**80,000.00**	
6.5	Unload and Transportation	**Skylink**	1	Set	150,000.00	100,000.00	**250,000.00**	
6.6	Insurance	**Skylink**		Set	-		**-**	
6.7	Management and Overhead	**Skylink**	1	**Set**		150,000.00	**150,000.00**	
	Total				**9,373,950.00**	**1,321,256.00**	**10,695,206.00**	
						Total	**10,695,206.00**	
	System Size (KWdc) = Q'ty Panel x PV Module Rate							
	THB/W				**26.74**	**3.77**	**30.51**	

Solar PV Rooftop 350.52 kWp. มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา พิษณุโลก

Total PV Plant Capacity (DC)	**350.52**	**kWp**
Daily Electricity Production	981.46	kWh/day
Monthly Electricity Production	29,443.68	kWh/month
Annual Electricity Production	353,324.16	kWh/year
Investment	10,695,206.0	Batt
Tariff	4.00	Bath/unit

Year	Degradation of PV Module		Annual Electricity Production (kWh/Year)	Estimated Yearly Saving (@ 4.00 Baht/kWh)	Accumulated Saving (Baht)	Payback Period (Baht)
0		100%		-10,695,206.00		-10,695,206.00
1	2.50%	97.50%	353,324	1,413,297	1,413,297	-9,281,909
2	0.60%	96.90%	344,491	1,377,964	2,791,261	-7,903,945
3	0.60%	96.30%	342,424	1,369,696	4,160,957	-6,534,249
4	0.60%	95.70%	340,370	1,361,478	5,522,436	-5,172,770
5	0.60%	95.10%	338,327	1,353,309	6,875,745	-3,819,461
6	0.60%	94.50%	336,297	1,345,190	8,220,934	-2,474,272
7	0.60%	93.90%	334,280	1,337,118	9,558,053	-1,137,153
8	0.60%	93.30%	332,274	1,329,096	10,887,149	191,943
9	0.60%	92.70%	330,280	1,321,121	12,208,270	1,513,064
10	0.60%	92.10%	328,299	1,313,194	13,521,464	2,826,258
11	0.60%	91.50%	326,329	1,305,315	14,826,779	4,131,573
12	0.60%	90.90%	324,371	1,297,483	16,124,263	5,429,057
13	0.60%	90.30%	322,425	1,289,698	17,413,961	6,718,755
14	0.60%	89.70%	320,490	1,281,960	18,695,921	8,000,715
15	0.60%	89.10%	318,567	1,274,268	19,970,190	9,274,984
16	0.60%	88.50%	316,656	1,266,623	21,236,813	10,541,607
17	0.60%	87.90%	314,756	1,259,023	22,495,836	11,800,630
18	0.60%	87.30%	312,867	1,251,469	23,747,305	13,052,099
19	0.60%	86.70%	310,990	1,243,960	24,991,265	14,296,059
20	0.60%	86.10%	309,124	1,236,496	26,227,761	15,532,555
21	0.60%	85.50%	307,269	1,229,077	27,456,839	16,761,633
22	0.60%	84.90%	305,426	1,221,703	28,678,542	17,983,336
23	0.60%	84.30%	303,593	1,214,373	29,892,914	19,197,708
24	0.60%	83.70%	301,772	1,207,087	31,100,001	20,404,795
25	0.60%	83.10%	299,961	1,199,844	32,299,845	21,604,639
Total			**8,074,961**	**32,299,845**	**32,299,845**