Array Parameter Tool 13

Array Parameter Calculations & Dimensions

String Size			Electrical Rack Size			CB capacity		
Min Temp	-26	C	Module width	3.28	ft	Module/string Isc (series)	9.44	A
			module height	6.54	ft	Isc continous current multiplier	1.25	see (a)
Voc	46.43	V				Nom Isc	11.8	A
Ref temp	25	C	Rack width	28	modules	Isc irradiance correction	1.25	see (b)
			Rack height	2	modules	Max Isc string	14.75	A
Temp Coeff of Voc	-0.0029	per deg C				Max Isc rack, at CB	29.5	A
Temp delta	-51		Rack width	91.84	ft	Allowed current CB	400	A
temp correction	1.15		Rack height	13.08	ft	Max current per CB	354	A
Voc corrected	53.297					Strings per CB	27.11864	
			Frame width	1.38	in	Number of CB per array	11	
String voltage/CB in vo	1500	V				Actual strings per CB	24	****
String size	28.1442							
string size (series)	28	modules						
String voltage calculate	1492.3	V						

(a) NEC690.8(B)(1) requires overcurrent device ratings shall not be less than 125% of the maximum currents calculated - continous current multiplier.

(b) NEC690.8(A)(1) requires another 125% correction multiplier before the applicaton of other correction factors.

The irradiance correction factor is a multiplier for the current output of a solar panel. Panels can have power spikes with higher solar irradiance.

Thus the total current correction factors are 156%

(c) The total component area includes the racks and inverter skid. Does not include negligable area of converter boxes or recombiners.

(rack area)(118)+(inv skid area)

(d) Referenced from true north. Azimuth is measured clockwise from true north to the point on the horizon directly below the object.

** Access road included

*** Assumes 6x6 configuration & 16 ft spacing between arrays.

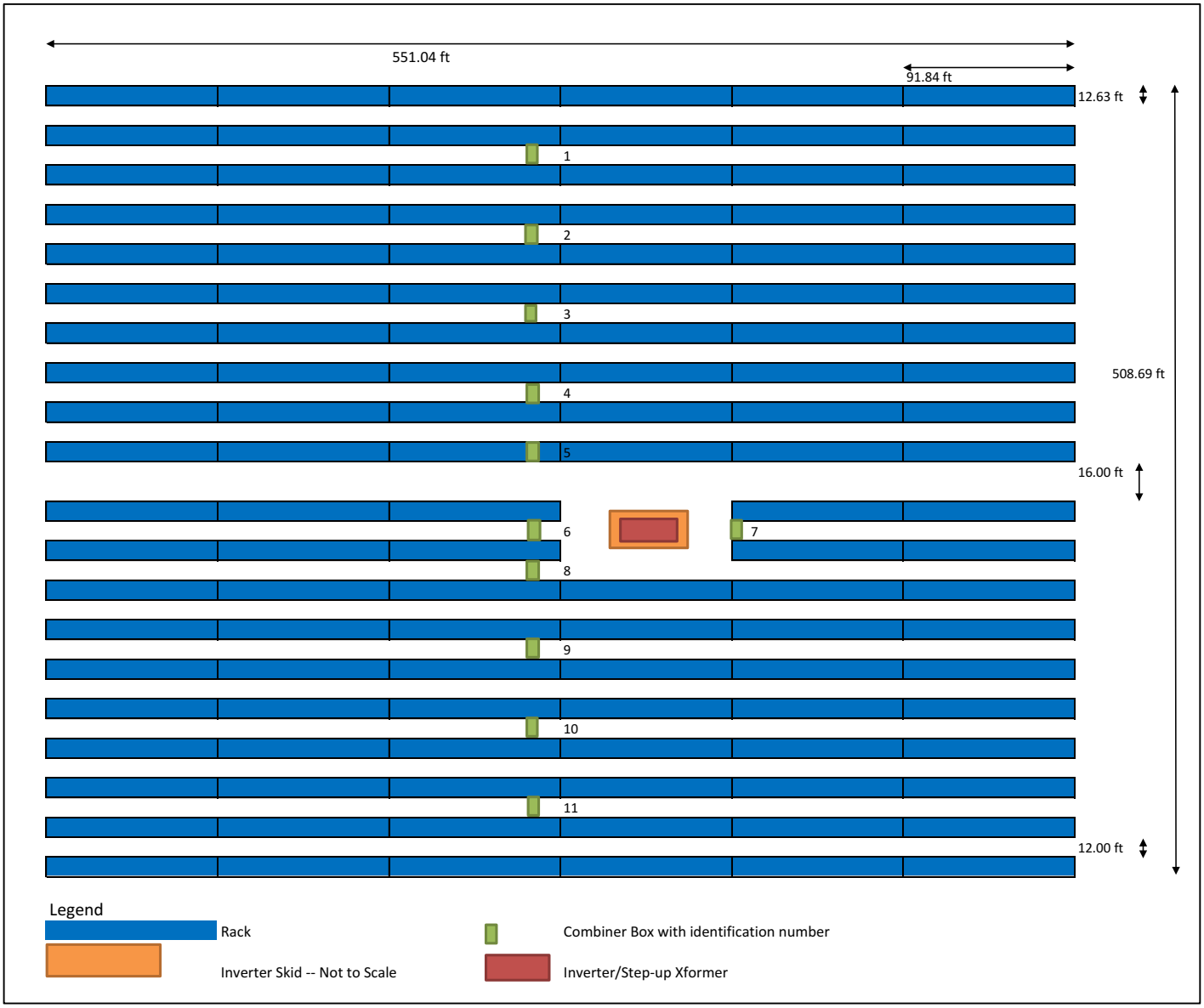
**** Except CB6 and CB7 ,see CB & Inverter Sheet (this xlsx)

Array Design			Array Size				Plant Totals		
Racks per row	6		Tilt	15	Degrees		Array Blocks	36	
			Azimuth	180	Degrees	see (d)			
Rows per block	20		Rack height proj	12.634	ft		Number of CBs	396	
Racks removed	2		Row spac	12	ft		Inverters	36	
Total Racks	118		Pitch	24.634	ft		Modules/Panels	237888	
Total modules in Array	6608		Array height	492.69	ft		Total Strings	236	
							Total Racks	472	
Module DC capacity	325	W	Array width	551.04	ft		AC Plant Output	59.976	MW AC
							DC Array Output	77.314	MW DC
DC capacity	2147.6	kW	Access road width	16	ft				
			Array Size with access road & spacing:				PV Plant Height	3132	ft ***
Inverter capacity	1666	kW	Array height		508.69	ft **	PV Plant Width	3386	ft ***
Inverter S capcity	1831	kVA	Array width		551.04	ft			
ILR ->Inv in/Inv out	1.2891		Array Area		280306	ft^2	Solar Plant Area	10605349	ft^2 ***
					26041	m^2		0.380	mi^2
CB's per Array	11		Inverter skid		22 x 8.5	ft		243.5	acres
			Inverter skid area		187	ft^2		985269.1	m^2
Power per CB	195.24	kW	Area of components		141937	ft^2			
Power per Rack	18.2	kW	Ground Coverage Ratio (GCR)		0.5064	see(c)			

Combiner Box (CB) Currents

Combiner (CB)	Strings In	Racks In	Per CB Output (A)
CB1	24	12	354
CB2	24	12	354
CB3	24	12	354
CB4	24	12	354
CB5	24	12	354
CB6	12	6	177
CB7	8	4	118
CB8	24	12	354
CB9	24	12	354
CB10	24	12	354
CB11	24	12	354
		Total Inverter	3481

Array Layout



Conductors

Conductors	Max Isc (A)	Type	Material	Temp (degC)	AWG	Cable Rating (A)	Minimum Depth	Fuse	
String Conductor	14.75	Free Air	Copper	75	12	35	NA	15	
Rack to CB - Jumper	29.5	Free Air	Copper	75	10	50	NA	30	
CB to Inverter - DC feeder	354	Buried	Aluminum	75	700	375	30 inch	355	see (a)
Xformer to Collector	116	Buried	Aluminum	75	1\0	120	36 inch	(*)	see (b)
(*) see substation detail									
(a) 1500 V conductor must be buried at least 30 inches , NEC310 Table 300.50 pg157									
(a) 34.5kV conductor must be buried at least 36 inches, NEC310 Table 300.50 pg157									

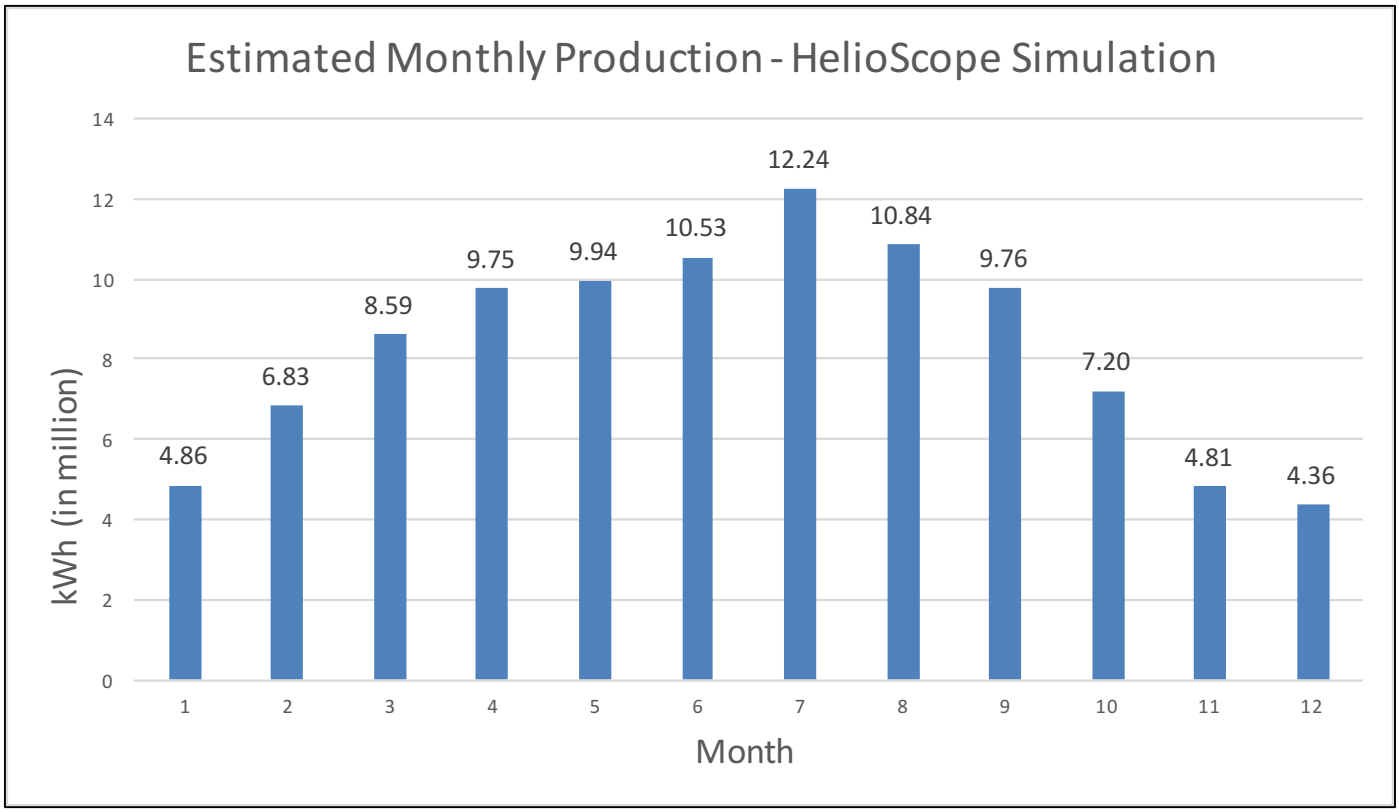
Expected Production Detail

Month	kWh/array	kWr for plant	
Jan	134908.3	4856699	
Feb	189793.8	6832577	
Mar	238735.9	8594492	
Apr	270896.2	9752263	
May	276162.1	9941836	
Jun	292464.2	10528711	
Jul	340070.1	12242524	
Aug	301173.1	10842232	
Sep	271199.4	9763178	
Oct	200029.3	7201055	
Nov	133627.1	4810576	
Dec	121172.2	4362199	
Total/year		99728341.2	kWh

Solar Radiation Data

Solar Radiation Data	
Source: NREL	
Location: Boone Municipal Airport	
Month	kWh/m^2/day
Jan	2.05
Feb	3.18
Mar	3.81
Apr	4.18
May	5.16
Jun	5.25
Jul	5.58
Aug	5.36
Sep	4.36
Oct	4.35
Nov	2.94
Dec	1.74

Expected Production Plot



Annual Solar Ration