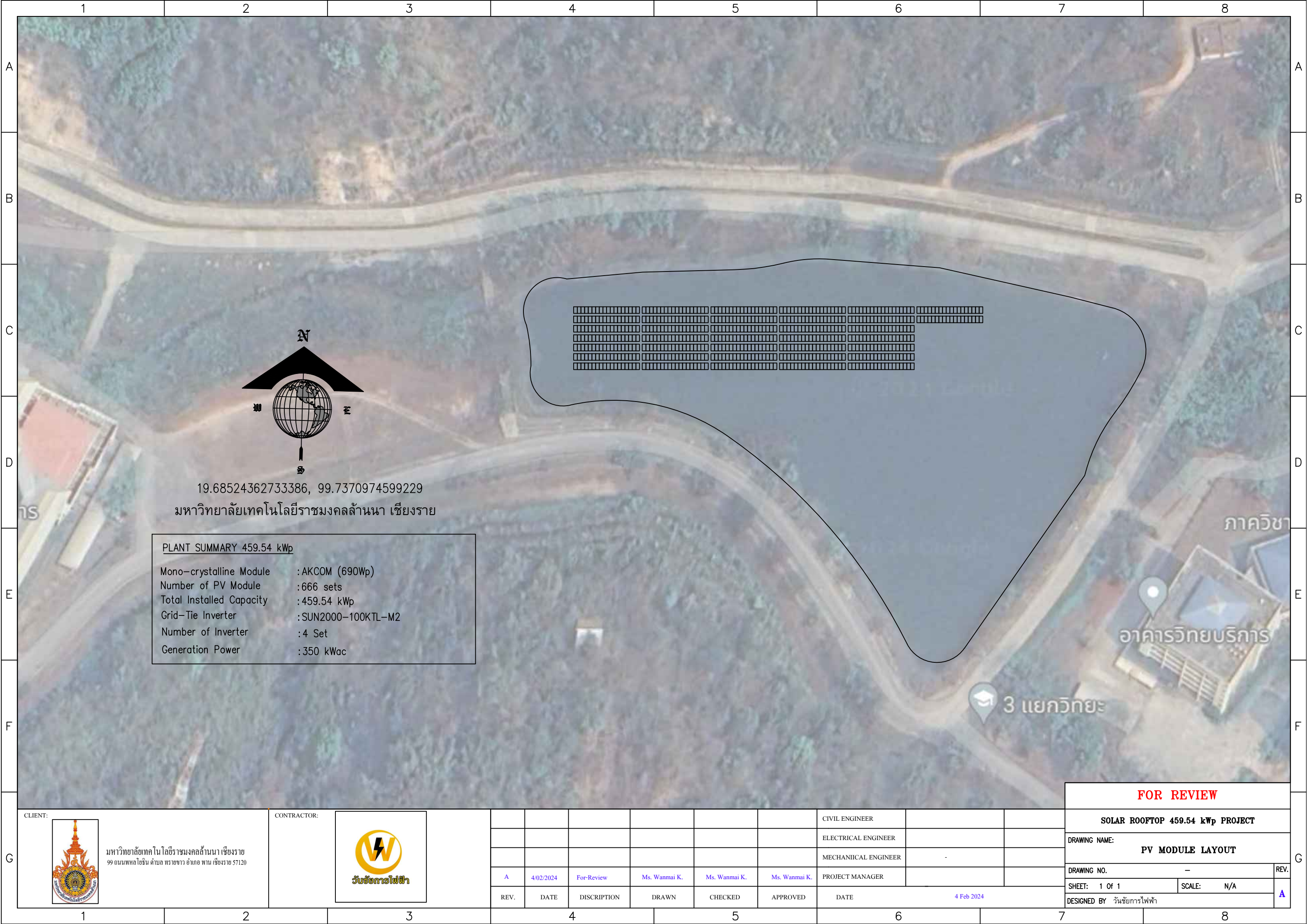




PLANT SUMMARY 459.54 kWp

Mono-crystalline Module	: AKCOM (690Wp)
Number of PV Module	: 666 sets
Total Installed Capacity	: 459.54 kWp
Grid-Tie Inverter	: SUN2000-100KTL-M2
Number of Inverter	: 4 Set
Generation Power	: 350 kWac

CLIENT:



มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา เชียงราย
99 ถนนพหลโยธิน ตำบลทรายขาว อำเภอพาน เชียงราย 57120

CONTRACTOR:



