

APPENDIX A-1

Electrical Service and Equipment Information

APPENDIX A-1

Electrical Service and Equipment Information

The following information is provided as a summary of the electrical service and equipment that is present at the sites.

The selected provider will need to field verify this information prior to commencement of design.

Site	Served from Station AC Switchboard	Equipment	Manufacturer	Voltage Rating	Amperage	kVA Rating	Phase	Number of Wires
Largo Operations Building	No	Transformer	Utility Owned	480/277	Utility Owned	Utility Owned	3	4
	No	Switchboard	Eaton	480/277	800	NA	3	4
Shady Grove Surface Lot	Yes	Transformer	GE	13.8kV/480/277	NA	1000/1333	3	4
	Yes	MV Breaker	GE	15kV	600	NA	3	NA
	Yes	LV Breaker	Siemens	480	1600	NA	3	4
	Yes	LV Switchboard	Abbott Power Corp	480	NA	NA	3	4
Landover Surface Lot	Yes	Transformer	Federal Pacific	13.8kV/480/277	NA	750	3	4
	Yes	MV Breaker	Federal Pacific	15kV	1200	NA	3	NA
	Yes	LV Breaker	Federal Pacific	480	1000	NA	3	4
	Yes	LV Switchboard	Federal Pacific	480	1600	NA	3	4
Rockville Surface Lot & Kiss & Ride	Yes	Transformer	GE	13.8kV/480/277	NA	750	3	4
	Yes	MV Breaker	GE	15 kV	600	NA	3	NA
	Yes	LV Breaker	Siemens	480	1600	NA	3	4
	Yes	LV Switchboard	Abbott Power Corp	480	NA	NA	3	4
Morgan Boulevard Surface Lot & Kiss & Ride	Yes	Transformer	Siemens	13.8kV/480/277	NA	2000/2667	3	4
	Yes	MV Breaker	Cutler Hammer	15kV	1200	NA	3	NA
	Yes	LV Breaker	Siemens	480	3200	NA	3	NA
	Yes	LV Switchboard	Siemens	480/277	NA	NA	3	4
Branch Ave Surface Lot	Yes	Transformer	OLSUN	13.8kV/480/277	NA	1500/2000	3	4
	Yes	MV Breaker	Industrial Electric	15kV	1200	NA	3	NA
	Yes	LV Breaker	Eaton	480	2400	NA	3	4
	Yes	LV Switchboard	Eaton	480/277	NA	NA	3	4

APPENDIX A-1 (Continued)

Electrical Service and Equipment Information

The following information is provided as a summary of the electrical service and equipment that is present at the sites.

The selected provider will need to field verify this information prior to commencement of design.

Site	Served from Station AC Switchboard	Equipment	Manufacturer	Voltage Rating	Amperage	kVA Rating	Phase	Number of Wires
Cheverly Surface Lot & Kiss and Ride	Yes	Transformer	Federal Pacific	13.8kV/480/277	NA	750	3	4
	Yes	MV Breaker	Federal Pacific	15kV	1200	NA	3	NA
	Yes	LV Breaker	Federal Pacific	480	1000	NA	3	4
	Yes	LV Switchboard	Federal Pacific	480	1600	NA	3	4
Deanwood Surface Lot & Kiss and Ride	Yes	Transformer	Federal Pacific	13.8kV/480/277	NA	750	3	4
	Yes	MV Breaker	Federal Pacific	15kV	1200	NA	3	NA
	Yes	LV Breaker	Federal Pacific	480	1000	NA	3	4
	Yes	LV Switchboard	Federal Pacific	480	NA	NA	3	4
Naylor Surface Lot & Kiss and Ride	Yes	Transformer	Virginia Transformer Corp	13.8kV/480/277	NA	1500/2000	3	4
	Yes	MV Breaker	Siemens	15kV	1200	NA	3	NA
	Yes	LV Breaker	Siemens	480	1600	NA	3	4
	Yes	LV Switchboard	Siemens	480	NA	NA	3	4

APPENDIX A-2

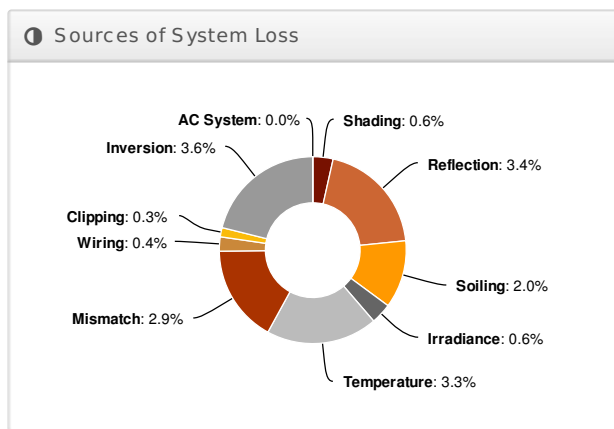
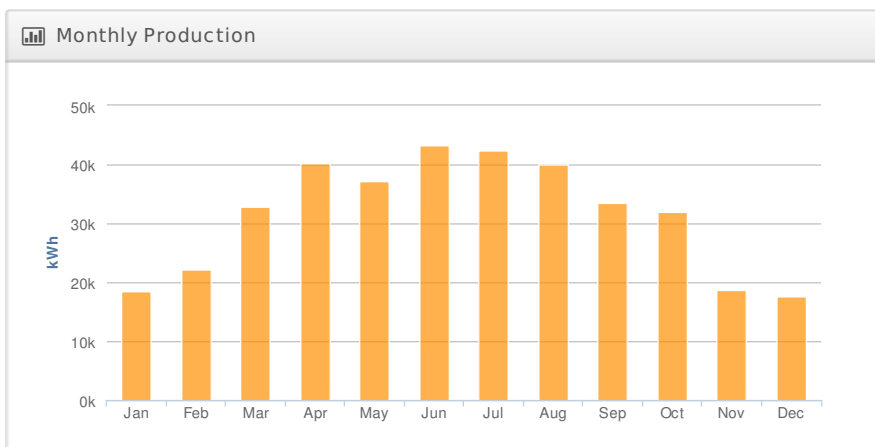
Annual Production Reports

G98 Largo Water Treatment GM1 G98 Largo Water Treatment Bldg Ground Mount, 9450 Lottsford Road, Largo, MD

Report	
Project Name	G98 Largo Water Treatment Bldg Ground Mount
Project Description	Largo Water Treatment and Operations Bldg Ground Mount Areas 1 & 2
Project Address	9450 Lottsford Road, Largo, MD
Prepared For	WMATA
Prepared By	Paul Lanning planning@bluefinllc.com



System Metrics	
Design	G98 Largo Water Treatment GM1
Module DC Nameplate	287.0 kW
Inverter AC Nameplate	250.0 kW Load Ratio: 1.15
Annual Production	378.3 MWh
Performance Ratio	84.1%
kWh/kWp	1,317.9
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,568.0	7.7%
	Shaded Irradiance	1,558.6	-0.6%
	Irradiance after Reflection	1,505.7	-3.4%
	Irradiance after Soiling	1,475.6	-2.0%
	Total Collector Irradiance	1,475.6	0.0%
Energy (kWh)	Nameplate	423,288.1	
	Output at Irradiance Levels	420,701.1	-0.6%
	Output at Cell Temperature Derate	406,866.2	-3.3%
	Output After Mismatch	395,167.9	-2.9%
	Optimal DC Output	393,499.6	-0.4%
	Constrained DC Output	392,436.5	-0.3%
	AC Output	378,303.0	-3.6%
	Energy to Grid	378,303.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		24.4 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

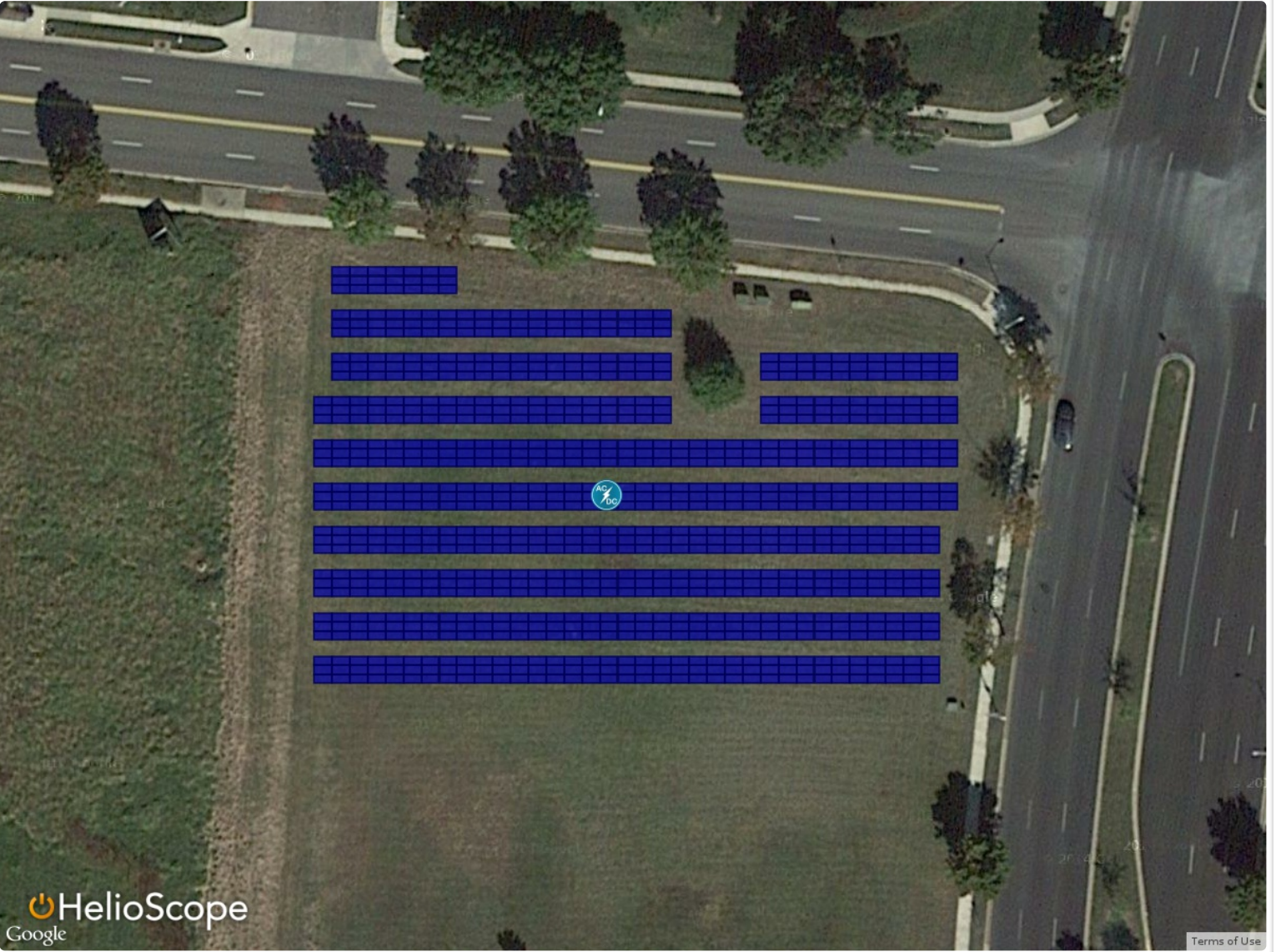
Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module			Characterization								
	CS6X - 320P (Canadian Solar)			Manufacturer Default, PAN								
Component Characterizations	Device			Characterization								
	Sunny Central SC 250 HE (SMA)			Default Characterization								

Components		
Component	Name	Count
Inverter	Sunny Central SC 250 HE (SMA)	1 (250.0 kW)
Combiners	None	7
Home Runs	2 AWG (Copper)	6 (243.0 ft)
Strings	10 AWG (Copper)	69 (10,146.5 ft)
Module	CS6X - 320P (Canadian Solar)	897

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	13	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	10°	180°	6.0 ft	3x1	299	897	

Detailed Layout

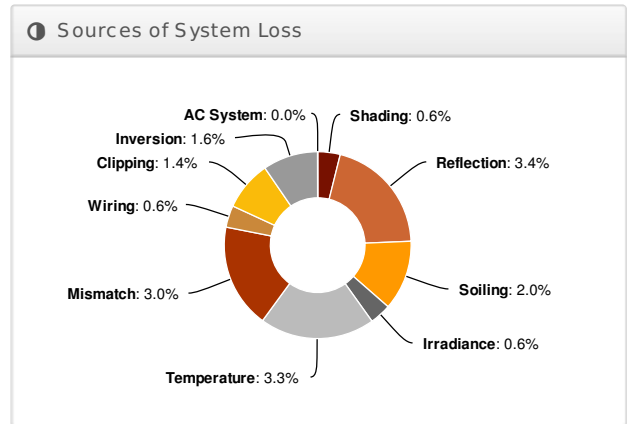
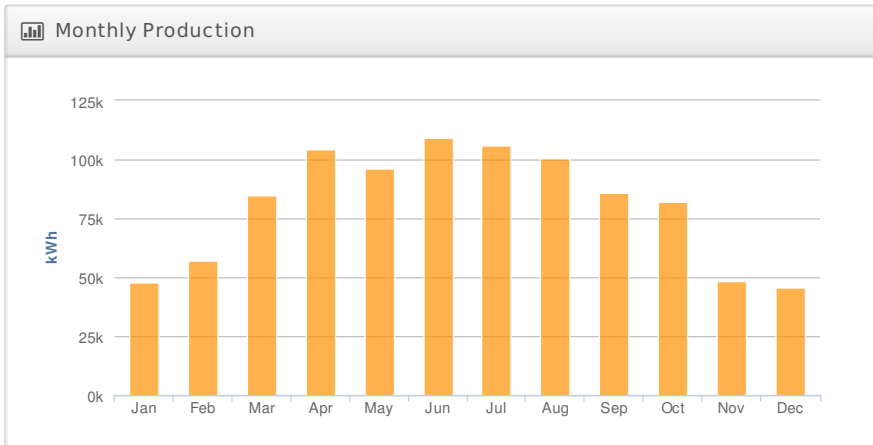
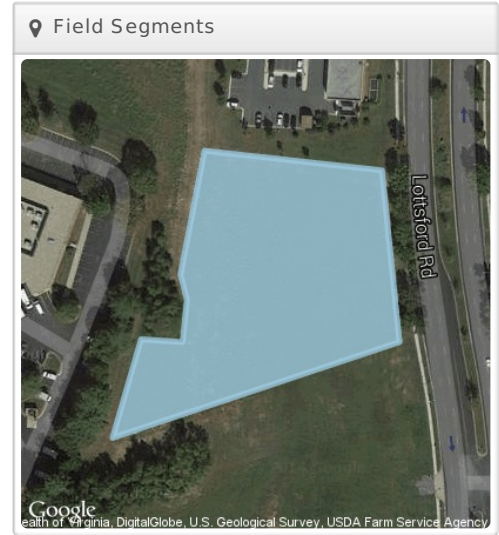


G98 Largo Water Treatment GM2 G98 Largo Water Treatment Bldg Ground Mount, 9450 Lottsford Road, Largo, MD

Report	
Project Name	G98 Largo Water Treatment Bldg Ground Mount
Project Description	Largo Water Treatment and Operations Bldg Ground Mount Areas 1 & 2
Project Address	9450 Lottsford Road, Largo, MD
Prepared For	WMATA
Prepared By	Paul Lanning planning@bluefinllc.com



System Metrics	
Design	G98 Largo Water Treatment GM2
Module DC Nameplate	730.2 kW
Inverter AC Nameplate	700.0 kW Load Ratio: 1.04
Annual Production	968.0 MWh
Performance Ratio	84.5%
kWh/kWp	1,325.6
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffb9d79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,568.0	7.7%
	Shaded Irradiance	1,557.9	-0.6%
	Irradiance after Reflection	1,505.3	-3.4%
	Irradiance after Soiling	1,475.2	-2.0%
	Total Collector Irradiance	1,475.2	0.0%
Energy (kWh)	Nameplate	1,076,557.8	
	Output at Irradiance Levels	1,069,974.5	-0.6%
	Output at Cell Temperature Derate	1,034,795.3	-3.3%
	Output After Mismatch	1,003,918.6	-3.0%
	Optimal DC Output	997,664.1	-0.6%
	Constrained DC Output	983,529.6	-1.4%
	AC Output	968,021.0	-1.6%
	Energy to Grid	968,021.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		24.4 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	Characterization										
	CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN										
Component Characterizations	Device	Characterization										
	Sunny Central SC 630 HE-11 (SMA)	Default Characterization										

Components

Component	Name	Count
Inverter	Sunny Central SC 630 HE-11 (SMA)	1 (700.0 kW)
Combiners	None	15
Home Runs	2 AWG (Copper)	14 (1,524.7 ft)
Strings	10 AWG (Copper)	163 (25,662.6 ft)
Module	CS6X - 320P (Canadian Solar)	2,282

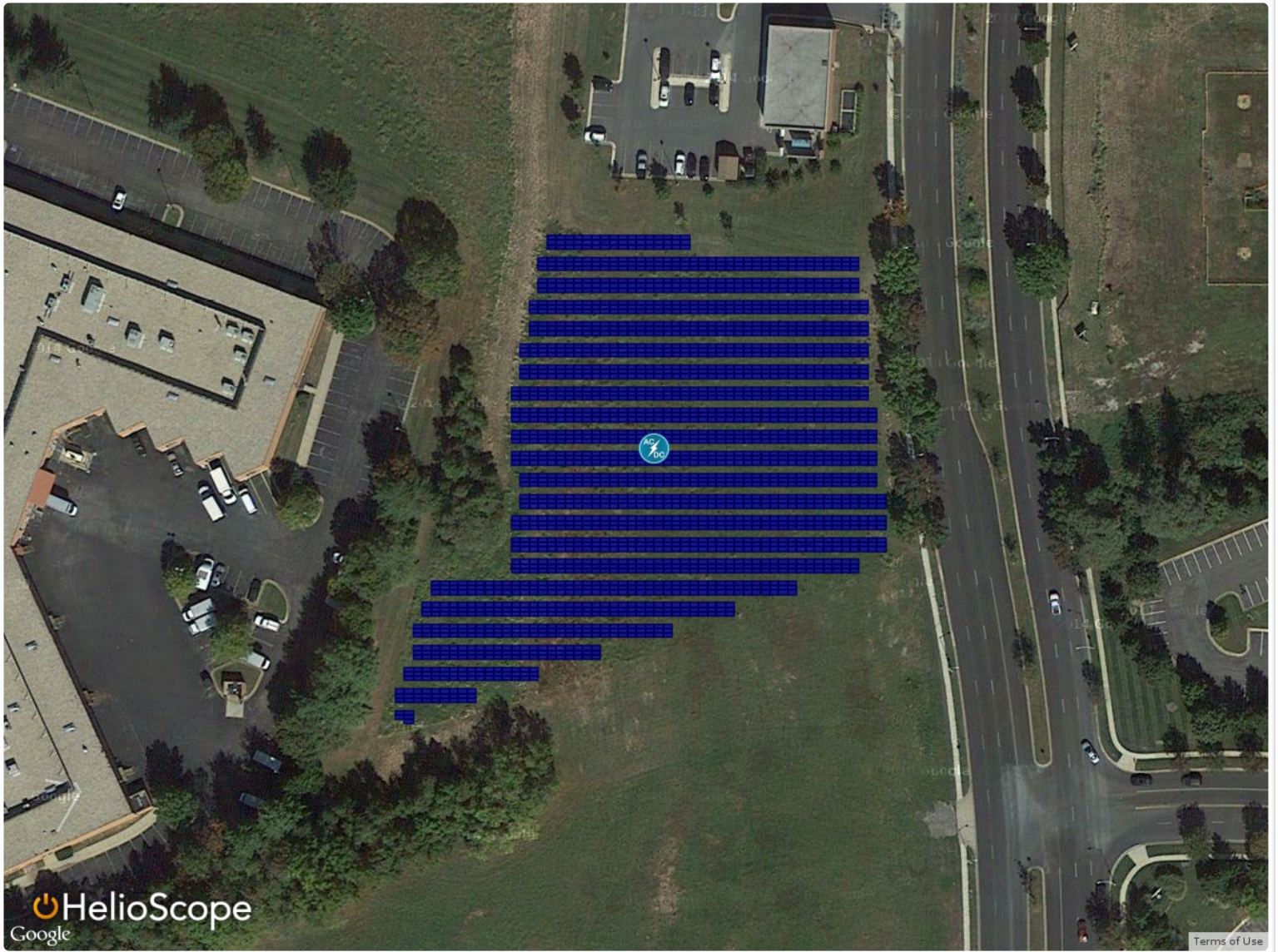
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	14	Along Racking


Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	10°	180°	6.0 ft	3x1	761	2,282

Detailed Layout



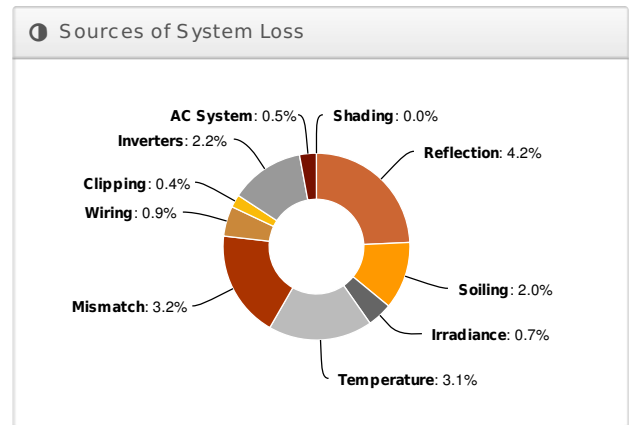
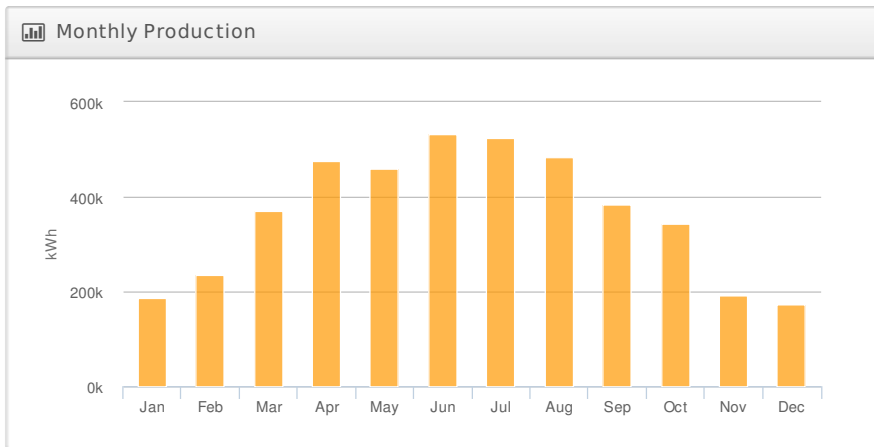
Shady Grove Surface Lots Shady Grove Surface Lots, 15903 Somerville Drive Rockville, MD 20855

Report	
Project Name	Shady Grove Surface Lots
Project Address	15903 Somerville Drive Rockville, MD 20855
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com
	

System Metrics	
Design	Shady Grove Surface Lots
Module DC Nameplate	3.57 MW
Inverter AC Nameplate	2.94 MW Load Ratio: 1.21
Annual Production	4,363 GWh
Performance Ratio	84.0%
kWh/kWp	1,223.1
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	115 (b803a01010-7cbc5cb251-7d6a292b34-d4631baf1f)

Field Segments

This site will need to be limited in size to meet Maryland Aggregated Net Metering Requirements. Solar Developer to work with WMATA to identify best areas to install solar on site.



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	4,875,240.0	
	Output at Irradiance Levels	4,839,060.5	-0.7%
	Output at Cell Temperature Derate	4,689,694.7	-3.1%
	Output After Mismatch	4,541,261.6	-3.2%
	Optimal DC Output	4,500,874.7	-0.9%
	Constrained DC Output	4,483,795.3	-0.4%
	Inverter Output	4,385,220.0	-2.2%
	Energy to Grid	4,363,290.0	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		23.9 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

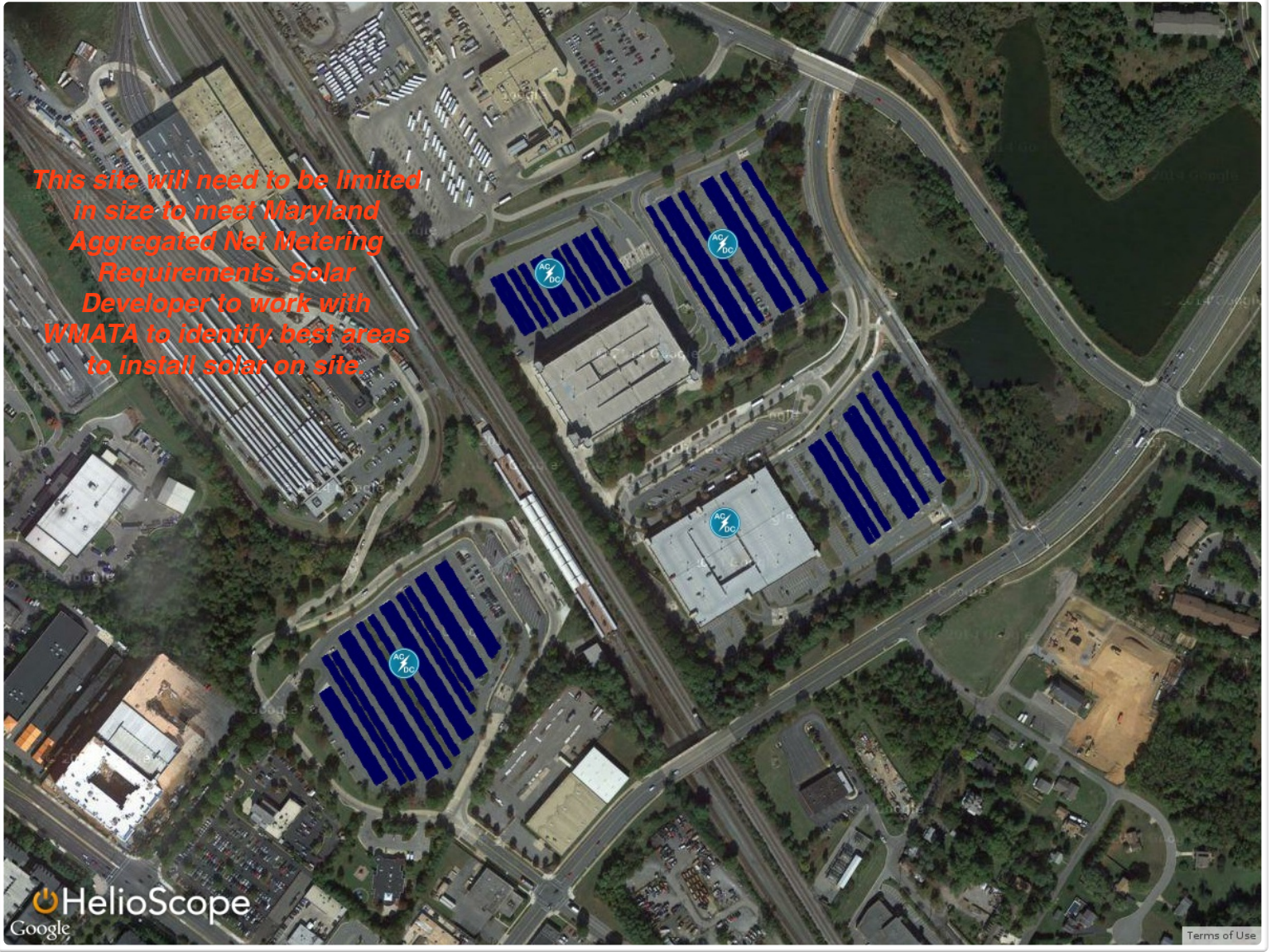
☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module						Characterization					
	CS6X - 320P (Canadian Solar)						Manufacturer Default, PAN					
Component Characterizations	Device						Characterization					
	Sunny Central SC 500HE-US (SMA)						Default Characterization					
	Sunny Central SC 1000MV-11-BG (SMA)						Default Characterization					
	SC 500CP-US (SMA)						CEC 2014-08-16					
	Sunny Central SC 720HE-20 (SMA)						Default Characterization					

🗑 Components		
Component	Name	Count
Inverter	Sunny Central SC 500HE-US (SMA)	1 (500.0 kW)
Inverter	Sunny Central SC 1000MV-11-BG (SMA)	1 (1.10 MW)
Inverter	SC 500CP-US (SMA)	1 (550.0 kW)
Inverter	Sunny Central SC 720HE-20 (SMA)	1 (792.0 kW)
Combiner	11 pole Combiner	30
Combiner	12 pole Combiner	30
Home Runs	2 AWG (Copper)	60 (27,086.1 ft)
Strings	10 AWG (Copper)	690 (182,923.0 ft)
Module	CS6X - 320P (Canadian Solar)	11,148

🔌 Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	18	Along Racking
Wiring Zone 2	12	10	Along Racking
Wiring Zone 3	12	18	Along Racking
Wiring Zone 4	12	18	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	340	340
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	340	340
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	340	340
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	340	340
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	340	340
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	360	360
Field Segment 1 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	360	360
Field Segment 1 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	352	352
Field Segment 9	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 7)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 8)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	145	145
Field Segment 9 (copy 9)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	140	140
Field Segment 20	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	285	285
Field Segment 20 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	285	285
Field Segment 20 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	275	275
Field Segment 20 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	275	275
Field Segment 20 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	255	255
Field Segment 20 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	248	248
Field Segment 20 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	255	255
Field Segment 27	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	480	480
Field Segment 27 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	750	750
Field Segment 27 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	700	700
Field Segment 27 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	520	520
Field Segment 27 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	468	468
Field Segment 32	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	335	335
Field Segment 32 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	335	335
Field Segment 32 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	380	380
Field Segment 32 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	365	365
Field Segment 32 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	310	310
Field Segment 32 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	238°	0.5 ft	1x1	265	265

Detailed Layout



D12 Landover Surface Lot D12 Landover SL; KR, 3000 Pennsy Drive Hyattsville MD

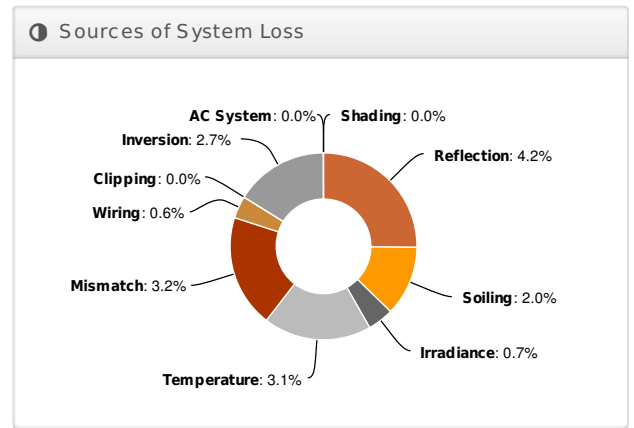
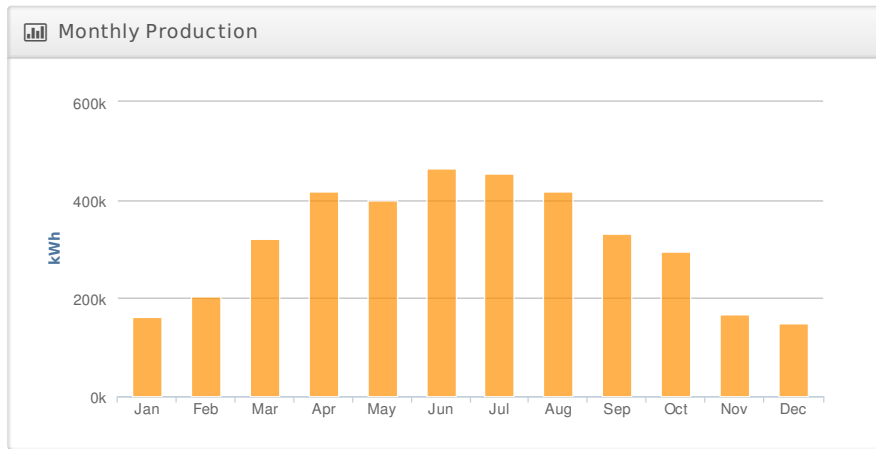
Report	
Project Name	D12 Landover SL; KR
Project Address	3000 Pennsy Drive Hyattsville MD
Prepared For	WMATA
Prepared By	Paul Lanning planning@bluefinllc.com



System Metrics	
Design	D12 Landover Surface Lot
Module DC Nameplate	3.08 MW
Inverter AC Nameplate	3.00 MW Load Ratio: 1.03
Annual Production	3.785 GWh
Performance Ratio	84.5%
kWh/kWp	1,230.4
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, l)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)

Field Segments

This site will need to be limited in size to meet Maryland Aggregated Net Metering Requirements. Solar Developer to work with WMATA to identify best areas to install solar on site.



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	4,203,516.8	
	Output at Irradiance Levels	4,172,322.0	-0.7%
	Output at Cell Temperature Derate	4,043,536.3	-3.1%
	Output After Mismatch	3,913,357.7	-3.2%
	Optimal DC Output	3,888,430.6	-0.6%
	Constrained DC Output	3,888,372.9	0.0%
	AC Output	3,784,660.0	-2.7%
Energy to Grid	3,784,660.0	0.0%	
Temperature Metrics			
	Avg. Operating Ambient Temp	16.6 °C	
	Avg. Operating Cell Temp	23.9 °C	
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set												
Description		Condition Set 1										
Weather Dataset		TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, l)										
Solar Angle Location		Meteo Lat/Lng										
Transposition Model		Perez Model										
Temperature Model		Sandia Model										
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance		5%										
Cell Temperature Spread		4° C										
Module Binning Range		-2.5% to 2.5%										
AC System Derate		0.00%										
Module Characterizations	Module	CS6X - 320P (Canadian Solar)							Characterization			
									Manufacturer Default, PAN			
Component Characterizations	Device	Sunny Central SC 1000MV-11-IT (SMA)							Characterization			
									Default Characterization			

Components		
Component	Name	Count
Inverter	Sunny Central SC 1000MV-11-IT (SMA)	3 (3.00 MW)
Combiners	None	50
Home Runs	2 AWG (Copper)	47 (8,146.4 ft)
Strings	10 AWG (Copper)	534 (102,403.0 ft)
Module	CS6X - 320P (Canadian Solar)	9,612

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	18	Along Racking
Wiring Zone 2	12	18	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	216	216
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	198	198
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	60	60
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	30	30
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	132	132
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	66	66
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	66	66
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	90	90
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	192	192
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	192	192
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	30	30
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	204	204
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	114	114
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	30	30
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	132	132
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	150	150
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	204	204
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	132	132
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	150	150
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	354	354
Field Segment 1 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	120	120
Field Segment 1 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	36	36
Field Segment 1 (copy 7)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	72	72
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	174	174
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	192	192
Field Segment 1 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	174	174
Field Segment 27	Fixed Tilt	Horizontal (Landscape)	0°	237°	0.5 ft	1x1	275	275
Field Segment 1 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	510	510
Field Segment 1 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	492	492
Field Segment 1 (copy 7)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	474	474
Field Segment 1 (copy 8)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	450	450
Field Segment 32	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	216	216
Field Segment 32 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	216	216
Field Segment 1 (copy 9)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	432	432
Field Segment 32 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	246	246
Field Segment 32 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	228	228
Field Segment 1 (copy 10)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	504	504
Field Segment 32 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	246	246
Field Segment 1 (copy 11)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	474	474
Field Segment 1 (copy 12)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	462	462
Field Segment 1 (copy 13)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	450	450
Field Segment 1 (copy 14)	Fixed Tilt	Horizontal (Landscape)	0°	148°	0.5 ft	1x1	427	427

Detailed Layout

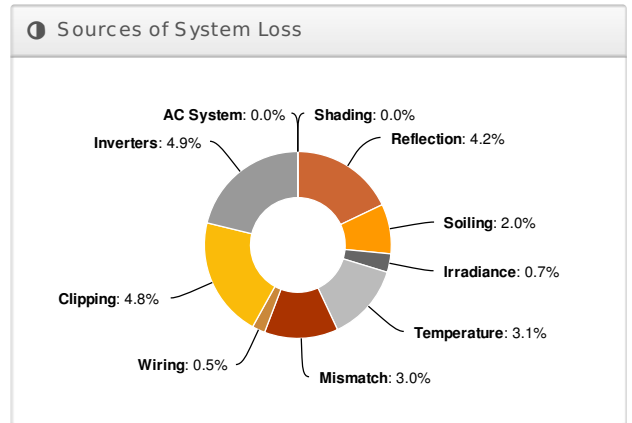
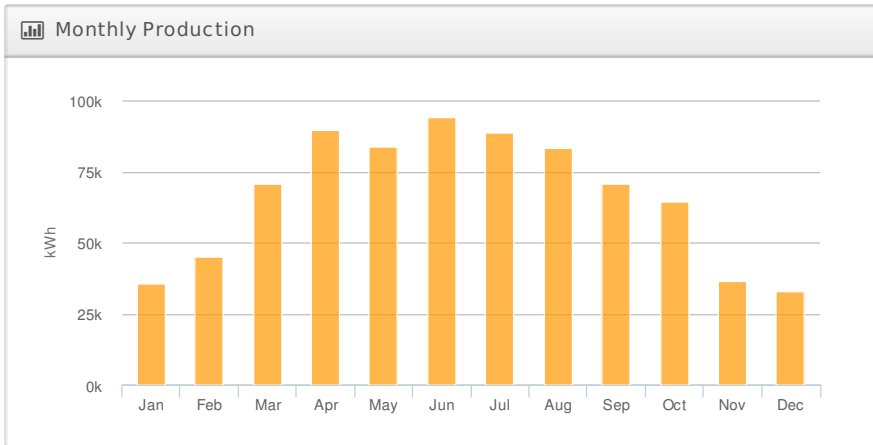
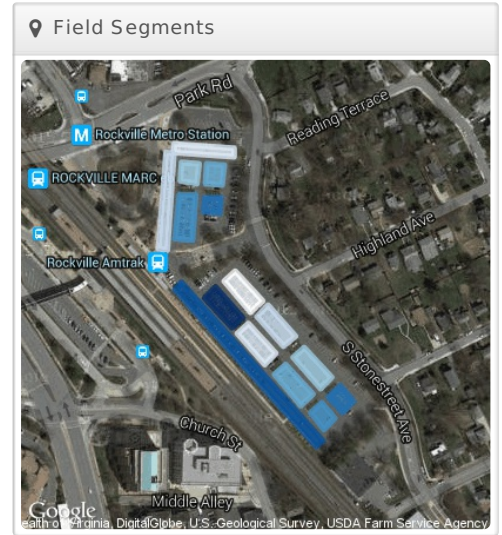


A14 Rockville Surface Lot A14 Rockville SL, KR 1&2, 251 Hungerford Drive, Rockville MD

Report	
Project Name	A14 Rockville SL, KR 1&2
Project Address	251 Hungerford Drive, Rockville MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	A14 Rockville Surface Lot
Module DC Nameplate	693.1 kW
Inverter AC Nameplate	600.0 kW Load Ratio: 1.16
Annual Production	796.0 MWh
Performance Ratio	78.9%
kWh/kWp	1,148.5
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	947,234.5	
	Output at Irradiance Levels	940,205.1	-0.7%
	Output at Cell Temperature Derate	911,184.2	-3.1%
	Output After Mismatch	884,191.9	-3.0%
	Optimal DC Output	879,601.9	-0.5%
	Constrained DC Output	837,213.5	-4.8%
	Inverter Output	796,047.0	-4.9%
	Energy to Grid	796,047.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		23.9 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module											Characterization
	CS6X - 320P (Canadian Solar)											Manufacturer Default, PAN
Component Characterizations	Device											Characterization
	Sunny Central SC 200 (SMA)											Default Characterization

Components		
Component	Name	Count
Inverter	Sunny Central SC 200 (SMA)	3 (600.0 kW)
Combiner	12 pole Combiner	19
Home Runs	2 AWG (Copper)	16 (2,905.7 ft)
Strings	10 AWG (Copper)	161 (51,390.7 ft)
Module	CS6X - 320P (Canadian Solar)	2,166

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	18	Along Racking
Wiring Zone 2	12	12	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	120	120
Field Segment 2	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	198	198
Field Segment 3	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	72	72
Field Segment 4	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	78	78
Field Segment 5	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	180	180
Field Segment 6	Fixed Tilt	Horizontal (Landscape)	0°	184°	0.5 ft	1x1	54	54
Field Segment 7	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	425	425
Field Segment 8	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	150	150
Field Segment 8 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	70	70
Field Segment 8 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	69	69

Detailed Layout

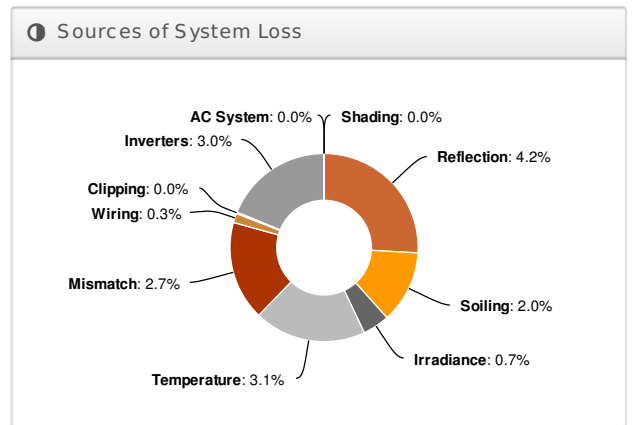
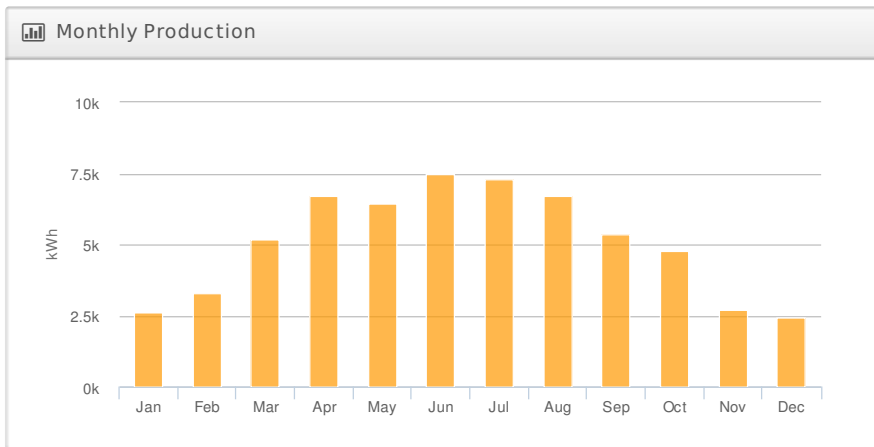
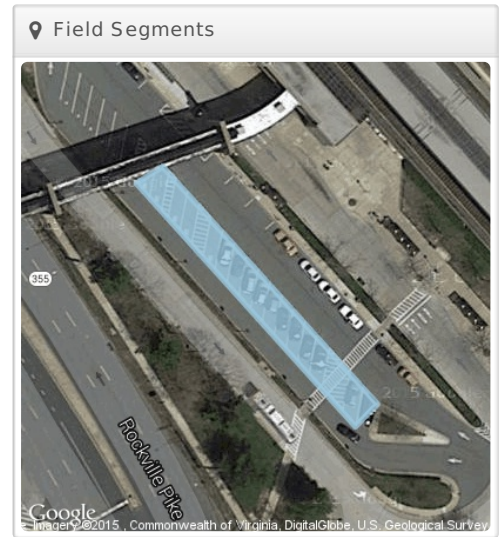


A14 Rockville Kiss & Ride A14 Rockville SL, KR 1&2, 251 Hungerford Drive, Rockville MD

Report	
Project Name	A14 Rockville SL, KR 1&2
Project Address	251 Hungerford Drive, Rockville MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	A14 Rockville Kiss & Ride
Module DC Nameplate	49.3 kW
Inverter AC Nameplate	40.0 kW Load Ratio: 1.23
Annual Production	60.92 MWh
Performance Ratio	84.9%
kWh/kWp	1,236.2
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	67,346.0	
	Output at Irradiance Levels	66,846.3	-0.7%
	Output at Cell Temperature Derate	64,783.2	-3.1%
	Output After Mismatch	63,006.0	-2.7%
	Optimal DC Output	62,846.0	-0.3%
	Constrained DC Output	62,820.7	0.0%
	Inverter Output	60,921.9	-3.0%
	Energy to Grid	60,921.9	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp	16.6 °C	
	Avg. Operating Cell Temp	23.9 °C	
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	Characterization										
	CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN										
Component Characterizations	Device	Characterization										
	Sunny Tripower 20000TL-US (SMA)	Modified CEC										

Components

Component	Name	Count
Inverter	Sunny Tripower 20000TL-US (SMA)	2 (40.0 kW)
Combiner	12 pole Combiner	4
Strings	10 AWG (Copper)	14 (3,388.0 ft)
Module	CS6X - 320P (Canadian Solar)	154

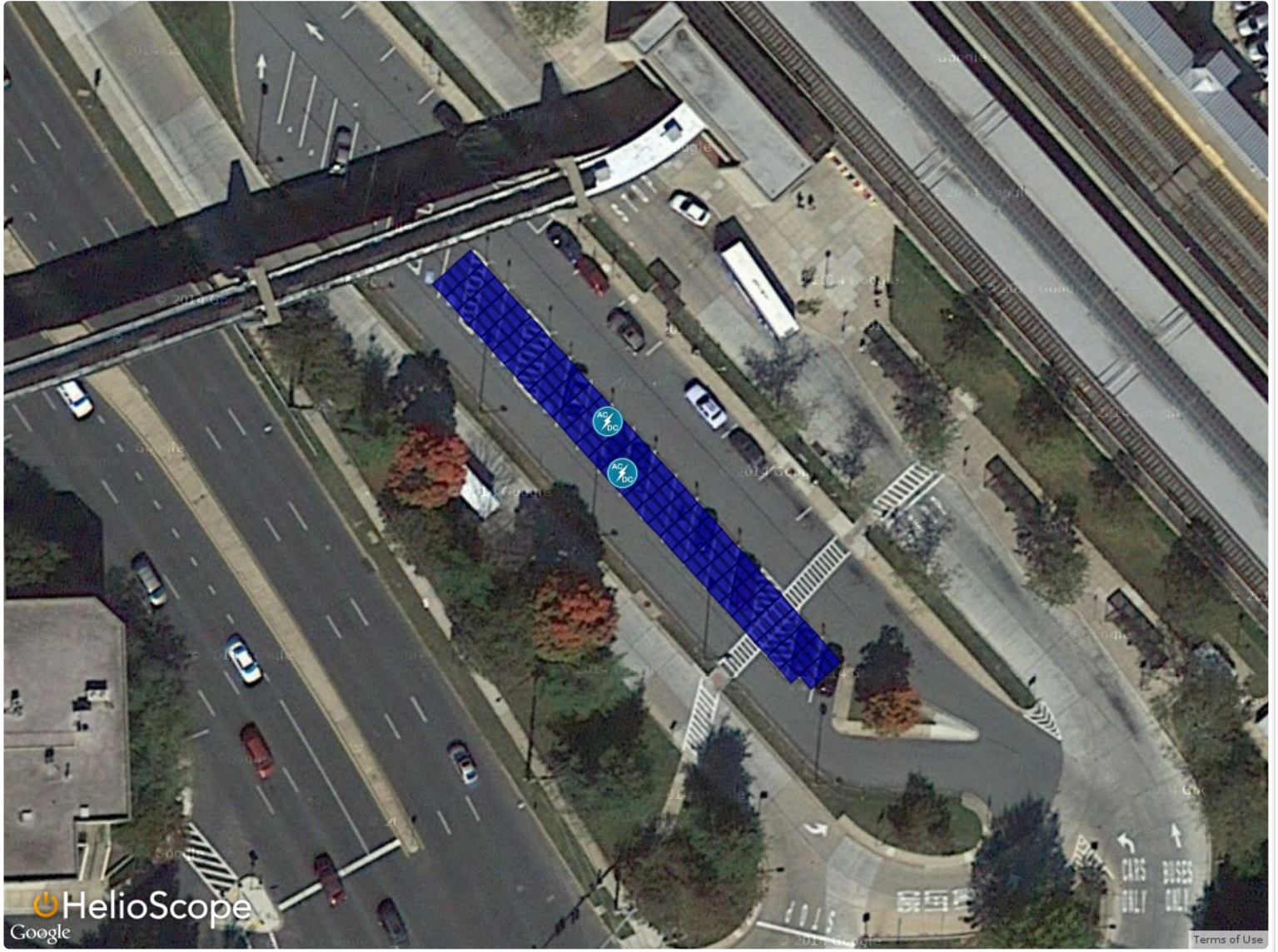
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	11	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	228°	0.5 ft	1x1	154	154

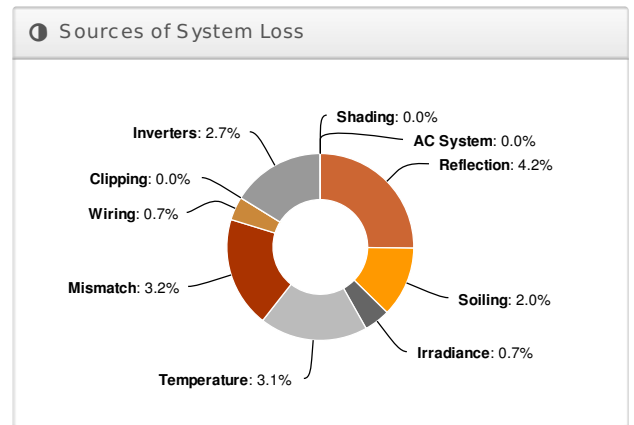
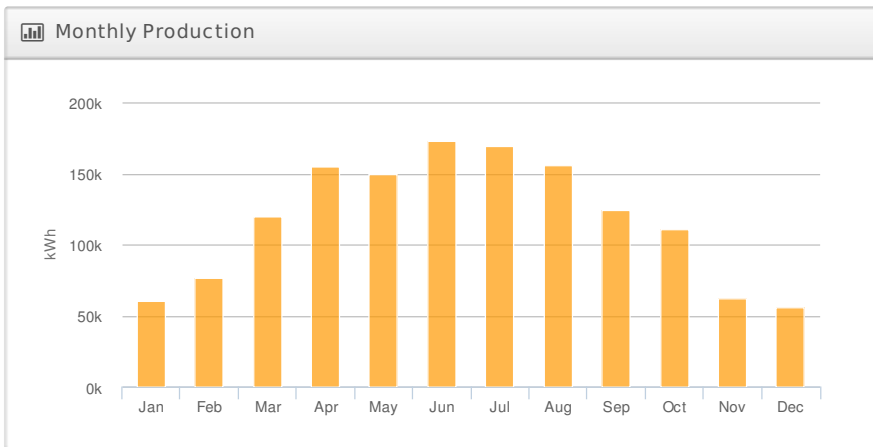
Detailed Layout



G04 Morgan Blvd Surface Lot G04 Morgan Blvd SL, KR, 38.89250086 -76.8694067

Report	
Project Name	G04 Morgan Blvd SL, KR
Project Address	38.89250086 -76.8694067
Prepared By	Paul Lanning paul@lightboxenergy.com
	

System Metrics	
Design	G04 Morgan Blvd Surface Lot
Module DC Nameplate	1.15 MW
Inverter AC Nameplate	1,000.0 kW Load Ratio: 1.15
Annual Production	1,413 GWh
Performance Ratio	84.5%
kWh/kWp	1,230.8
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
Total Collector Irradiance		1,367.5	0.0%
Energy (kWh)	Nameplate	1,568,666.0	
	Output at Irradiance Levels	1,557,024.6	-0.7%
	Output at Cell Temperature Derate	1,508,964.1	-3.1%
	Output After Mismatch	1,461,298.4	-3.2%
	Optimal DC Output	1,451,505.4	-0.7%
	Constrained DC Output	1,451,480.6	0.0%
	Inverter Output	1,412,780.0	-2.7%
Energy to Grid		1,412,780.0	0.0%
Temperature Metrics			
Avg. Operating Ambient Temp		16.6 °C	
Avg. Operating Cell Temp		23.9 °C	
Simulation Metrics			
Operating Hours		4422	
Solved Hours		4422	

Condition Set

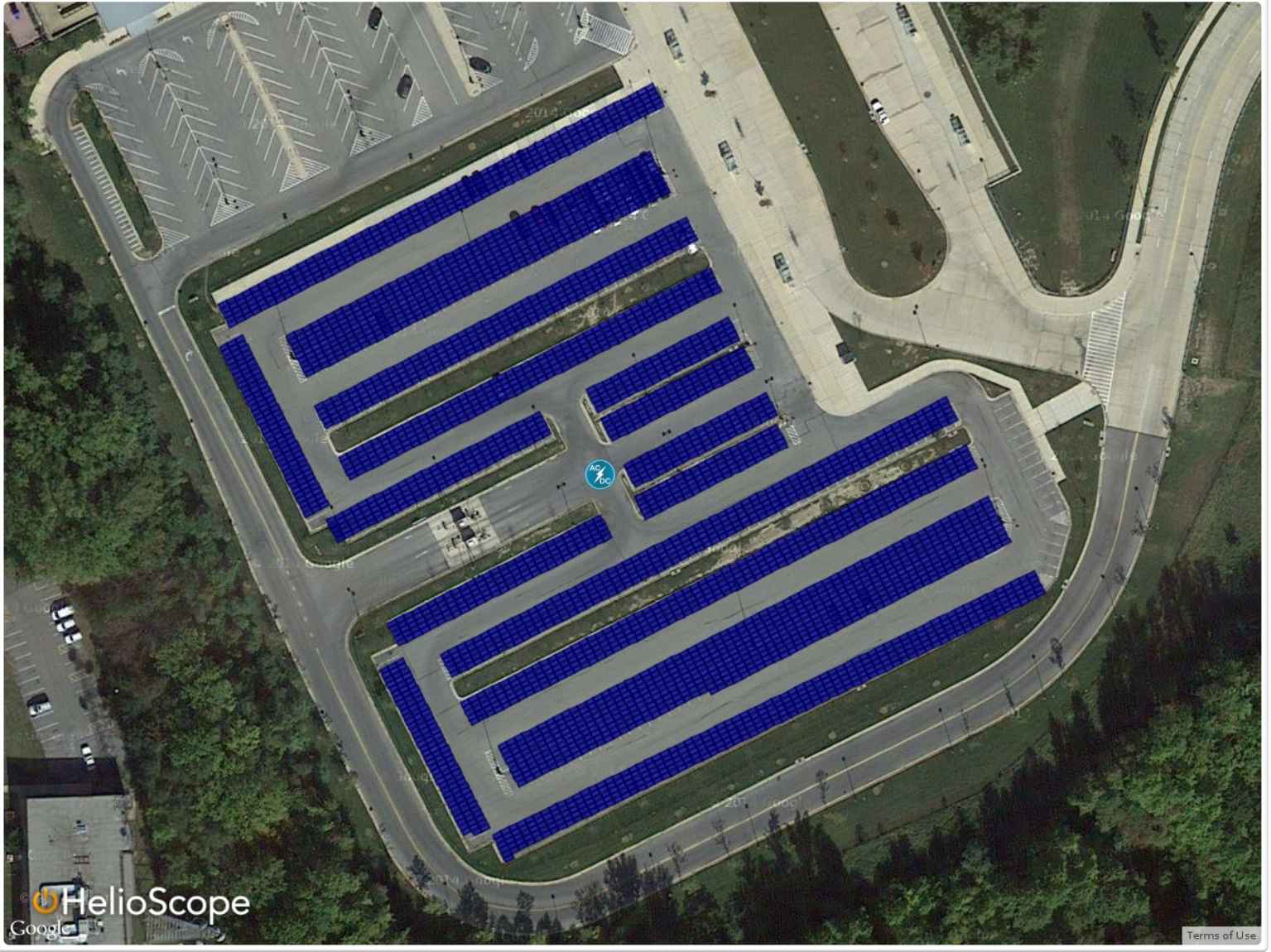
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module						Characterization					
	CS6X - 320P (Canadian Solar)						Manufacturer Default, PAN					
Component Characterizations	Device						Characterization					
	Sunny Central SC 1000MV-11-IT (SMA)						Default Characterization					

Components		
Component	Name	Count
Inverter	Sunny Central SC 1000MV-11-IT (SMA)	1 (1,000.0 kW)
Combiner	12 pole Combiner	19
Home Runs	2 AWG (Copper)	18 (5,422.8 ft)
Strings	10 AWG (Copper)	211 (94,177.7 ft)
Module	CS6X - 320P (Canadian Solar)	3,587

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	17	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	154°	0.5 ft	1x1	341	341
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	320	320
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	320	320
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	135	135
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	90	90
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	90	90
Field Segment 1 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	90	90
Field Segment 1 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	90	90
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	135	135
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	235	235
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	235	235
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	275	275
Field Segment 13	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	414	414
Field Segment 13 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	596	596
Field Segment 15	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	111	111
Field Segment 16	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	110	110

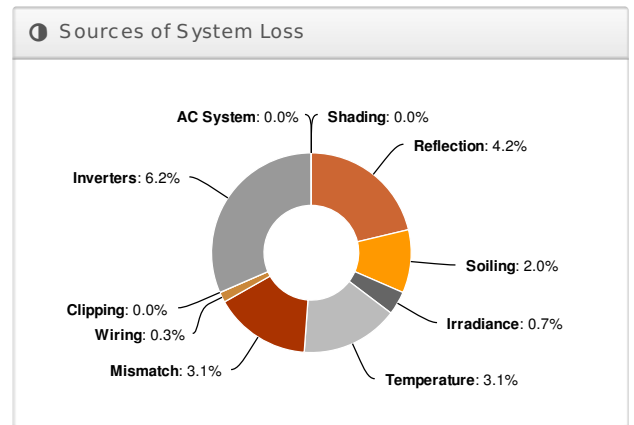
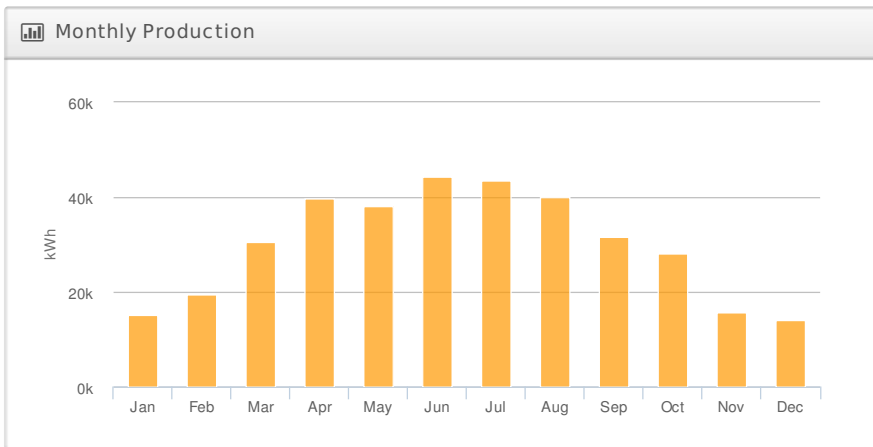
Detailed Layout



G04 Morgan Blvd Kiss & Ride G04 Morgan Blvd SL, KR, 38.89250086 -76.8694067

Report	
Project Name	G04 Morgan Blvd SL, KR
Project Address	38.89250086 -76.8694067
Prepared By	Paul Lanning paul@lightboxenergy.com
	

System Metrics	
Design	G04 Morgan Blvd Kiss & Ride
Module DC Nameplate	302.4 kW
Inverter AC Nameplate	270.0 kW Load Ratio: 1.12
Annual Production	360.5 MWh
Performance Ratio	81.9%
kWh/kWp	1,192.1
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
Total Collector Irradiance		1,367.5	0.0%
Energy (kWh)	Nameplate	413,267.0	
	Output at Irradiance Levels	410,200.1	-0.7%
	Output at Cell Temperature Derate	397,538.7	-3.1%
	Output After Mismatch	385,385.5	-3.1%
	Optimal DC Output	384,133.0	-0.3%
	Constrained DC Output	384,123.0	0.0%
	Inverter Output	360,490.0	-6.2%
Energy to Grid		360,490.0	0.0%
Temperature Metrics			
Avg. Operating Ambient Temp		16.6 °C	
Avg. Operating Cell Temp		23.9 °C	
Simulation Metrics			
Operating Hours		4422	
Solved Hours		4422	

Condition Set

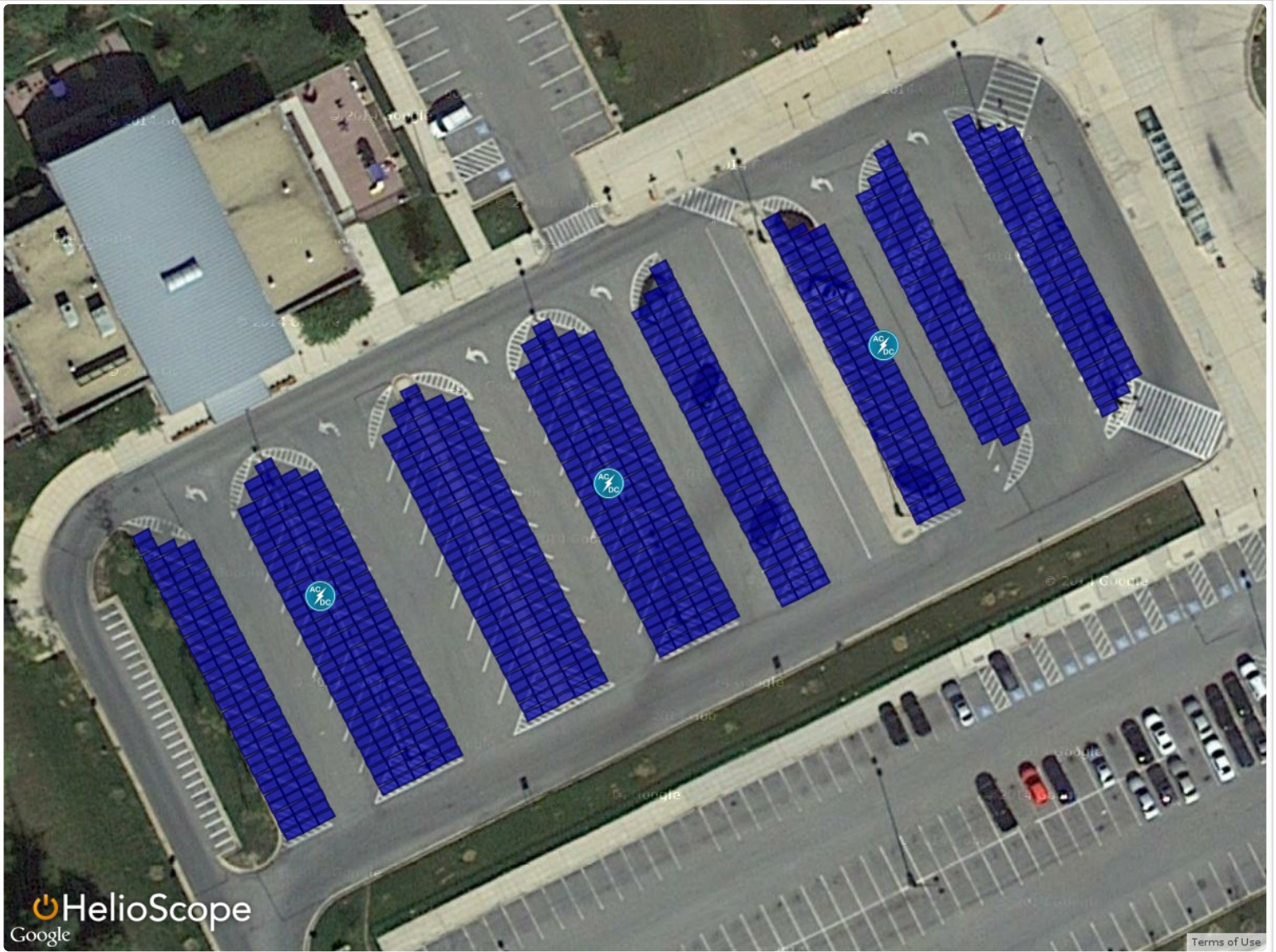
Description	Condition Set 1																										
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)																										
Solar Angle Location	Meteo Lat/Lng																										
Transposition Model	Perez Model																										
Temperature Model	Sandia Model																										
Temperature Model Parameters	<table border="1"> <thead> <tr> <th>Rack Type</th> <th>a</th> <th>b</th> <th>Temperature Delta</th> </tr> </thead> <tbody> <tr> <td>Fixed Tilt</td> <td>-3.56</td> <td>-0.075</td> <td>3°C</td> </tr> <tr> <td>Flush Mount</td> <td>-2.81</td> <td>-0.0455</td> <td>0°C</td> </tr> </tbody> </table>	Rack Type	a	b	Temperature Delta	Fixed Tilt	-3.56	-0.075	3°C	Flush Mount	-2.81	-0.0455	0°C														
	Rack Type	a	b	Temperature Delta																							
	Fixed Tilt	-3.56	-0.075	3°C																							
Flush Mount	-2.81	-0.0455	0°C																								
Soiling (%)	<table border="1"> <thead> <tr> <th></th> <th>J</th> <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> </tr> </thead> <tbody> <tr> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> </tbody> </table>		J	F	M	A	M	J	J	A	S	O	N	D		2	2	2	2	2	2	2	2	2	2	2	2
	J	F	M	A	M	J	J	A	S	O	N	D															
	2	2	2	2	2	2	2	2	2	2	2	2															
Irradiation Variance	5%																										
Cell Temperature Spread	4° C																										
Module Binning Range	-2.5% to 2.5%																										
AC System Derate	0.00%																										
Module Characterizations	<table border="1"> <thead> <tr> <th>Module</th> <th>Characterization</th> </tr> </thead> <tbody> <tr> <td>CS6X - 320P (Canadian Solar)</td> <td>Manufacturer Default, PAN</td> </tr> </tbody> </table>	Module	Characterization	CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN																						
	Module	Characterization																									
CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN																										
Component Characterizations	<table border="1"> <thead> <tr> <th>Device</th> <th>Characterization</th> </tr> </thead> <tbody> <tr> <td>Sunny Central SC 90 outdoor (SMA)</td> <td>Default Characterization</td> </tr> </tbody> </table>	Device	Characterization	Sunny Central SC 90 outdoor (SMA)	Default Characterization																						
Device	Characterization																										
Sunny Central SC 90 outdoor (SMA)	Default Characterization																										

Components		
Component	Name	Count
Inverter	Sunny Central SC 90 outdoor (SMA)	3 (270.0 kW)
Combiner	14 pole Combiner	9
Home Runs	2 AWG (Copper)	6 (383.1 ft)
Strings	10 AWG (Copper)	63 (20,197.6 ft)
Module	CS6X - 320P (Canadian Solar)	945


Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	14	15	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	94	94
Field Segment 2	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	161	161
Field Segment 2 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	161	161
Field Segment 2 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	161	161
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	94	94
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	88	88
Field Segment 7	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	100	100
Field Segment 7 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	153°	0.5 ft	1x1	86	86

Detailed Layout



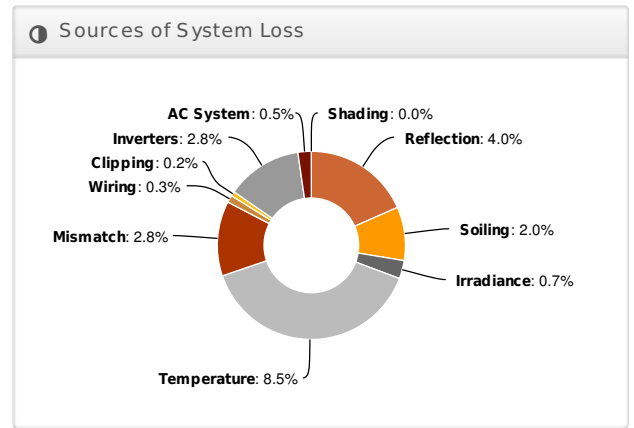
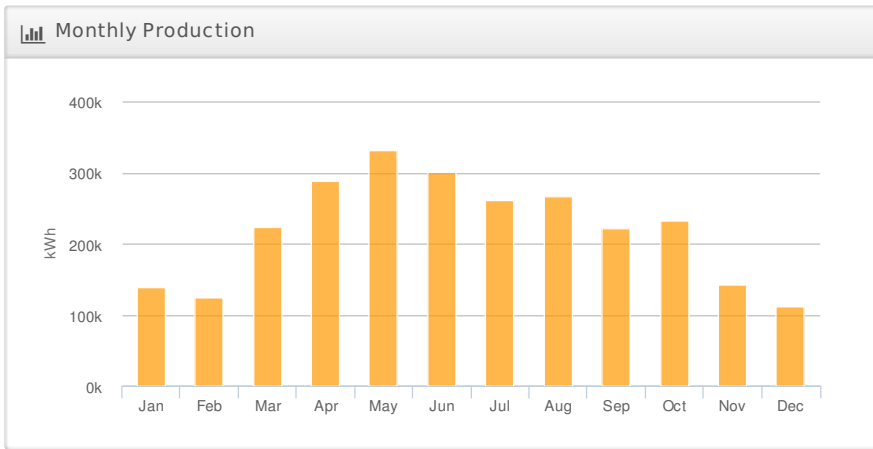
Carport Branch Ave. Metro, 4704 Old Soper Rd, Suitland, MD 20746

Report	
Project Name	Branch Ave. Metro
Project Address	4704 Old Soper Rd, Suitland, MD 20746
Prepared By	Paul Lanning paul@lightboxenergy.com
	

System Metrics	
Design	Carport
Module DC Nameplate	2.21 MW
Inverter AC Nameplate	1.96 MW Load Ratio: 1.13
Annual Production	2,643 GWh
Performance Ratio	79.9%
kWh/kWp	1,194.4
Weather Dataset	TMY, ANDREWS AFB, NSRDB (tmy3, II)
Simulator Version	153 (443094f0ad-ea93f843ef-fce6caf820-00aa14f623)

Field Segments

This site will need to be limited in size to meet Maryland Aggregated Net Metering Requirements. Solar Developer to work with WMATA to identify best areas to install solar on site.



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.2	
	POA Irradiance	1,494.5	2.6%
	Shaded Irradiance	1,494.5	0.0%
	Irradiance after Reflection	1,434.7	-4.0%
	Irradiance after Soiling	1,406.0	-2.0%
	Total Collector Irradiance	1,406.0	0.0%
Energy (kWh)	Nameplate	3,109,080.1	
	Output at Irradiance Levels	3,087,843.8	-0.7%
	Output at Cell Temperature Derate	2,825,337.1	-8.5%
	Output After Mismatch	2,746,269.3	-2.8%
	Optimal DC Output	2,738,732.0	-0.3%
	Constrained DC Output	2,734,089.0	-0.2%
	Inverter Output	2,656,350.0	-2.8%
	Energy to Grid	2,643,070.0	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.4 °C
	Avg. Operating Cell Temp		31.9 °C
Simulation Metrics			
	Operating Hours	4457	
	Solved Hours	4457	

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, ANDREWS AFB, NSRDB (tmy3, II)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN										
Component Characterizations												
Device				Characterization								
Sunny Tripower 20000TL-US (SMA)				Modified CEC								
Sunny Central SC 90 outdoor (SMA)				Default Characterization								
Sunny Central SC 100 outdoor HE (SMA)				Default Characterization								
Sunny Boy SB 10000TLUS-12 (208V AC) (SMA)				Default Characterization								

Components		
Component	Name	Count
Inverter	Sunny Tripower 20000TL-US (SMA)	68 (1.36 MW)
Inverter	Sunny Central SC 90 outdoor (SMA)	3 (270.0 kW)
Inverter	Sunny Central SC 100 outdoor HE (SMA)	1 (100.0 kW)
Inverter	Sunny Boy SB 10000TLUS-12 (208V AC) (SMA)	23 (230.0 kW)
Combiner	1 pole Combiner	91
Combiner	2 pole Combiner	4
Combiner	3 pole Combiner	6
Combiner	4 pole Combiner	59
Combiner	5 pole Combiner	26
Combiner	9 pole Combiner	1
Combiner	10 pole Combiner	7
Home Runs	2 AWG (Copper)	99 (298.2 ft)
Strings	10 AWG (Copper)	463 (62,780.7 ft)
Module	CS6X - 320P (Canadian Solar)	6,915

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone 2	12	9	Along Racking
Wiring Zone 3	12	17	Along Racking
Wiring Zone 4	12	17	Along Racking
Wiring Zone 5	12	15	Along Racking
Wiring Zone 6	12	9	Along Racking
Wiring Zone 7	12	16	Along Racking
Wiring Zone 8	12	18	Along Racking
Wiring Zone 9	12	16	Along Racking
Wiring Zone 10	12	17	Along Racking
Wiring Zone 11	12	16	Along Racking
Wiring Zone 12	12	16	Along Racking
Wiring Zone 13	12	17	Along Racking
Wiring Zone 14	12	16	Along Racking
Wiring Zone 15	12	16	Along Racking
Wiring Zone 16	12	16	Along Racking
Wiring Zone 17	12	16	Along Racking
Wiring Zone 17	12	9	Along Racking
Wiring Zone 18	12	10	Along Racking
Wiring Zone 19	12	10	Along Racking
Wiring Zone 20	12	10	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 4	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	159	159
Field Segment 4 (copy)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	164	164
Field Segment 4 (copy)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	167	167
Field Segment 4 (copy 1)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	175	175
Field Segment 3 (copy 1)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	448	448
Field Segment 4 (copy)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	108	108
Field Segment 4 (copy 1)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	108	108
Field Segment 4 (copy 2)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	176	176
Field Segment 4 (copy 3)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	184	184
Field Segment 3 (copy 2)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	435	435
Field Segment 3 (copy 3)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	408	408
Field Segment 3 (copy 2)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	464	464
Field Segment 4 (copy 4)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	186	186
Field Segment 4 (copy 5)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	188	188
Field Segment 3 (copy 3)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	496	496
Field Segment 4 (copy 5)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	200	200
Field Segment 4 (copy 6)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	200	200
Field Segment 3 (copy 4)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	510	510
Field Segment 4 (copy 7)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	208	208
Field Segment 4 (copy 8)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	208	208
Field Segment 4 (copy 2)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	210	210
Field Segment 4 (copy 3)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	206	206
Field Segment 3 (copy 5)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	416	416
Field Segment 3 (copy 6)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	415	415
Field Segment 4 (copy 4)	Flush Mount	Horizontal (Landscape)	5°	128.118°	0.3 ft	1x1	225	225
Field Segment 26	Flush Mount	Horizontal (Landscape)	5°	128.66°	0.3 ft	1x1	100	100
Field Segment 27	Flush Mount	Horizontal (Landscape)	5°	217.92°	0.3 ft	1x1	81	81
Field Segment 28	Flush Mount	Horizontal (Landscape)	5°	127.999°	0.3 ft	1x1	40	40
Field Segment 29	Flush Mount	Horizontal (Landscape)	5°	37.9863°	0.3 ft	1x1	30	30

Detailed Layout

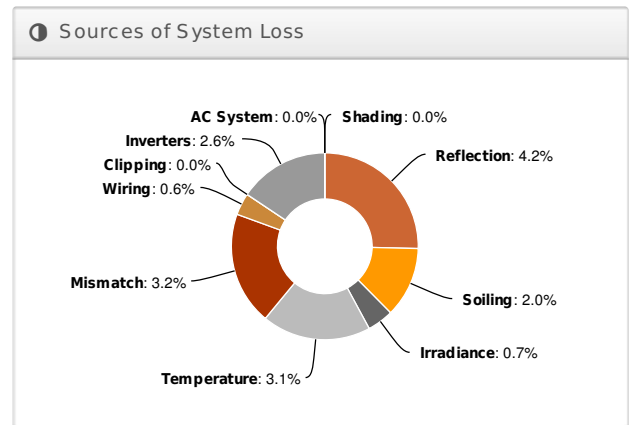
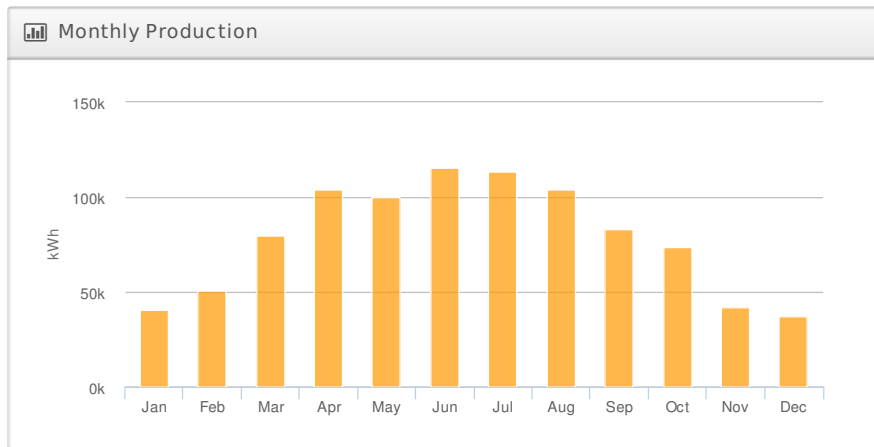
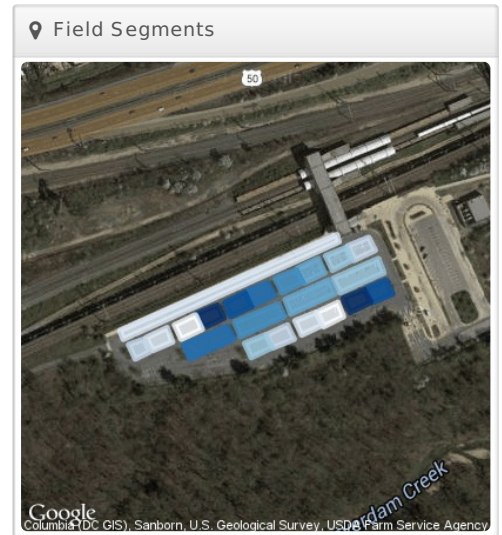


D11 Cheverly Surface Lot D11 Cheverly SL; KR, 5501 Columbia Park, Cheverly MD

Report	
Project Name	D11 Cheverly SL; KR
Project Address	5501 Columbia Park, Cheverly MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	D11 Cheverly Surface Lot
Module DC Nameplate	766.1 kW
Inverter AC Nameplate	700.0 kW Load Ratio: 1.09
Annual Production	943.9 MWh
Performance Ratio	84.6%
kWh/kWp	1,232.2
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	1,046,943.9	
	Output at Irradiance Levels	1,039,174.3	-0.7%
	Output at Cell Temperature Derate	1,007,098.8	-3.1%
	Output After Mismatch	974,791.2	-3.2%
	Optimal DC Output	968,724.0	-0.6%
	Constrained DC Output	968,704.9	0.0%
	Inverter Output	943,933.0	-2.6%
	Energy to Grid	943,933.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		23.9 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set

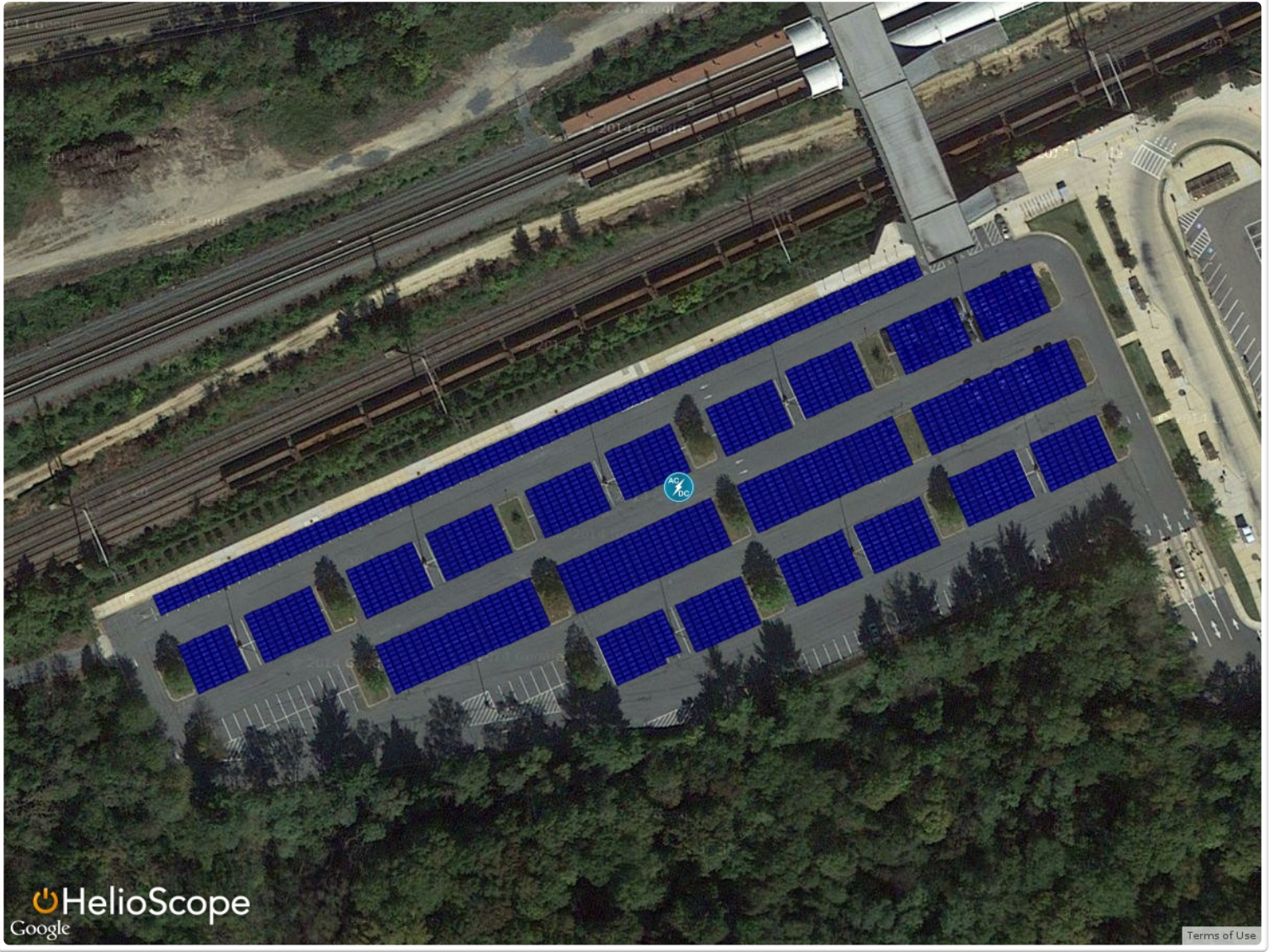
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module											Characterization
	CS6X - 320P (Canadian Solar)											Manufacturer Default, PAN
Component Characterizations	Device											Characterization
	Sunny Central SC 630MV-11 (SMA)											Default Characterization

Components		
Component	Name	Count
Inverter	Sunny Central SC 630MV-11 (SMA)	1 (700.0 kW)
Combiner	12 pole Combiner	13
Home Runs	2 AWG (Copper)	12 (3,718.4 ft)
Strings	10 AWG (Copper)	133 (59,033.1 ft)
Module	CS6X - 320P (Canadian Solar)	2,394

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	18	Along Racking

Field Segments								
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	376	376
Field Segment 2	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 6)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 7)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 8)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	60	60
Field Segment 12	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	190	190
Field Segment 12 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	190	190
Field Segment 12 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	190	190
Field Segment 12 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	190	190
Field Segment 2 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	80	80
Field Segment 2 (copy 5)	Fixed Tilt	Horizontal (Landscape)	0°	156°	0.5 ft	1x1	78	78

Detailed Layout

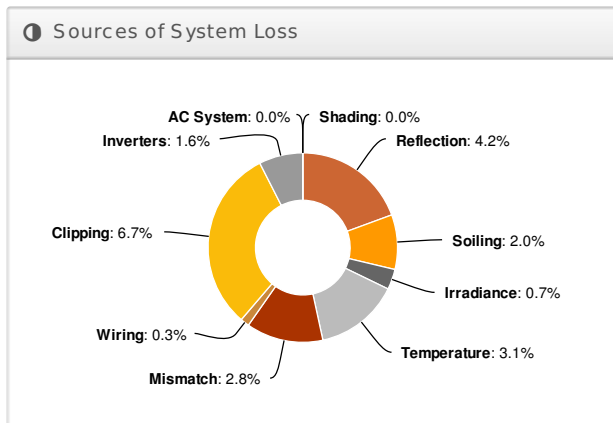
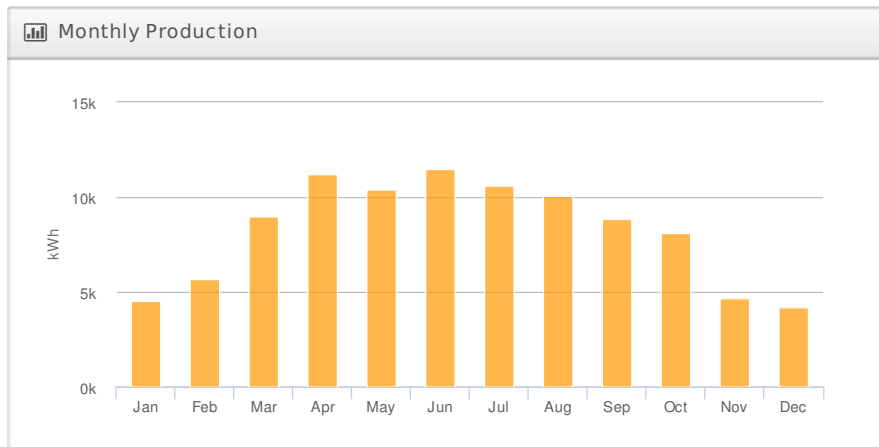


D11 Cheverly Kiss & Ride D11 Cheverly SL; KR, 5501 Columbia Park, Cheverly MD

Report	
Project Name	D11 Cheverly SL; KR
Project Address	5501 Columbia Park, Cheverly MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	D11 Cheverly Kiss & Ride
Module DC Nameplate	84.5 kW
Inverter AC Nameplate	100.0 kW Load Ratio: 0.84
Annual Production	98.76 MWh
Performance Ratio	80.3%
kWh/kWp	1,169.1
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)




Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
Total Collector Irradiance		1,367.5	0.0%
Energy (kWh)	Nameplate	115,452.1	
	Output at Irradiance Levels	114,595.5	-0.7%
	Output at Cell Temperature Derate	111,058.6	-3.1%
	Output After Mismatch	107,929.2	-2.8%
	Optimal DC Output	107,578.1	-0.3%
	Constrained DC Output	100,371.2	-6.7%
	Inverter Output	98,762.6	-1.6%
Energy to Grid		98,762.6	0.0%
Temperature Metrics			
Avg. Operating Ambient Temp		16.6 °C	
Avg. Operating Cell Temp		23.9 °C	
Simulation Metrics			
Operating Hours		4422	
Solved Hours		4422	

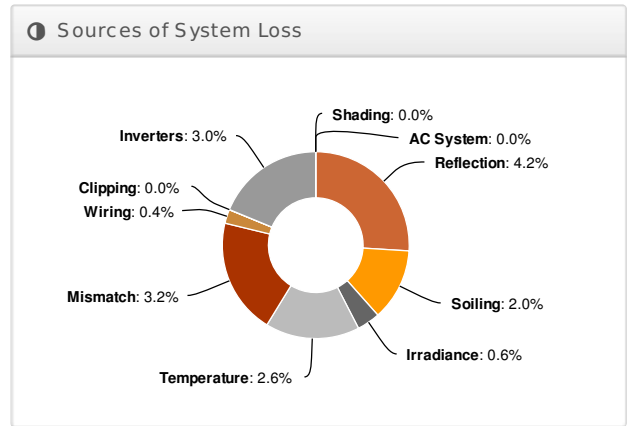
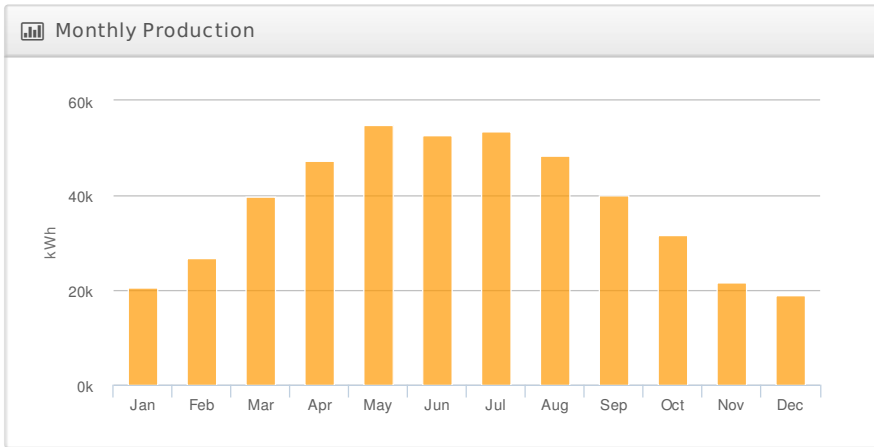
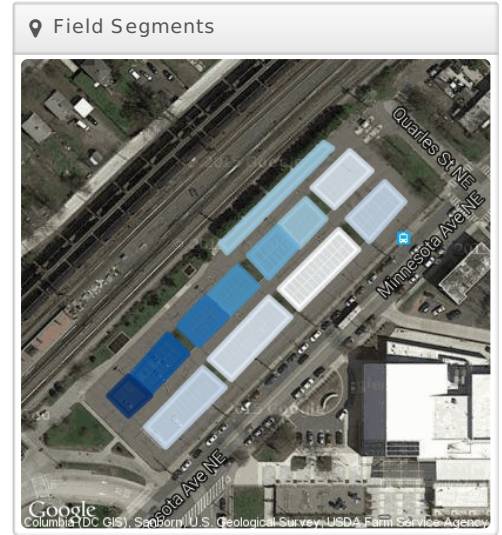
Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	CS6X - 320P (Canadian Solar)										
	Characterization	Manufacturer Default, PAN										
Component Characterizations	Device	Sunny Central SC 100 outdoor HE (SMA)										
	Characterization	Default Characterization										

D10 Deanwood Surface Lot D10 Deanwood SL; KR, 4720 Minnesota Avenue NE, Washington, DC

Report	
Project Name	D10 Deanwood SL; KR
Project Address	4720 Minnesota Avenue NE, Washington, DC
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com
	

System Metrics	
Design	D10 Deanwood Surface Lot
Module DC Nameplate	346.6 kW
Inverter AC Nameplate	300.0 kW Load Ratio: 1.16
Annual Production	456.8 MWh
Performance Ratio	84.9%
kWh/kWp	1,318.0
Weather Dataset	
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,553.6	
	POA Irradiance	1,552.4	-0.1%
	Shaded Irradiance	1,552.4	0.0%
	Irradiance after Reflection	1,487.6	-4.2%
	Irradiance after Soiling	1,457.9	-2.0%
	Total Collector Irradiance	1,457.9	0.0%
Energy (kWh)	Nameplate	504,909.0	
	Output at Irradiance Levels	501,673.7	-0.6%
	Output at Cell Temperature Derate	488,536.6	-2.6%
	Output After Mismatch	472,815.0	-3.2%
	Optimal DC Output	470,989.5	-0.4%
	Constrained DC Output	470,970.6	0.0%
	Inverter Output	456,777.0	-3.0%
	Energy to Grid	456,777.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		15.7 °C
	Avg. Operating Cell Temp		23.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

Condition Set

Description	
Weather Dataset	
Solar Angle Location	Meteo Lat/Lng
Transposition Model	
Temperature Model	
Temperature Model Parameters	Rack Type, U _{const} , U _{wind}
Soiling (%)	J F M A M J J A S O N D
Irradiation Variance	%
Cell Temperature Spread	° C
Module Binning Range	% to %
AC System Derate	%
Module Characterizations	Module, Characterization
Component Characterizations	Device, Characterization

Components

Component	Name	Count
Inverter	Sunny Central SC 100 outdoor (SMA)	3 (300.0 kW)
Combiner	12 pole Combiner	9
Home Runs	2 AWG (Copper)	6 (892.0 ft)
Strings	10 AWG (Copper)	57 (22,785.3 ft)
Module	CS6X - 320P (Canadian Solar)	1,083

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	19	Along Racking

Field Segments


Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	90	90
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	90	90
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	63	63
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	63	63
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	63	63
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	63	63
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	90	90
Field Segment 1 (copy 4)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	45	45
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	144	144
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	144	144
Field Segment 1 (copy 3)	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	144	144
Field Segment 12	Fixed Tilt	Horizontal (Landscape)	0°	135°	0.5 ft	1x1	84	84

Detailed Layout

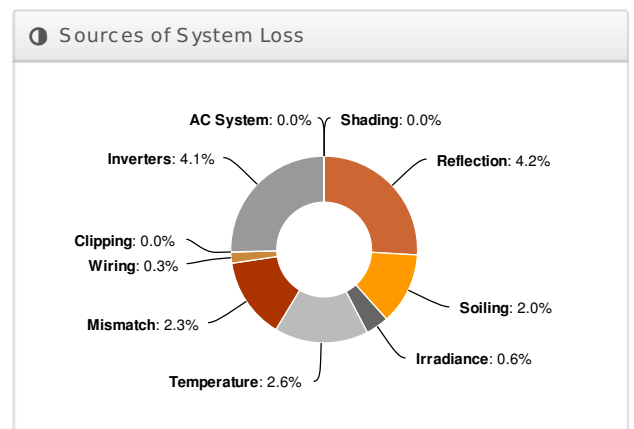
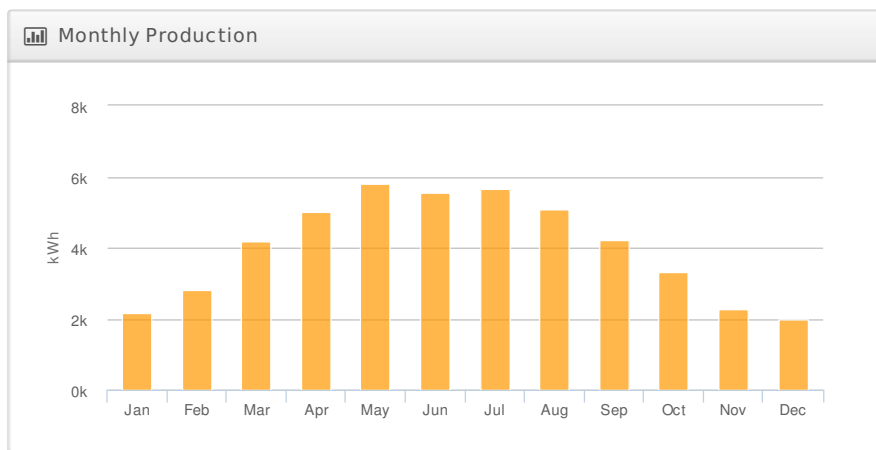
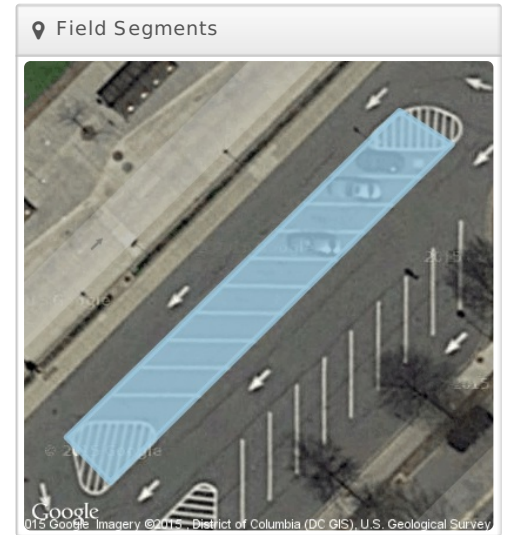


D10 Deanwood Kiss & Ride D10 Deanwood SL; KR, 4720 Minnesota Avenue NE, Washington, DC

Report	
Project Name	D10 Deanwood SL; KR
Project Address	4720 Minnesota Avenue NE, Washington, DC
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	D10 Deanwood Kiss & Ride
Module DC Nameplate	36.5 kW
Inverter AC Nameplate	40.0 kW Load Ratio: 0.91
Annual Production	48.06 MWh
Performance Ratio	84.9%
kWh/kWp	1,317.5
Weather Dataset	TMY, 10km grid (38.95,-76.95), NREL (prospector)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,553.6	
	POA Irradiance	1,552.4	-0.1%
	Shaded Irradiance	1,552.4	0.0%
	Irradiance after Reflection	1,487.6	-4.2%
	Irradiance after Soiling	1,457.9	-2.0%
	Total Collector Irradiance	1,457.9	0.0%
Energy (kWh)	Nameplate	53,148.4	
	Output at Irradiance Levels	52,807.8	-0.6%
	Output at Cell Temperature Derate	51,424.7	-2.6%
	Output After Mismatch	50,267.0	-2.3%
	Optimal DC Output	50,111.5	-0.3%
	Constrained DC Output	50,109.6	0.0%
	Inverter Output	48,062.1	-4.1%
	Energy to Grid	48,062.1	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		15.7 °C
	Avg. Operating Cell Temp		23.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km grid (38.95,-76.95), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	CS6X - 320P (Canadian Solar)		Characterization								
				Manufacturer Default, PAN								
Component Characterizations	Device	Sunny Tripower 20000TL-US (SMA)		Characterization								
				Modified CEC								

Components

Component	Name	Count
Inverter	Sunny Tripower 20000TL-US (SMA)	2 (40.0 kW)
Combiner	12 pole Combiner	4
Strings	10 AWG (Copper)	19 (2,906.1 ft)
Module	CS6X - 320P (Canadian Solar)	114

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	6	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	136°	0.5 ft	1x1	114	114

Detailed Layout



Components

Component	Name	Count
Inverter	Sunny Central SC 100 outdoor HE (SMA)	1 (100.0 kW)
Combiner	12 pole Combiner	3
Home Runs	2 AWG (Copper)	2 (101.8 ft)
Strings	10 AWG (Copper)	22 (5,521.9 ft)
Module	CS6X - 320P (Canadian Solar)	264

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	12	Along Racking

Field Segments


Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	245°	0.5 ft	1x1	140	140
Field Segment 2	Fixed Tilt	Horizontal (Landscape)	0°	245°	0.5 ft	1x1	124	124

Detailed Layout

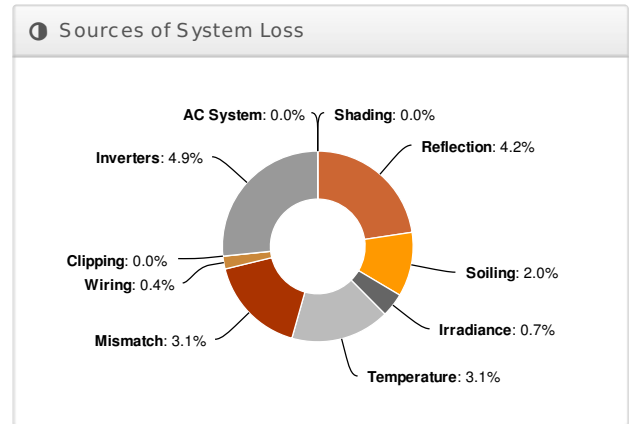
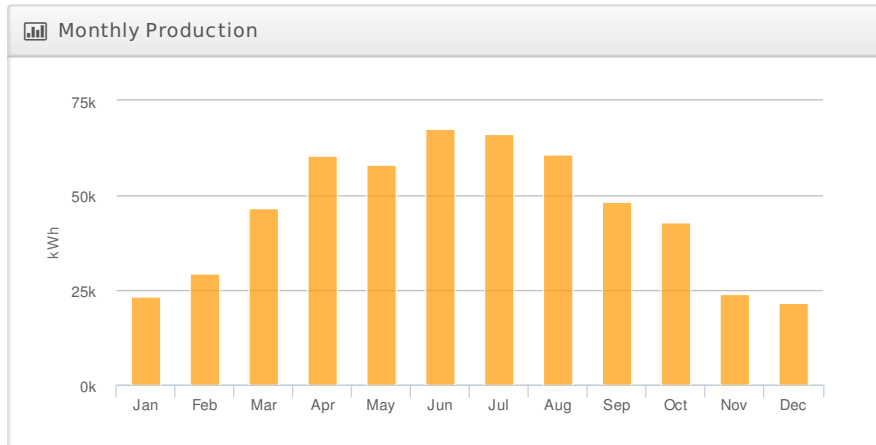
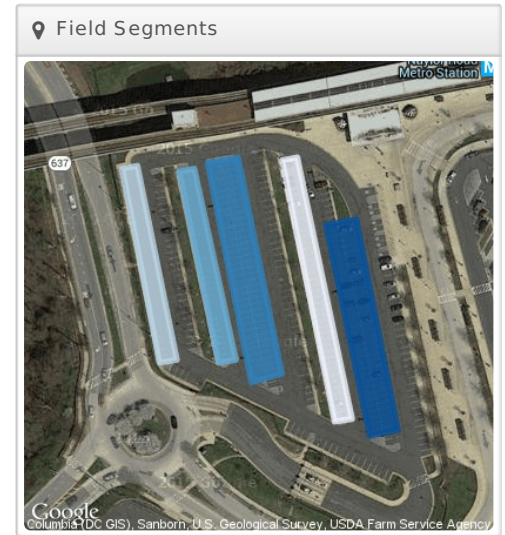


F09 Naylor Road Surface Lot F09 Naylor Road SL; KR, 3101 Branch Ave, Temple Hills, MD

Report	
Project Name	F09 Naylor Road SL; KR
Project Address	3101 Branch Ave, Temple Hills, MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	F09 Naylor Road Surface Lot
Module DC Nameplate	455.7 kW
Inverter AC Nameplate	400.0 kW Load Ratio: 1.14
Annual Production	550.0 MWh
Performance Ratio	82.9%
kWh/kWp	1,206.9
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	622,743.4	
	Output at Irradiance Levels	618,121.9	-0.7%
	Output at Cell Temperature Derate	599,043.3	-3.1%
	Output After Mismatch	580,544.8	-3.1%
	Optimal DC Output	578,233.4	-0.4%
	Constrained DC Output	578,221.5	0.0%
	Inverter Output	549,968.0	-4.9%
	Energy to Grid	549,968.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		23.9 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3° C								
	Flush Mount	-2.81	-0.0455	0° C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	CS6X - 320P (Canadian Solar)		Characterization								
				Manufacturer Default, PAN								
Component Characterizations	Device	Sunny Central SC 200 (SMA)		Characterization								
				Default Characterization								

Components

Component	Name	Count
Inverter	Sunny Central SC 200 (SMA)	2 (400.0 kW)
Combiner	12 pole Combiner	10
Home Runs	2 AWG (Copper)	8 (867.4 ft)
Strings	10 AWG (Copper)	89 (32,477.6 ft)
Module	CS6X - 320P (Canadian Solar)	1,424

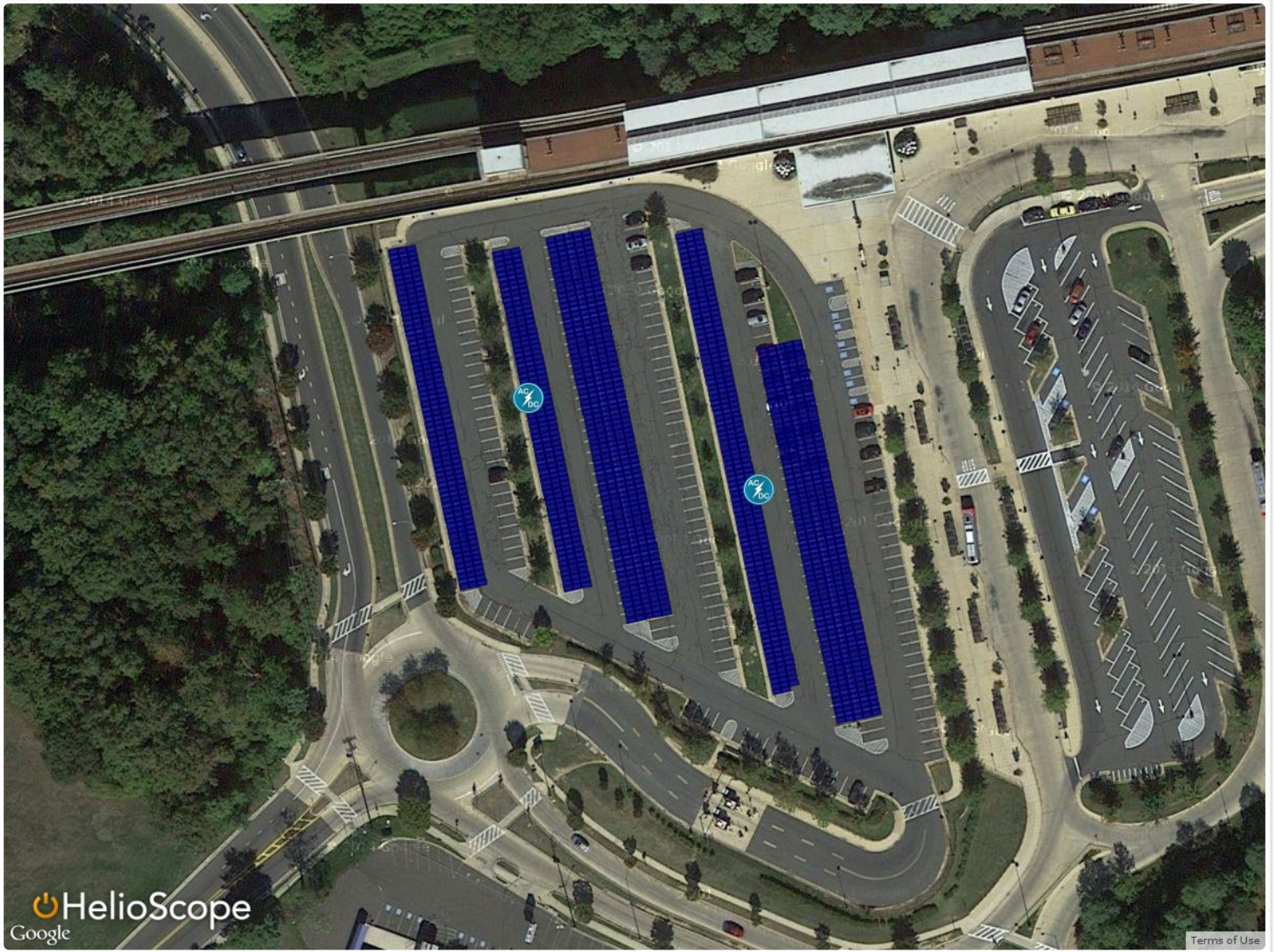
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	16	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	168°	0.5 ft	1x1	201	201
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	168°	0.5 ft	1x1	201	201
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	168°	0.5 ft	1x1	380	380
Field Segment 1 (copy 2)	Fixed Tilt	Horizontal (Landscape)	0°	168°	0.5 ft	1x1	370	370
Field Segment 1 (copy 1)	Fixed Tilt	Horizontal (Landscape)	0°	168°	0.5 ft	1x1	272	272

Detailed Layout

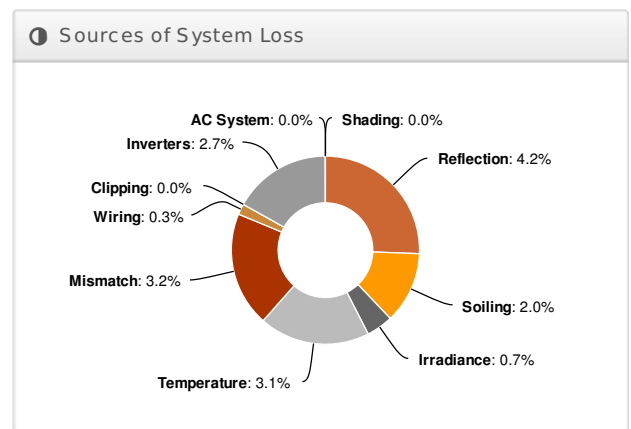
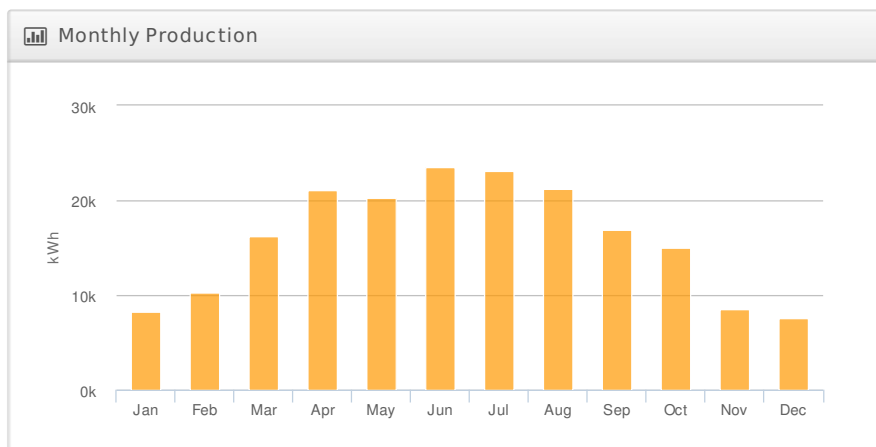
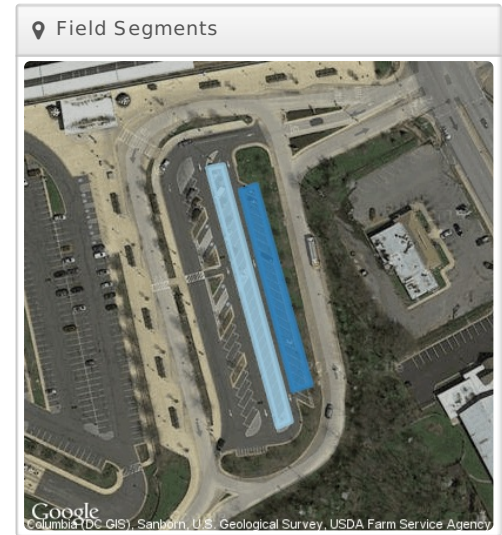


F09 Naylor Road Kiss & Ride F09 Naylor Road SL; KR, 3101 Branch Ave, Temple Hills, MD

Report	
Project Name	F09 Naylor Road SL; KR
Project Address	3101 Branch Ave, Temple Hills, MD
Prepared For	WMATA
Prepared By	Paul Lanning paul@lightboxenergy.com



System Metrics	
Design	F09 Naylor Road Kiss & Ride
Module DC Nameplate	155.5 kW
Inverter AC Nameplate	200.0 kW Load Ratio: 0.78
Annual Production	191.9 MWh
Performance Ratio	84.8%
kWh/kWp	1,233.9
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)
Simulator Version	93 (2a7ffbdd79-d60235b045-2323a94417-ebfb90548e)



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,456.5	
	POA Irradiance	1,455.9	0.0%
	Shaded Irradiance	1,455.9	0.0%
	Irradiance after Reflection	1,395.4	-4.2%
	Irradiance after Soiling	1,367.5	-2.0%
	Total Collector Irradiance	1,367.5	0.0%
Energy (kWh)	Nameplate	212,537.7	
	Output at Irradiance Levels	210,960.5	-0.7%
	Output at Cell Temperature Derate	204,448.5	-3.1%
	Output After Mismatch	197,898.3	-3.2%
	Optimal DC Output	197,310.4	-0.3%
	Constrained DC Output	197,307.5	0.0%
	Inverter Output	191,897.0	-2.7%
	Energy to Grid	191,897.0	0.0%
Temperature Metrics			
	Avg. Operating Ambient Temp		16.6 °C
	Avg. Operating Cell Temp		23.9 °C
Simulation Metrics			
	Operating Hours	4422	
	Solved Hours	4422	

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, WASHINGTON DC REAGAN AP, NSRDB (tmy3, I)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.00%											
Module Characterizations	Module	Characterization										
	CS6X - 320P (Canadian Solar)	Manufacturer Default, PAN										
Component Characterizations	Device	Characterization										
	Sunny Central SC 100 outdoor (SMA)	Default Characterization										

Components

Component	Name	Count
Inverter	Sunny Central SC 100 outdoor (SMA)	2 (200.0 kW)
Combiner	12 pole Combiner	6
Home Runs	2 AWG (Copper)	4 (461.1 ft)
Strings	10 AWG (Copper)	27 (9,276.9 ft)
Module	CS6X - 320P (Canadian Solar)	486

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	18	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules
Field Segment 1	Fixed Tilt	Horizontal (Landscape)	0°	165°	0.5 ft	1x1	273	273
Field Segment 1 (copy)	Fixed Tilt	Horizontal (Landscape)	0°	165°	0.5 ft	1x1	213	213

Detailed Layout

