PLOT DATE: 1/30/2024 12:03 PM

AC CIRCUIT CALCULATIONS

EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	FLA x 1.25	OCPD SIZE [A]	CONDUIT TYPE	CONDUIT SIZE	GROUND SIZE	CONDUCTORS PER PHASE	PHASE CONDUCTOR SIZE	NEUTRAL CONDUCTOR SIZE	75° AMPACITY	90° AMPACITY	90° AMPACITY WITH C.O.U.	C.O.U DERATE AMBIENT TEMP	C.O.U. DERATE CONDUIT FILL	FEEDER LENGTH (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
UTILITY CT CABINET	UTILITY TRANSFORMER	480	1443.0	1804	2000	EMT	3.5"	CU 350MCM	6	CU 500MCM	CU 500MCM	2280	2580	2477	0.96	1.00	25	0.06%	0.06%
SOLAR SYSTEM AC DISCONNECT 1	UTILITY CT CABINET	480	865.8	1082	1200	EMT	3.5"	CU #1/0 SSBJ	4	CU 500MCM	CU 500MCM	1520	1720	1651	0.96	1.00	10	0.02%	0.09%
SOLAR SYSTEM AC DISCONNECT 2	UTILITY CT CABINET	480	577.2	722	800	EMT	3.5"	CU #2 SSBJ	3	CU 350MCM	CU 350MCM	930	1050	1008	0.96	1.00	20	0.05%	0.12%
SOLAR AC PANELBOARD 1	SOLAR SYSTEM AC DISCONNECT 1	480	865.8	1082	1200	EMT/PVC	3.5"	CU #3/0	4	AL 500MCM	NONE	1240	1400	1344	0.96	1.00	300	1.05%	1.14%
SOLAR AC PANELBOARD 2	SOLAR SYSTEM AC DISCONNECT 2	480	577.2	722	800	EMT/PVC	3.5"	CU #1/0	3	AL 350MCM	NONE	750	840	806	0.96	1.00	320	1.40%	1.52%
INVERTER 1	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	15	0.08%	0.08%
INVERTER 2	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	25	0.13%	1.27%
INVERTER 3	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	30	0.16%	1.30%
INVERTER 4	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	35	0.18%	1.32%
INVERTER 5	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	40	0.21%	1.35%
INVERTER 6	SOLAR AC PANELBOARD 1	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	45	0.23%	1.37%
INVERTER 7	SOLAR AC PANELBOARD 2	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	15	0.08%	1.59%
INVERTER 8	SOLAR AC PANELBOARD 2	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	25	0.13%	1.65%
INVERTER 9	SOLAR AC PANELBOARD 2	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	30	0.16%	1.67%
INVERTER 10	SOLAR AC PANELBOARD 2	480	144.3	180	200	EMT	2.5"	CU #6	1	AL #4/0	NONE	180	205	197	0.96	1.00	35	0.18%	1.70%

AVERAGE AC VOLTAGE DROP FROM POI TO INVERTERS: 1.33%

MODULE SPECIFICATIONS	
MAKE/MODEL	TD7G72M144-545W
POWER [W]	545
ISC [A]	13.93
IMP [A]	13.04
VOC [V]	49.76
VMP [V]	41.80
β VOC [%/degC]	-0.260%
SITE CLIMATE CRITERIA	
ASHRAE HIGH [°C]	34
ASHRAE LOW [°C]	-15
STRING SPECIFICATIONS AT STC	
MODULES/STRING	2
POWER [W]	1090
STRING ISC [A]	13.93
STRING IMP [A]	13.04
STRING VMP [V]	83.60
STRING MAX VOLTAGE CALCULATION	
VOC TEMP ADJUSTMENT @ -15 °C	1.10
VOC @ -15 °C [V]	54.94
MAX STRING VOC [V]	109.9
STRING CALCULATIONS REFER TO THE PV SIDE OF DC OPTIMIZERS, NOT TO THE OPTIMIZER OUTPUT CIRCUIT	