วันชัยการไฟฟ้า

							CIVIL ENGINEER		
							ELECTRICAL ENGINEER		
							MECHANICAL ENGINEER	-	
A	4/02/2024	For-Review	Ms. Wanmai K.	Ms. Wanmai K.	Ms. Wanmai K.	PROJECT MANAGER			
REV.	DATE	DISCRIPTION	DRAWN	CHECKED	APPROVED	DATE	4 Feb 2024		

FOR REVIEW		
SOLAR ROOFTOP 459.54 kWp PROJECT		
DRAWING NAME: PV MODULE LAYOUT		
DRAWING NO. —		REV.
SHEET: 1 Of 1	SCALE: N/A	A
DESIGNED BY วันชัยการไฟฟ้า		

BOQ มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา เชียงราย 459.54 kW Rev.1 (2024)

Item	Description							Remark
		Model / Brand	Quantity	Unit	Price / Unit		Total Price	
					Material	Installation		
1	Permit Coordination	Government	1	Set		120,000.00	120,000.00	
2	Engineering / Design Work	PV Syst	1	Set		50,000.00	50,000.00	
3	Procurement / Installation	-	1	Set			-	
							-	
3.1	PV Module 690 W	AKCOM	666	Panel	4,135,860.00	166,500.00	4,302,360.00	
3.2	String Inverter SUN2000-100KTL-M2	Huawei	4	ea	773,960.00	8,000.00	781,960.00	
3.3	String Inverter SUN2000-50KTL-M3	Huawei	0	ea	-	-	-	
3.3	Rapid shutdown for comply with EIT standard with Emergency Botton	Projoy	0	ea	-	-	-	ตามมาตรฐาน วศท.กำหนดให้ต้องติดตั้ง Rapid shutdown ตั้งแต่วันที่ 1 ก.ค. 2566
3.3	Controller Box for DC24V กล่องควบคุมไฟฟ้า (Rapid Shutdown Device)	Projoy	0	ea	-	-	-	
3.3	สายไฟเลี้ยง Rapit shutdown	Thai Yazaki	0	m	-	-	-	
3.3	DC Fuse(Inline Fuse)	Uriarte	0	set	-	-	-	
3.4	DC Connector	Multi Contact	55	ea	11,000.00	3,850.00	14,850.00	
3.5	DC Extension Cable (Solar Cable) FD depends on calculation	Helukabel/JJ Lap/Prysmian/Link	15,000.00	m	540,000.00	90,000.00	630,000.00	
3.6	AC Cable						-	
3.6.1	AC Cable CV Cable size ...1C x 70.. Sq.mm.(Inverter to MDB Solar)	Thai Yazaki	2000	m	900,000.00	360,000.00	1,260,000.00	
3.6.2	AC Cable CV Cable size ...240.. Sq.mm. (MDB Solar to TR)	Thai Yazaki	150	m	142,500.00	30,000.00	172,500.00	
3.6.4	AC Cable THW Cable size ...120.. Sq.mm. (AC Collection Ground)	Thai Yazaki	50	m	27,500.00	4,000.00	31,500.00	
3.6.5	AC Cable THW Cable size ...16.. Sq.mm. (Ground)	Thai Yazaki	300	m	18,900.00	7,500.00	26,400.00	
3.6.5	AC Cable THW Cable size ...6.. Sq.mm. (DC Ground)	Thai Yazaki	500	m	22,500.00	7,500.00	30,000.00	
3.6.6	Acc . AC Cable (cable lag,Terminat lag,support cable grend)	Thai Yazaki	1	Set	30,000.00	15,000.00	45,000.00	
3.7	Main Distribution Board	Precise					-	
3.7.1	Main Distribution Board (MDB)	Precise	1	ea	450,000.00	5,000.00	455,000.00	
3.8	Grounding System	Kumwell	1	Set	15,000.00	5,000.00	20,000.00	
3.9	Mounting Structure (459.54 kWp)	-	1	Set	1,608,390.00	827,172.00	2,435,562.00	
3.10	Cable Tray	Perforated Tray					-	
3.10.1	Cable Tray 100x100x2400	Perforated Tray	150	ea	231,000.00	22,500.00	253,500.00	
3.10.3	Cable Tray 200x100x2400	Perforated Tray	50	ea	67,500.00	10,000.00	77,500.00	
3.10.4	Cable Tray 300x100x2400	Perforated Tray	15	ea	29,625.00	4,500.00	34,125.00	
3.10.5	Cable ladder 400x100x2400	Perforated Tray	0	ea	-	-	-	
3.10.6	Conduit and Flexible, Support Cable Tray		1	Lot	35,000.00	25,000.00	60,000.00	
							-	
3.11	Metering System						-	
3.11.1	PQM Meter (UMG 512 Pro)	Janitza	1	ea	120,000.00	15,000.00	135,000.00	
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 500 kVA	-	1	ea	400,000.00	30,000.00	430,000.00	
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	-	3	ea	96,000.00	15,000.00	111,000.00	
3.13.5	Potential Transformer MV	-	1	ea	51,700.00	10,000.00	61,700.00	
3.13.6	Concret Pole and Support CT,VT and Acc.	STC	1	ea	35,000.00	25,000.00	60,000.00	
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	1	ea	15,000.00	8,000.00	23,000.00	
3.13.11	Electrical System (Lighting Fixture, Receptacle)	Philips	1	Set	8,000.00	2,000.00	10,000.00	
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	5,000.00	3,500.00	8,500.00	
3.14.4	UPS	Leonic	1	ea	5,000.00	1,000.00	6,000.00	
4	Safety System						-	
4.1	Warning Sign,Fire Extinguisher 1 Sets ,Equipment Name Plate (Acrylic)		1	Set	10,000.00	3,000.00	13,000.00	
4.2	Ladder For Service		0	Set	-	-	-	
4.3	Inverter Support Structure and Fence		1	Set	70,000.00	20,000.00	90,000.00	
5	Test and Comissioning System						-	
5.1	Commissioning Work		1	Set		35,000.00	35,000.00	
6	Others						-	
6.1	Hand rail Lifegrad			Set	-	-	-	
6.2	Walkway			Set	-	-	-	
6.3	Water Cleaning system			Set	-	-	-	
6.4	Mobilization		1	Set	-	100,000.00	100,000.00	
6.5	Unload and Transportation		1	Set	250,000.00	100,000.00	350,000.00	
6.6	Insurance			Set	-		-	
6.7	Management and Overhead		1	Set		300,000.00	300,000.00	
	Total				10,311,185.00	2,503,522.00	12,814,707.00	
		Total					12,814,707.00	
	System Size (KWdc) = Q'ty Panel x PV Module Rate							
	THB/W			22.44	5.45	27.89		

Solar PV Rooftop 459.54 kWp. มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา เชียงราย

Total PV Plant Capacity (DC)	459.54 kWp
Daily Electricity Production	1,286.71 kWh/day
Monthly Electricity Production	38,601.36 kWh/month
Annual Electricity Production	463,216.32 kWh/year
Investment	12,814,707.0 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%		-12,814,707.00		-12,814,707.00
1	2.50%	97.50%	463,216	1,852,865	1,852,865	-10,961,842
2	0.60%	96.90%	451,636	1,806,544	3,659,409	-9,155,298
3	0.60%	96.30%	448,926	1,795,704	5,455,113	-7,359,594
4	0.60%	95.70%	446,233	1,784,930	7,240,043	-5,574,664
5	0.60%	95.10%	443,555	1,774,221	9,014,264	-3,800,443
6	0.60%	94.50%	440,894	1,763,575	10,777,839	-2,036,868
7	0.60%	93.90%	438,248	1,752,994	12,530,833	-283,874
8	0.60%	93.30%	435,619	1,742,476	14,273,309	1,458,602
9	0.60%	92.70%	433,005	1,732,021	16,005,330	3,190,623
10	0.60%	92.10%	430,407	1,721,629	17,726,959	4,912,252
11	0.60%	91.50%	427,825	1,711,299	19,438,258	6,623,551
12	0.60%	90.90%	425,258	1,701,031	21,139,289	8,324,582
13	0.60%	90.30%	422,706	1,690,825	22,830,114	10,015,407
14	0.60%	89.70%	420,170	1,680,680	24,510,794	11,696,087
15	0.60%	89.10%	417,649	1,670,596	26,181,391	13,366,684
16	0.60%	88.50%	415,143	1,660,572	27,841,963	15,027,256
17	0.60%	87.90%	412,652	1,650,609	29,492,572	16,677,865
18	0.60%	87.30%	410,176	1,640,705	31,133,277	18,318,570
19	0.60%	86.70%	407,715	1,630,861	32,764,139	19,949,432
20	0.60%	86.10%	405,269	1,621,076	34,385,215	21,570,508
21	0.60%	85.50%	402,837	1,611,350	35,996,564	23,181,857
22	0.60%	84.90%	400,420	1,601,681	37,598,246	24,783,539
23	0.60%	84.30%	398,018	1,592,071	39,190,317	26,375,610
24	0.60%	83.70%	395,630	1,582,519	40,772,836	27,958,129
25	0.60%	83.10%	393,256	1,573,024	42,345,860	29,531,153
Total			10,586,465	42,345,860	42,345,860	