DC STRING WIRING CALCULATION – CONDUIT	
OPTIMIZER OUTPUT [A]	18.00
MAX CONTINUOUS FAULT CURRENT FROM PARALLEL SOURCES [AMPS]	18.00
1.25x MAX CONTINUOUS FAULT CURRENT [AMPS]	22.50
MAX # OF WIRES PER CONDUIT	40
DERATE FOR # OF CONDUCTORS IN A CONDUIT	0.4
MAX AMBIENT TEMPERATURE	34
TEMPERATURE DERATE	0.96
WIRE GAUGE	CU #8
75 DEG AMPACITY WITHOUT COU ADJUSTMENT [AMPS]	50
IS 75 DEG AMPACITY WITHOUT COU ADJUSTMENT >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(1)
90DEG AMPACITY WITH COU ADJUSTMENT [AMPS]	21.12
IS 90DEG AMPACITY WITH COU ADJUSTMENT >= 1.0x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(2)
DC OPTIMIZER OUTPUT CIRCUIT FUSE RATING [AMPS]	25
AVAILABLE FAULT CURRENT FROM ALL PARALLEL SOURCES [AMPS]	18
IS FUSE RATING >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.9(B)

INVERTERS 1-10	
STRING WIRE GAUGE	8AWG-CU
DC IMPEDANCE [OHM/KFT]	0.8090
OPERATING VOLTAGE [VDC]	850
OPERATING CURRENT [AMP]	18.0

INVERTERS 1-5				INVERTERS 6-10			
STRING NUMBER	TOTAL STRING DISTANCE [FT]	STRING VOLTAGE DROP		STRING NUMBER	TOTAL STRING DISTANCE [FT]	STRING VOLTAGE DROP	
1-1	205	0.70%		6-1	395	1.35%	
1-2	180	0.62%		6-2	385	1.32%	
1-3	160	0.55%		6-3	375	1.28%	
1-4	120	0.41%		6-4	365	1.25%	
1-5	110	0.38%		6-5	355	1.22%	
1-6	100	0.34%		6-6	340	1.16%	
1-7	90	0.31%		6-7	330	1.13%	
1-8	80	0.27%		6-8	325	1.11%	
1-9	95	0.33%		6-9	335	1.15%	
2-1	100	0.34%		7-1	395	1.35%	
2-2	115	0.39%		7-2	300	1.03%	
2-3	125	0.43%		7-3	340	1.16%	
2-4	110	0.38%		7-4	350	1.20%	
2-5	120	0.41%		7-5	360	1.23%	
2-6	135	0.46%		7-6	370	1.27%	
2-7	145	0.50%		7-7	385	1.32%	
2-8	155	0.53%		7-8	395	1.35%	
2-9	165	0.57%		7-9	400	1.37%	
3-1	170	0.58%		8-1	405	1.39%	
3-2	285	0.98%		8-2	415	1.42%	
3-3	275	0.94%		8-3	570	1.95%	
3-4	260	0.89%		8-4	555	1.90%	
3-5	245	0.84%		8-5	540	1.85%	
3-6	235	0.81%		8-6	560	1.92%	
3-7	225	0.77%		8-7	550	1.88%	
3-8	215	0.74%		8-8	540	1.85%	
3-9	205	0.70%		8-9	525	1.80%	
4-1	190	0.65%		9-1	510	1.75%	
4-2	180	0.62%		9-2	500	1.71%	
4-3	175	0.60%		9-3	490	1.68%	
4-4	210	0.72%		9-4	480	1.64%	
4-5	230	0.79%		9-5	490	1.68%	
4-6	245	0.84%		9-6	500	1.71%	
4-7	260	0.89%		9-7	510	1.75%	
4-8	145	0.50%		9-8	520	1.78%	
4-9	185	0.63%		9-9	530	1.82%	
5-1	270	0.93%		10-1	535	1.83%	
5-2	285	0.98%		10-2	545	1.87%	
5-3	210	0.72%		10-3	555	1.90%	
5-4	300	1.03%		10-4	565	1.94%	
5-5	310	1.06%		10-5	580	1.99%	
5-6	320	1.10%		10-6	590	2.02%	
5-7	480	1.64%		10-7	505	1.73%	
5-8	455	1.56%		10-8	435	1.49%	
5-9	440	1.51%		AVERAGE VOLTAGE DROP		1.13%	

WIRE TROUGH – LOAD SIDE
CALCULATIONS REPRESENT WORST CASE FILL IN SECTION

WIRE SPECIFICATIONS					
CABLE TYPE	CABLE GAUGE	QUANTITY	CABLE OUTER DIAMETER [IN]	CROSS-SECTIONAL AREA PER CABLE [SQ.IN]	WEIGHT [LBS/FT]
AL	500MCM	12	0.902	0.639	6.672
AL	350MCM	9	0.777	0.474	3.609
(EGC) CU (AC)	#3/0	1	0.568	0.253	0.575
TROUGH SIZE					
# OF CURRENT CARRYING CONDUCTORS	TOTAL CROSS-SECTIONAL AREA OF CABLES [SQ.IN]	REQUIRED FILL AREA [SQ.IN]	TROUGH CROSS-SECTION AL AREA [SQ.IN]	TROUGH PERCENT FILL	TROUGH SIZE [IN]
21	12.19	60.9	100.00	12%	10" x 10"
TOTAL WEIGHT [LBS/FT]					
TOTAL CABLE WEIGHT		TROUGH WEIGHT		TOTAL	
10.86		9.11		19.97	

WIRE TROUGH – LINE SIDE
CALCULATIONS REPRESENT WORST CASE FILL IN SECTION

WIRE SPECIFICATIONS					
CABLE TYPE	CABLE GAUGE	QUANTITY	CABLE OUTER DIAMETER [IN]	CROSS-SECTIONAL AREA PER CABLE [SQ.IN]	WEIGHT [LBS/FT]
AL	500MCM	16	0.902	0.639	8.896
AL	350MCM	12	0.777	0.474	4.812
CU	#1/0	1	0.474	0.176	0.372
CU	#2	1	0.375	0.110	0.234
TROUGH SIZE					
# OF CURRENT CARRYING CONDUCTORS	TOTAL CROSS-SECTIONAL AREA OF CABLES [SQ.IN]	REQUIRED FILL AREA [SQ.IN]	TROUGH CROSS-SECTION AL AREA [SQ.IN]	TROUGH PERCENT FILL	TROUGH SIZE [IN]
21	16.20	81.0	100.00	16%	10" x 10"
TOTAL WEIGHT [LBS/FT]					
TOTAL CABLE WEIGHT		TROUGH WEIGHT		TOTAL	
14.31		9.11		23.43	

CABLE TRAY SECTION – A
CALCULATIONS REPRESENT WORST CASE FILL IN SECTION

WIRE SPECIFICATIONS					
CABLE TYPE	CABLE GAUGE	QUANTITY	CABLE OUTER DIAMETER [IN]	CROSS-SECTIONAL AREA PER CABLE [SQ.IN]	WEIGHT [LBS/FT]
AL	500MCM	12	0.902	0.639	6.672
AL	350MCM	9	0.777	0.474	3.609
(EGC) CU (AC)	#3/0	1	0.568	0.253	0.575
TRAY WIDTH					
TRAY SECTION	TOTAL CROSS-SECTIONAL AREA OF CABLES [SQ.IN]	% ALLOWABLE FILL AREA		SUM OF DIAMETER OF CABLES [IN]	PARTIAL TRAY WIDTH [IN]
SINGLE CONDUCTORS (AC)	12.189	86.29%		–	13
COMMUNICATIONS	–	–		–	2
SPARE	–	–		–	21
				TOTAL WIDTH	36
TOTAL WEIGHT [LBS/FT]					
TOTAL CABLE WEIGHT		TRAY WEIGHT		TOTAL	
10.86		5.57		16.43	

DRAWING NOTES:
1. DISTANCES ARE ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DATE	REVISION DESCRIPTION	PM	ENG	CHK
01/30/2024	ISSUE FOR PERMIT-REV3	RK	AA	RI
01/10/2024	ISSUE FOR PERMIT-REV2	RK	AA	RI
12/15/2023	ISSUE FOR PERMIT-REV1	RK	KP	RI
10/12/2023	ISSUE FOR PERMIT	RK	KP	RI

PUREPOWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM
RICHARD A. IVINS
MD LICENSE No. 40152

ENGINEER
STATE OF MARYLAND RICHARD A. IVINS No. 40152 PROFESSIONAL ENGINEER

CONTRATOR
solargaines
SOLAR GAINES
9 SCHILLING ROAD
SUITE 202
HUNT VALLEY, MD 21031
WWW.SOLARGAINES.COM

PAGE SIZE 36" x 24"
PROJECT # 07204.03

DC SYSTEM SIZE: 1,714.57 kWDC
AC SYSTEM SIZE: 1,200.00 kWAC
MODULE TYPE: TALESUN TD7G72M 545W
MODULE QUANTITY: (3,146)
ORIENTATION: 10° TILT, 175° AZIMUTH

PROJECT
1,714.57 KW SOLAR ROOFTOP SYSTEM AT NCBP - BUILDING 12
(38.8713, -76.7339) 15821 QUEENS COURT
UPPER MARLBORO, MD 20774

DRAWING TITLE: SCHEDULES & CALCULATIONS

DRAWING #: E310

RULER IN INCHES: