

Saratoga Solar Project

Public Service Commission of Wisconsin
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Appendix M

EMF Study

**Saratoga Solar Project, LLC
EMF STUDY**



EMF Study

Saratoga Solar Project, LLC
Wood County, Wisconsin.
Stantec Project #: 193708352
Docket #: 9816-CE-100

February 24, 2022

Prepared for:

Saratoga Solar Project, LLC

Prepared by:

Anurag Ghosh, PE
Stantec Consulting Services Inc.

1340 Treat Boulevard
Suite 300
Walnut Creek, CA 94597-7966

Saratoga Solar Project, LLC
EMF STUDY

Revision Chart

Rev	Reason for Change	Author	Reviewer	Approved by	Issue Date
0	Released for Review	AG	PM	CP	02/10/2022

**Saratoga Solar Project, LLC
EMF STUDY**

Sign-off Sheet

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Prepared by:

Anurag Ghosh
(signature)

Name / Title

Anurag Ghosh, Electrical Engineer

Reviewed by:

Paul Moldovan
(signature)

Name / Title

Paul Moldovan, Manager - Studies

Approved by:

Ch Pekar
(signature)

Name / Title

Chris Pekar, Senior Principal

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Saratoga Solar Project, LLC

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1.0 Summary

Saratoga Solar Project, LLC (Client) is proposing to construct the Saratoga Solar Project ("Project") in Wood County, Wisconsin. The proposed Project is in the town of Saratoga. The Project will consist of a 150.5-megawatt (MW) alternating current (AC) solar farm with a 50 MW AC Battery Energy Storage System (BESS). Proposed Project developments, including ancillary facilities, will consist of solar panels and tracking systems, access roads, underground collector cables, transformers, junction boxes, and a Project substation. Client retained the services of Stantec Consulting Services Inc. (Stantec) to conduct an Electric and Magnetic Field (EMF) study for the Project.

Stantec's Portland Office Power Group conducted an EMF study for the underground collector system using CYMCAP 7.3 software. Assumed underground cable orientations were used to perform the study.

2.0 Purpose and Project Description

The Project is a 150.5 MW rated solar generating facility proposed in Wood County, Wisconsin. The proposed underground collector system for the Project is designed to be rated at 34.5 kV and expected to have 6 - 1000 kcmil circuits routed in parallel trenches, each 5 or 10 feet apart depending on scenario.

The purpose of the study was to estimate the EMF strength created by the collector system of the Project. For the underground collector system, six (6) different scenarios were considered based on the number of 1000 kcmil circuits, as detailed in Section 3.1-Underground Collector System Scenarios.

3.0 Underground Collector System

The entire collector system was assumed to have a 48-inch burial depth. The conductor diameter of the 1000 kcmil cables was assumed to be 1.117 inches. The underground collector system will be buried in parallel trenches located approximately 5 feet apart from each other when up to 3 circuits are parallel and 10 feet apart when parallel circuits are more than 3. Refer to Appendix B.2 which shows the trench cross section details and the ROW (right-of-way) of the underground collector system. The edge of ROW is at 2.5 ft from the outermost cable, when up to 3 circuits are in parallel and the edge of ROW is at 5 ft from the outer most cable, when more than 3 circuits are in parallel.

The magnetic field impact has been calculated one meter (~3.28 feet) above ground. This follows convention undertaken in other states.

3.1 UNDERGROUND COLLECTOR SYSTEM SCENARIOS

Based on the conceptual layout, refer appendix B.1, and the details mentioned above, it was determined that following scenarios should be studied.

UNDERGROUND SYSTEM	
Scenario 1	Single Circuit 1 - 1000 kcmil cable (typical buried collector circuit)
Scenario 2	Two (2) Circuits 1 and 2 - 1000 kcmil cables in parallel, 5 feet apart
Scenario 3	Three (3) Circuits 1, 2 and 3 - 1000 kcmil cables in parallel, 5 feet apart
Scenario 4	Four (4) Circuits 1, 2, 3 and 4 - 1000 kcmil cables in parallel, 10 feet apart
Scenario 5	Five (5) Circuits 1, 2, 3, 4 and 5 - 1000 kcmil cables in parallel, 10 feet apart
Scenario 6	Six (6) Circuits 1, 2, 3, 4, 5 and 6 - 1000 kcmil cables in parallel, 10 feet apart

Saratoga Solar Project, LLC

EMF STUDY

3.2 AMPACITY VALUES

The following parameters were assumed for the cable ampacity calculation:

Ambient Soil Temperature	25 deg. C
Soil resistivity	1.2 deg. C-m/W
Conductor temperature	90 deg. C

The cables are assumed to be carrying maximum allowable current as per the cable ampacity data from CYMCAP (refer to Appendix B.3).

Circuit 1 - Single	543 Amps
Circuits 1, 2 – Parallel, 5 ft apart	507 Amps, each
Circuits 1, 2, 3 - Parallel, 5 ft apart	479 Amps, each
Circuits 1, 2, 3, 4 - Parallel, 10 ft apart	511 Amps, each
Circuits 1, 2, 3, 4, 5 - Parallel, 10 ft apart	507 Amps, each
Circuits 1, 2, 3, 4, 5, 6 - Parallel, 10 ft apart	505 Amps, each

4.0 Conclusion

The information presented above for underground collector cables were introduced into CYMCAP to calculate the magnetic field for individual scenarios.

4.1 COLLECTOR SYSTEM

The maximum magnetic field strength estimated near or at the centerline of the trench was calculated and is summarized in the table below. Electric field intensity was not calculated for the underground cable scenarios in the analysis because it is canceled out due to the shielding by the metallic screen on the underground cables.

Appendices A.1 to A.6 provide detailed results for the six underground cable scenarios. By way of comparison, as per WHO (<https://www.who.int/peh-emf/about/WhatisEMF/en/index3.html>), a typical microwave gives off 40-80 mG, when at a distance of around 1 foot from the equipment.

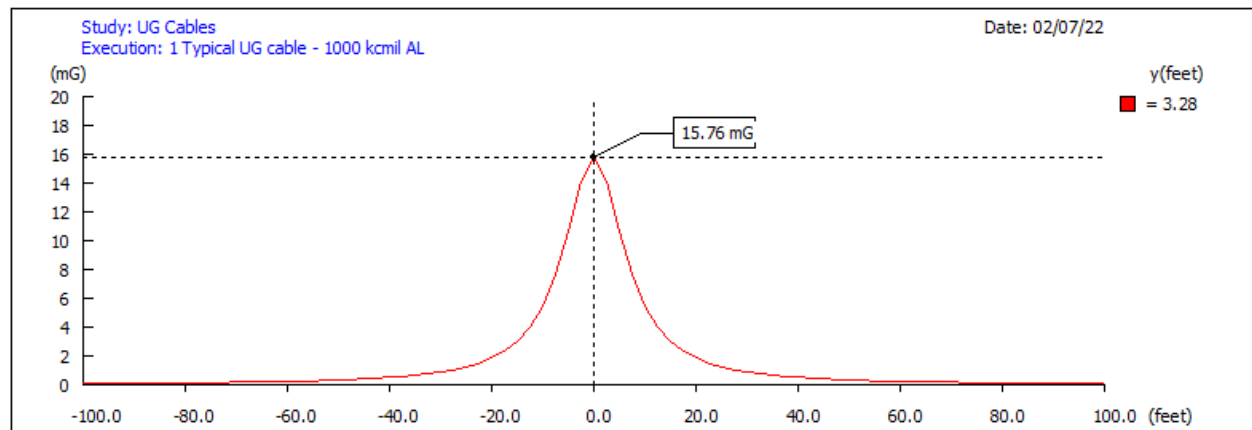
UNDERGROUND (UG) CABLES	MAXIMUM MAGNETIC FIELD (mG)	MAGNETIC FIELD AT EDGE OF ROW (mG)
Scenario 1: 1 UG cable	15.75	14.09
Scenario 2: 2 parallel UG cables	20.78	18.31
Scenario 3: 3 parallel UG cables	20.74	19.15
Scenario 4: 4 parallel UG cables	14.29	12.50
Scenario 5: 5 parallel UG cables	14.12	12.52
Scenario 6: 6 parallel UG cables	14.02	12.54

Appendix A Detailed Results for Underground Collector System

**Saratoga Solar Project, LLC
EMF STUDY**

A.1 SCENARIO 1: SINGLE CIRCUIT-UNDERGROUND CABLE

Scenario 1: 1-Circuit-1000 kcmil cable



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-0.095	4.055	542.6	0.0
1	B	0.095	4.055	542.6	-120.0
1	C	0.0	3.888	542.6	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables

Execution: 1 Typical UG cable - 1000 kcmil AL

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X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.083
-97.5		0.0873
-95.0		0.0919
-92.5		0.097
-90.0		0.1024
-87.5		0.1083
-85.0		0.1147
-82.5		0.1217
-80.0		0.1294
-77.5		0.1378
-75.0		0.147
-72.5		0.1572
-70.0		0.1685
-67.5		0.1811
-65.0		0.1951
-62.5		0.2108
-60.0		0.2285
-57.5		0.2485
-55.0		0.2712
-52.5		0.2971
-50.0		0.327
-47.5		0.3615
-45.0		0.4017
-42.5		0.449
-40.0		0.505
-37.5		0.572
-35.0		0.6531
-32.5		0.7525
-30.0		0.8759
-27.5		1.0315
-25.0		1.2312
-22.5		1.4926
-20.0		1.8427
-17.5		2.3236
-15.0		3.0028
-12.5		3.9895
-10.0		5.4564
-7.5		7.6419
-5.0		10.7045
-2.5		14.0935
0.0		15.7562
2.5		14.0935
5.0		10.7046
7.5		7.6419
10.0		5.4564
12.5		3.9895
15.0		3.0028
17.5		2.3236
20.0		1.8427
22.5		1.4926
25.0		1.2312
27.5		1.0315
30.0		0.8759
32.5		0.7525
35.0		0.6531
37.5		0.572
40.0		0.505
42.5		0.449
45.0		0.4017
47.5		0.3615
50.0		0.327
52.5		0.2971
55.0		0.2712

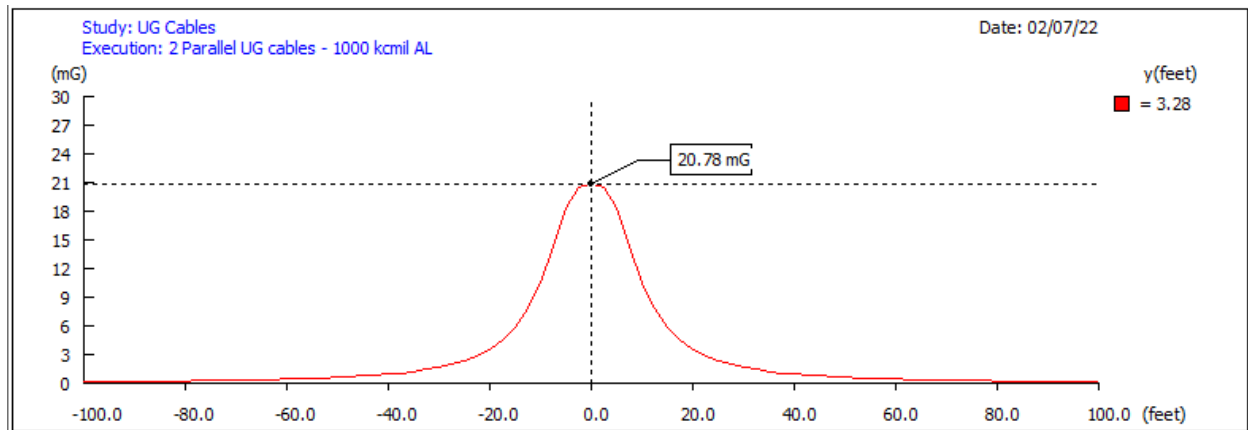
57.5	0.2485
60.0	0.2285
62.5	0.2108
65.0	0.1951
67.5	0.1811
70.0	0.1685
72.5	0.1572
75.0	0.147
77.5	0.1378
80.0	0.1294
82.5	0.1217
85.0	0.1147
87.5	0.1083
90.0	0.1024
92.5	0.097
95.0	0.0919
97.5	0.0873
100.0	0.083

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
0.0	15.7562

A.2 SCENARIO 2: TWO (2) CIRCUITS—UNDERGROUND CABLES

Scenario 2: 2-Circuits - 1000 kcmil cables



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-2.595	4.055	507.1	0.0
1	B	-2.405	4.055	507.1	-120.0
1	C	-2.5	3.888	507.1	120.0
2	A	2.405	4.055	507.1	0.0
2	B	2.595	4.055	507.1	-120.0
2	C	2.5	3.888	507.1	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables
Execution: 2 Parallel UG cables - 1000 kcmil AL
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X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.1555
-97.5		0.1635
-95.0		0.1722
-92.5		0.1816
-90.0		0.1918
-87.5		0.2029
-85.0		0.2149
-82.5		0.2281
-80.0		0.2425
-77.5		0.2583
-75.0		0.2757
-72.5		0.2949
-70.0		0.3162
-67.5		0.3398
-65.0		0.3663
-62.5		0.3959
-60.0		0.4292
-57.5		0.467
-55.0		0.5099
-52.5		0.559
-50.0		0.6154
-47.5		0.6809
-45.0		0.7573
-42.5		0.8472
-40.0		0.9539
-37.5		1.082
-35.0		1.2374
-32.5		1.4282
-30.0		1.6661
-27.5		1.9672
-25.0		2.3556
-22.5		2.8668
-20.0		3.5553
-17.5		4.506
-15.0		5.8515
-12.5		7.7922
-10.0		10.5826
-7.5		14.3338
-5.0		18.319
-2.5		20.5575
0.0		20.7824
2.5		20.5575
5.0		18.3191
7.5		14.3338
10.0		10.5826
12.5		7.7922
15.0		5.8515
17.5		4.506
20.0		3.5553
22.5		2.8668
25.0		2.3556
27.5		1.9672
30.0		1.6661
32.5		1.4282
35.0		1.2374
37.5		1.082
40.0		0.9539
42.5		0.8472
45.0		0.7573
47.5		0.6809
50.0		0.6154
52.5		0.559
55.0		0.5099

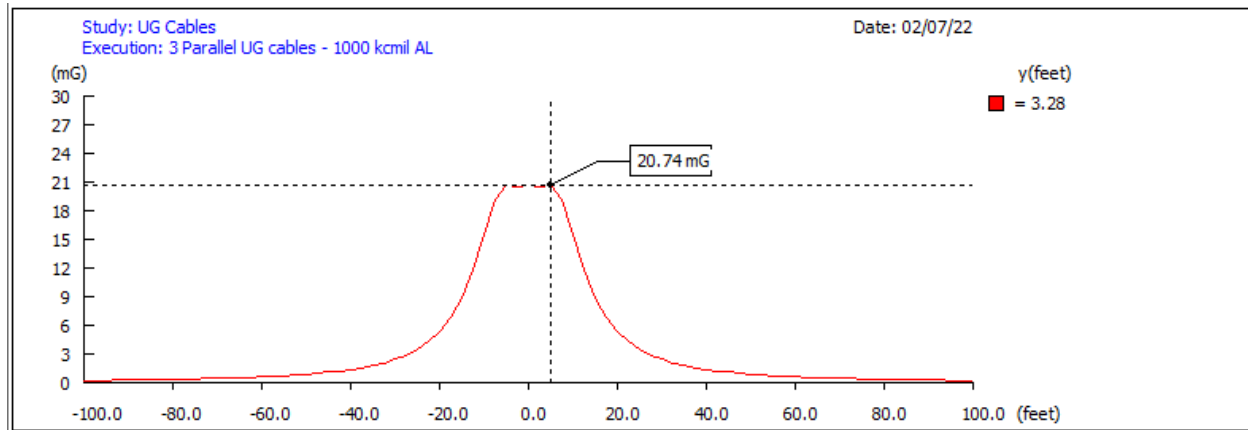
57.5	0.467
60.0	0.4292
62.5	0.3959
65.0	0.3663
67.5	0.3398
70.0	0.3162
72.5	0.2949
75.0	0.2757
77.5	0.2583
80.0	0.2425
82.5	0.2281
85.0	0.2149
87.5	0.2029
90.0	0.1918
92.5	0.1816
95.0	0.1722
97.5	0.1635
100.0	0.1555

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
0.0	20.7824

A.3 SCENARIO 3: THREE (3) CIRCUITS–UNDERGROUND CABLES

Scenario 3: 3-Circuits - 1000 kcmil cables



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-5.095	4.055	479.2	0.0
1	B	-4.905	4.055	479.2	-120.0
1	C	-5.0	3.888	479.2	120.0
2	A	-0.095	4.055	479.2	0.0
2	B	0.095	4.055	479.2	-120.0
2	C	0.0	3.888	479.2	120.0
3	A	4.905	4.055	479.2	0.0
3	B	5.095	4.055	479.2	-120.0
3	C	5.0	3.888	479.2	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables
Execution: 3 Parallel UG cables - 1000 kcmil AL
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X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.2211
-97.5		0.2326
-95.0		0.2449
-92.5		0.2584
-90.0		0.2729
-87.5		0.2887
-85.0		0.3059
-82.5		0.3247
-80.0		0.3453
-77.5		0.368
-75.0		0.3929
-72.5		0.4204
-70.0		0.451
-67.5		0.4849
-65.0		0.5229
-62.5		0.5655
-60.0		0.6135
-57.5		0.6679
-55.0		0.7299
-52.5		0.8009
-50.0		0.8828
-47.5		0.9778
-45.0		1.089
-42.5		1.2203
-40.0		1.3766
-37.5		1.5649
-35.0		1.7943
-32.5		2.0776
-30.0		2.4327
-27.5		2.8855
-25.0		3.474
-22.5		4.2553
-20.0		5.3164
-17.5		6.7897
-15.0		8.8659
-12.5		11.7639
-10.0		15.4952
-7.5		19.1532
-5.0		20.7426
-2.5		20.574
0.0		20.6982
2.5		20.574
5.0		20.7426
7.5		19.1532
10.0		15.4952
12.5		11.7639
15.0		8.8659
17.5		6.7897
20.0		5.3164
22.5		4.2553
25.0		3.474
27.5		2.8855
30.0		2.4327
32.5		2.0776
35.0		1.7943
37.5		1.5649
40.0		1.3766
42.5		1.2203
45.0		1.089
47.5		0.9778
50.0		0.8828
52.5		0.8009
55.0		0.7299

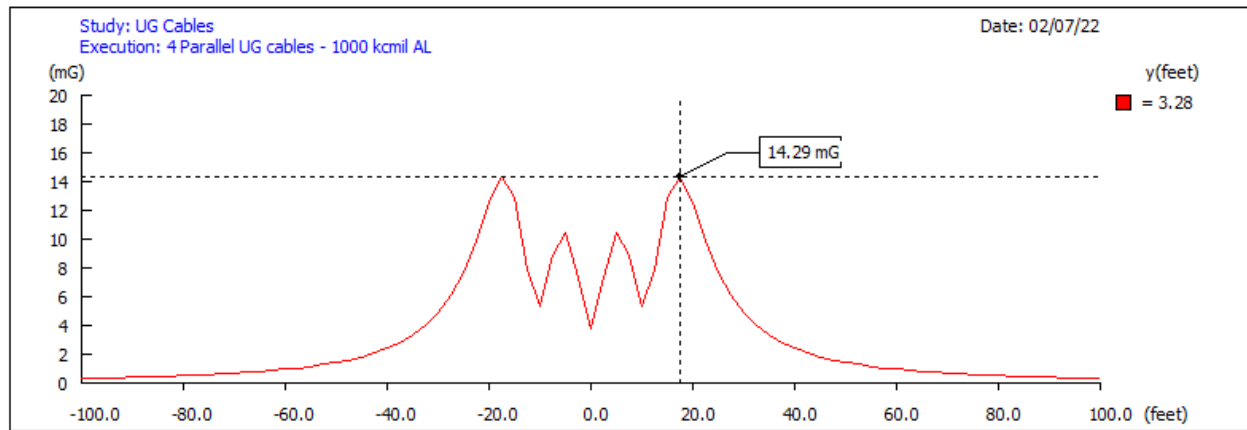
57.5	0.6679
60.0	0.6135
62.5	0.5655
65.0	0.5229
67.5	0.4849
70.0	0.451
72.5	0.4204
75.0	0.3929
77.5	0.368
80.0	0.3453
82.5	0.3247
85.0	0.3059
87.5	0.2887
90.0	0.2729
92.5	0.2584
95.0	0.2449
97.5	0.2326
100.0	0.2211

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
5.0	20.7426

A.4 SCENARIO 4: FOUR (4) CIRCUITS–UNDERGROUND CABLES

Scenario 4: 4-Circuits - 1000 kcmil cables



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-15.095	4.055	511.0	0.0
1	B	-14.905	4.055	511.0	-120.0
1	C	-15.0	3.888	511.0	120.0
2	A	-5.095	4.055	511.0	0.0
2	B	-4.905	4.055	511.0	-120.0
2	C	-5.0	3.888	511.0	120.0
3	A	4.905	4.055	511.0	0.0
3	B	5.095	4.055	511.0	-120.0
3	C	5.0	3.888	511.0	120.0
4	A	14.905	4.055	511.0	0.0
4	B	15.095	4.055	511.0	-120.0
4	C	15.0	3.888	511.0	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables
Execution: 4 Parallel UG cables - 1000 kcmil AL
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X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.3247
-97.5		0.3422
-95.0		0.3611
-92.5		0.3816
-90.0		0.4039
-87.5		0.4283
-85.0		0.455
-82.5		0.4843
-80.0		0.5166
-77.5		0.5523
-75.0		0.5919
-72.5		0.6359
-70.0		0.6852
-67.5		0.7405
-65.0		0.803
-62.5		0.8739
-60.0		0.9548
-57.5		1.0478
-55.0		1.1555
-52.5		1.2811
-50.0		1.429
-47.5		1.6048
-45.0		1.8164
-42.5		2.074
-40.0		2.3923
-37.5		2.7922
-35.0		3.3036
-32.5		3.9711
-30.0		4.8606
-27.5		6.0683
-25.0		7.7212
-22.5		9.9248
-20.0		12.5029
-17.5		14.2899
-15.0		12.8882
-12.5		7.9418
-10.0		5.329
-7.5		8.8468
-5.0		10.4098
-2.5		7.363
0.0		3.7357
2.5		7.363
5.0		10.4098
7.5		8.8468
10.0		5.329
12.5		7.9418
15.0		12.8881
17.5		14.2899
20.0		12.5029
22.5		9.9248
25.0		7.7212
27.5		6.0683
30.0		4.8606
32.5		3.9711
35.0		3.3036
37.5		2.7922
40.0		2.3923
42.5		2.074
45.0		1.8164
47.5		1.6048
50.0		1.429
52.5		1.2811
55.0		1.1555

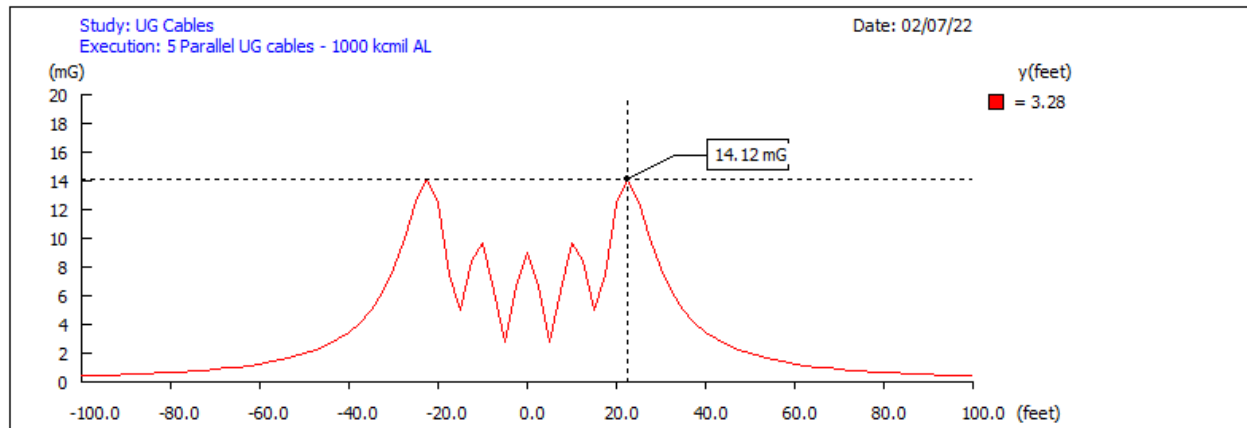
57.5	1.0478
60.0	0.9548
62.5	0.8739
65.0	0.803
67.5	0.7405
70.0	0.6852
72.5	0.6359
75.0	0.5919
77.5	0.5523
80.0	0.5166
82.5	0.4843
85.0	0.455
87.5	0.4283
90.0	0.4039
92.5	0.3816
95.0	0.3611
97.5	0.3422
100.0	0.3247

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
17.5	14.2899

A.5 SCENARIO 5: FIVE (5) CIRCUITS–UNDERGROUND CABLES

Scenario 5: 5-Circuits - 1000 kcmil cables



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-20.095	4.055	507.2	0.0
1	B	-19.905	4.055	507.2	-120.0
1	C	-20.0	3.888	507.2	120.0
2	A	-10.095	4.055	507.2	0.0
2	B	-9.905	4.055	507.2	-120.0
2	C	-10.0	3.888	507.2	120.0
3	A	-0.095	4.055	507.2	0.0
3	B	0.095	4.055	507.2	-120.0
3	C	0.0	3.888	507.2	120.0
4	A	9.905	4.055	507.2	0.0
4	B	10.095	4.055	507.2	-120.0
4	C	10.0	3.888	507.2	120.0
5	A	19.905	4.055	507.2	0.0
5	B	20.095	4.055	507.2	-120.0
5	C	20.0	3.888	507.2	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables
Execution: 5 Parallel UG cables - 1000 kcmil AL

Report created on: 02/07/22 3:46:47 PM

X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.4123
-97.5		0.435
-95.0		0.4596
-92.5		0.4865
-90.0		0.5158
-87.5		0.5479
-85.0		0.5831
-82.5		0.622
-80.0		0.665
-77.5		0.7127
-75.0		0.7659
-72.5		0.8254
-70.0		0.8924
-67.5		0.9682
-65.0		1.0544
-62.5		1.1532
-60.0		1.267
-57.5		1.3993
-55.0		1.5545
-52.5		1.7382
-50.0		1.9581
-47.5		2.2246
-45.0		2.5524
-42.5		2.9618
-40.0		3.4827
-37.5		4.1584
-35.0		5.0531
-32.5		6.2591
-30.0		7.8954
-27.5		10.0516
-25.0		12.5242
-22.5		14.123
-20.0		12.4962
-17.5		7.4233
-15.0		4.9715
-12.5		8.4522
-10.0		9.6596
-7.5		6.356
-5.0		2.8063
-2.5		6.6561
0.0		8.9533
2.5		6.6561
5.0		2.8063
7.5		6.356
10.0		9.6596
12.5		8.4522
15.0		4.9716
17.5		7.4233
20.0		12.4962
22.5		14.123
25.0		12.5242
27.5		10.0516
30.0		7.8954
32.5		6.2591
35.0		5.0531
37.5		4.1584
40.0		3.4827
42.5		2.9618
45.0		2.5524
47.5		2.2246
50.0		1.9581
52.5		1.7382
55.0		1.5545

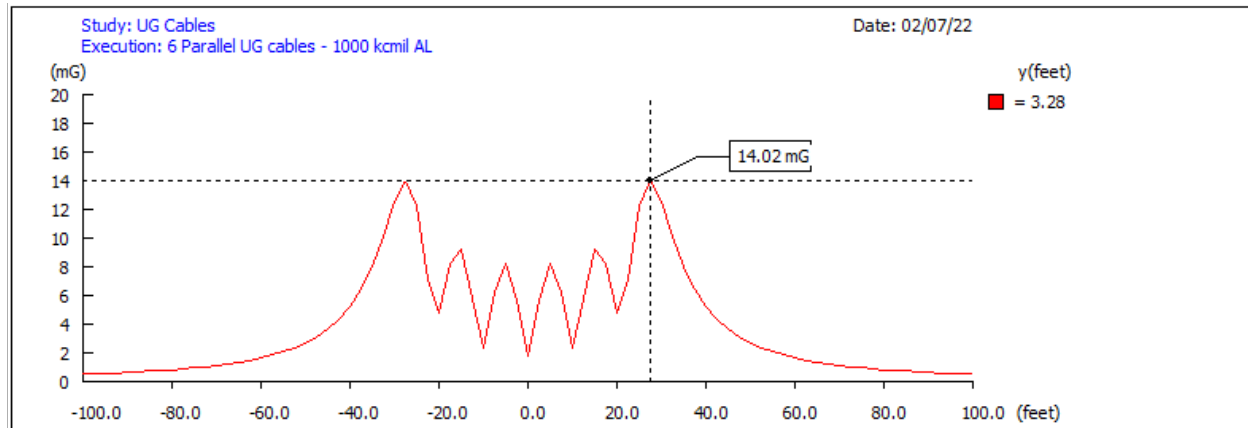
57.5	1.3993
60.0	1.267
62.5	1.1532
65.0	1.0544
67.5	0.9682
70.0	0.8924
72.5	0.8254
75.0	0.7659
77.5	0.7127
80.0	0.665
82.5	0.622
85.0	0.5831
87.5	0.5479
90.0	0.5158
92.5	0.4865
95.0	0.4596
97.5	0.435
100.0	0.4123

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
22.5	14.123

A.6 SCENARIO 6: SIX (6) CIRCUITS-UNDERGROUND CABLES

Scenario 6: 6-Circuits - 1000 kcmil cables



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-5.095	4.055	505.4	0.0
1	B	-4.905	4.055	505.4	-120.0
1	C	-5.0	3.888	505.4	120.0
2	A	4.905	4.055	505.4	0.0
2	B	5.095	4.055	505.4	-120.0
2	C	5.0	3.888	505.4	120.0
3	A	-15.095	4.055	505.4	0.0
3	B	-14.905	4.055	505.4	-120.0
3	C	-15.0	3.888	505.4	120.0
4	A	14.905	4.055	505.4	0.0
4	B	15.095	4.055	505.4	-120.0
4	C	15.0	3.888	505.4	120.0
5	A	-25.095	4.055	505.4	0.0
5	B	-24.905	4.055	505.4	-120.0
5	C	-25.0	3.888	505.4	120.0
6	A	24.905	4.055	505.4	0.0
6	B	25.095	4.055	505.4	-120.0
6	C	25.0	3.888	505.4	120.0

MAGNETIC FLUX DENSITY [mG]
=====

Study : UG Cables
Execution: 6 Parallel UG cables - 1000 kcmil AL
Report created on: 02/07/22 3:48:39 PM

X (feet)	Y=3.28 (feet)	B(mG)
-100.0		0.5075
-97.5		0.5363
-95.0		0.5677
-92.5		0.6019
-90.0		0.6395
-87.5		0.6808
-85.0		0.7264
-82.5		0.7769
-80.0		0.8331
-77.5		0.8959
-75.0		0.9663
-72.5		1.0458
-70.0		1.1359
-67.5		1.2388
-65.0		1.3572
-62.5		1.4943
-60.0		1.6546
-57.5		1.8438
-55.0		2.0695
-52.5		2.3422
-50.0		2.6763
-47.5		3.0922
-45.0		3.6191
-42.5		4.2999
-40.0		5.1974
-37.5		6.4012
-35.0		8.025
-32.5		10.1478
-30.0		12.5485
-27.5		14.0222
-25.0		12.2499
-22.5		7.0992
-20.0		4.7575
-17.5		8.2108
-15.0		9.2187
-12.5		5.801
-10.0		2.3338
-7.5		6.2752
-5.0		8.205
-2.5		5.6724
0.0		1.7614
2.5		5.6724
5.0		8.205
7.5		6.2752
10.0		2.3338
12.5		5.801
15.0		9.2187
17.5		8.2108
20.0		4.7575
22.5		7.0992
25.0		12.2499
27.5		14.0222
30.0		12.5485
32.5		10.1478
35.0		8.025
37.5		6.4012
40.0		5.1974
42.5		4.2999
45.0		3.6191
47.5		3.0922
50.0		2.6763
52.5		2.3422
55.0		2.0695

57.5	1.8438
60.0	1.6546
62.5	1.4943
65.0	1.3572
67.5	1.2388
70.0	1.1359
72.5	1.0458
75.0	0.9663
77.5	0.8959
80.0	0.8331
82.5	0.7769
85.0	0.7264
87.5	0.6808
90.0	0.6395
92.5	0.6019
95.0	0.5677
97.5	0.5363
100.0	0.5075

Peak value found at:

X	Y=3.28
(feet)	(feet)
	B(mG)
27.5	14.0222

Appendix B Reference Data

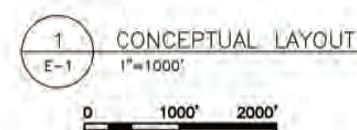
**Saratoga Solar Project, LLC
EMF STUDY**

B.1 PROJECT LAYOUT

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Notes

LEGEND	
	PROJECT BOUNDARY
	SITE CONSTRAINTS
	PRELIMINARY PRIMARY SOLAR ARRAY (197.880 MW DC/51.2 MW AC)
	PRELIMINARY ALTERNATE SOLAR ARRAY (52.060 MW DC/39.600MW AC)
	STORM WATER BMP AREA
	PRELIMINARY MV FEEDER RUNS



Alternate PV System Power Summary								
Inverter Station No.	AC Inverter Rating (MW)	PV Module Rating (W)	Qty of Modules	Qty of Strings	Qty 3-String Trackers	Qty 2-String Trackers	DC Power (MW)	DC/AC Ratio
A1	3,600	540	9,464	364	90	47	5.111	1.42
A2	3,600	540	9,438	363	89	48	5.097	1.42
A3	3,600	540	8,398	323	103	7	4.535	1.26
A4	3,600	540	8,346	321	105	3	4.507	1.25
A5	3,600	540	8,560	330	108	3	4.633	1.29
A6	3,600	540	8,840	340	112	2	4.774	1.33
A7	3,600	540	8,658	333	109	3	4.675	1.30
A8	3,600	540	8,658	333	109	3	4.675	1.30
A9	3,600	540	8,658	333	109	3	4.675	1.30
A10	3,600	540	8,658	333	81	45	4.675	1.30
A11	3,600	540	8,710	335	77	52	4.703	1.31
Total	39,600		96,408	3,708	1,092	216	52.060	1.31

NOTE: TOTAL AC POWER TO BE LIMITED TO 150.5MW AT THE POINT OF CONNECTION

CONCEPTUAL LAYOUT	CMA	CMA	2021.11.02
	By	ADD	YYYY.MM.DD
File Name: E-1 - CONCEPTUAL LAYOUT	CMA	CMA	2021.11.02
	Own	Disn	Chkd
			YYYY.MM.DD

Permit/Seal

Client/Project Logo

Client/Project
SARATOGA SOLAR PROJECT, LLC

SARATOGA SOLAR PROJECT

TOWN OF SARATOGA, WOOD COUNTY, WISCONSIN

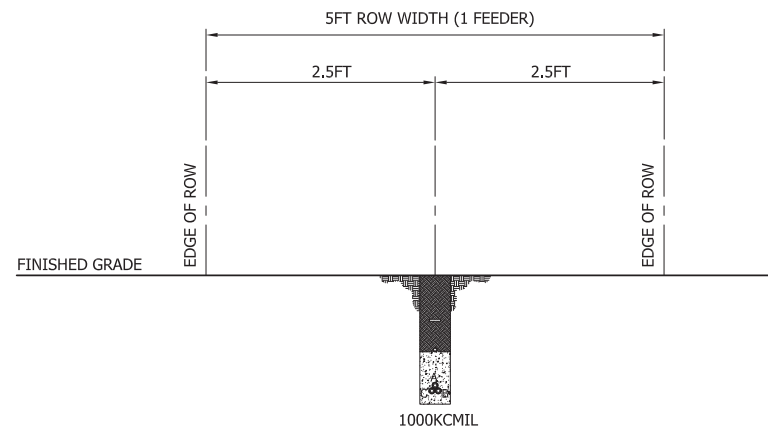
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Project No. 193708352	Scale 1" = 1000'
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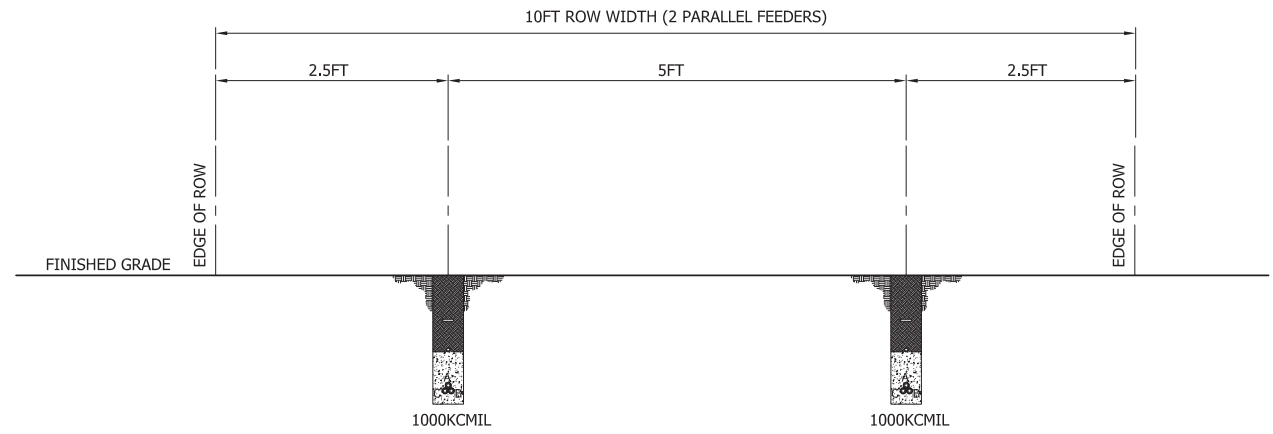
Revision Sheet
C 1 of 1

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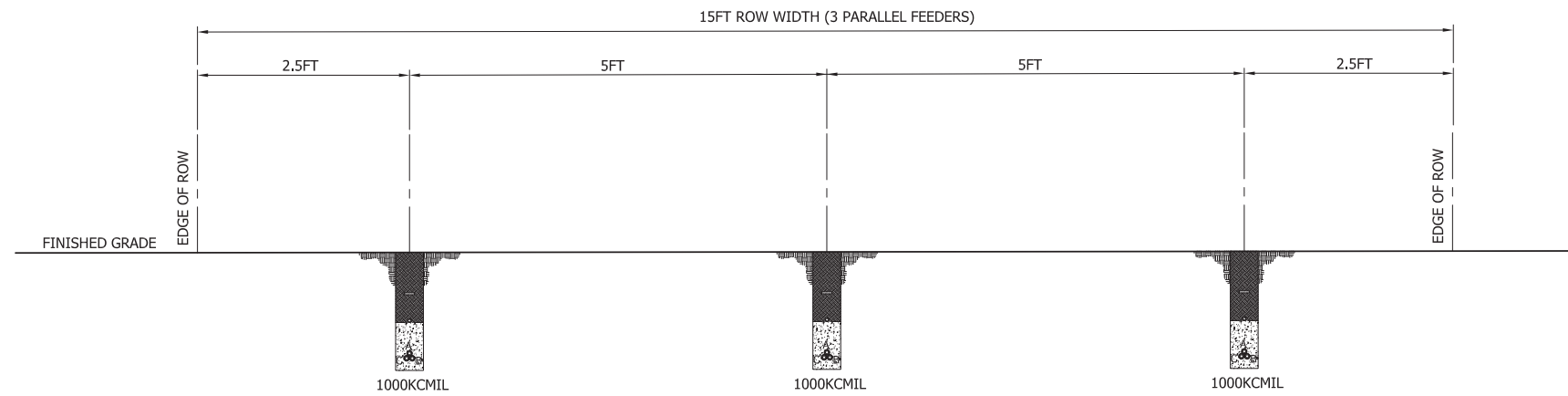
B.2 CABLE TRENCH DETAILS



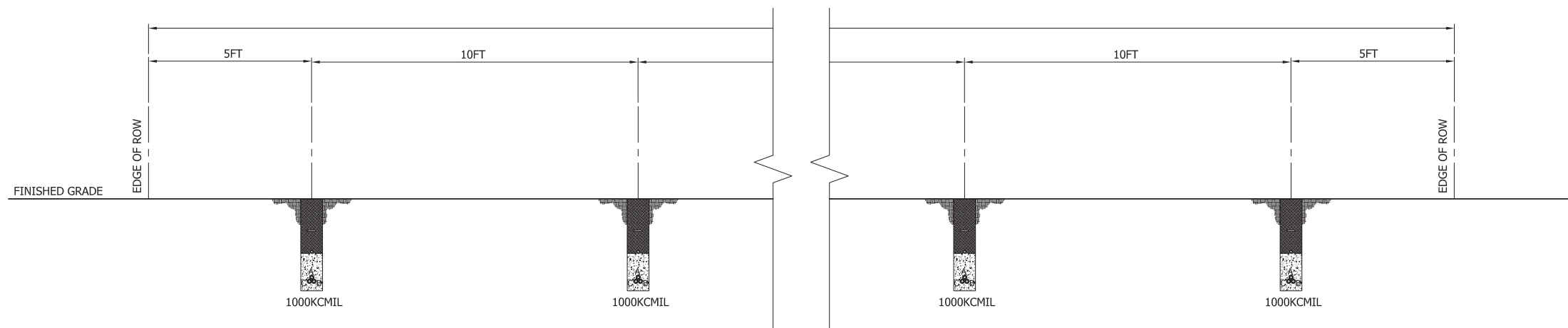
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NOT TO SCALE



2 TYPICAL 2 PARALLEL TRENCH SEPARATION
NOT TO SCALE



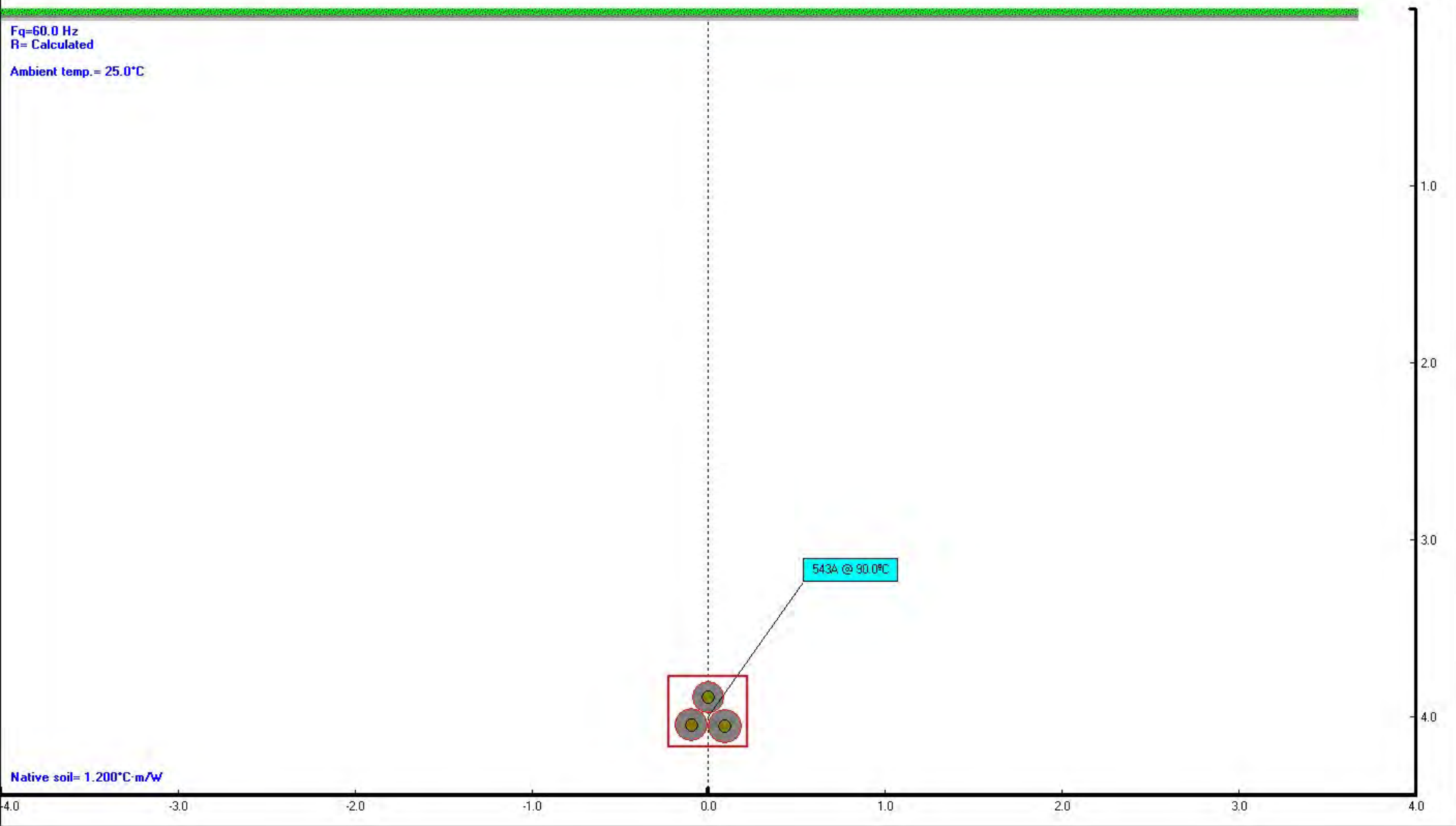
3 TYPICAL 3 PARALLEL TRENCH SEPARATION
NOT TO SCALE



4 TYPICAL MULTIPLE PARALLEL TRENCH SEPARATION
NOT TO SCALE

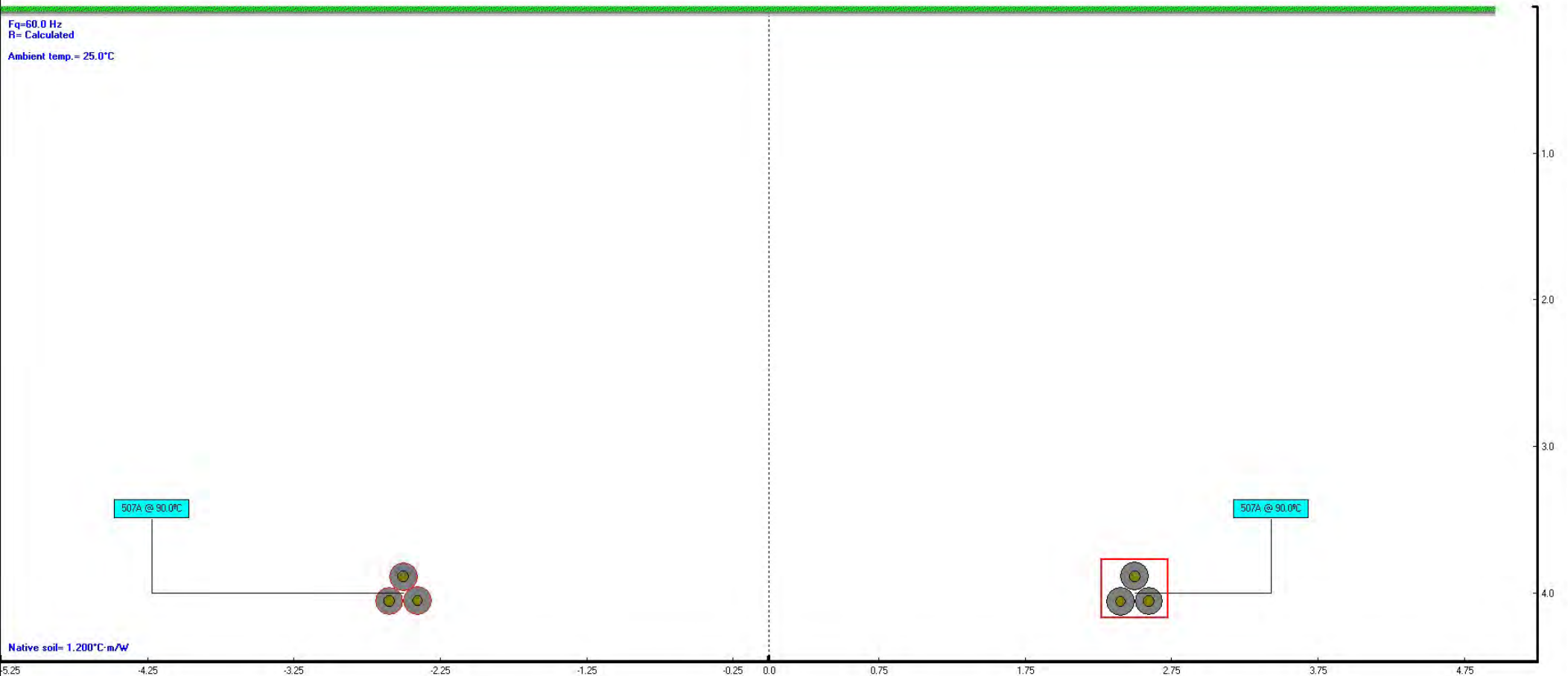
PARALLEL SPEARATION	
# PARALLEL CIRCUITS	TOTAL TRENCH WIDTH
4	40'-0"
5	50'-0"
6	60'-0"
7	70'-0"
8	80'-0"

B.3 SCREENSHOTS OF CABLE AMPACITY SCENARIOS- CYMCAP



Fq=60.0 Hz
R= Calculated

Ambient temp.= 25.0°C



Fq=60.0 Hz
R= Calculated

Ambient temp.= 25.0°C

479A @ 85.4°C



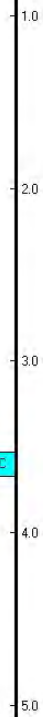
479A @ 90.0°C



479A @ 85.4°C



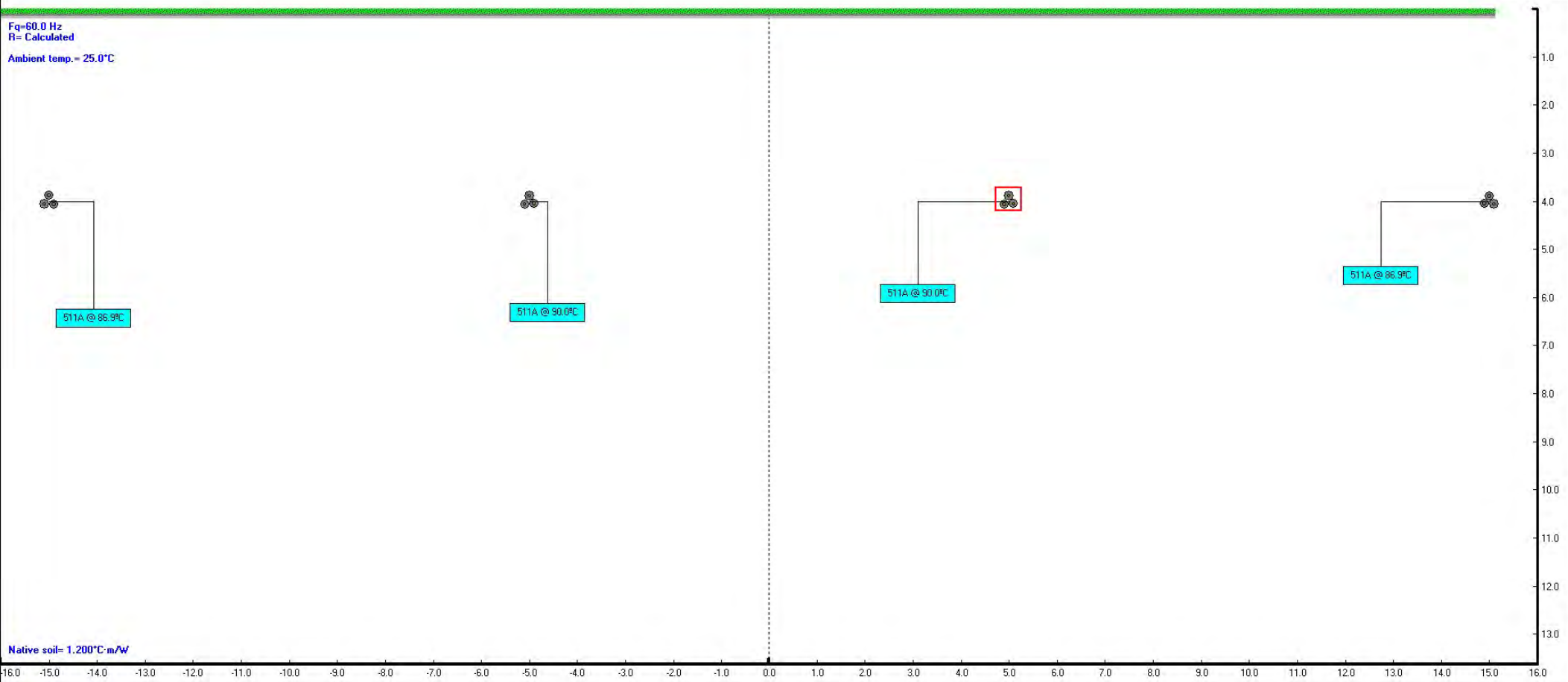
Native soil= 1.200°C·m/W



Fq=60.0 Hz
R= Calculated

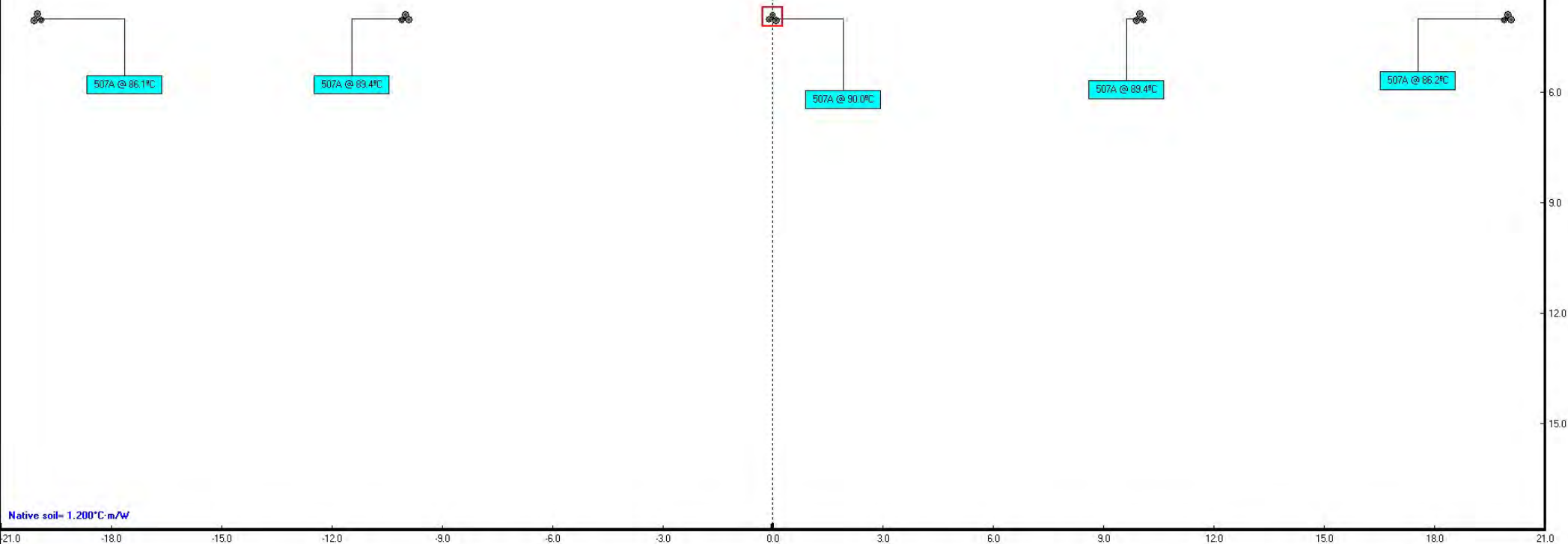
Ambient temp.= 25.0°C

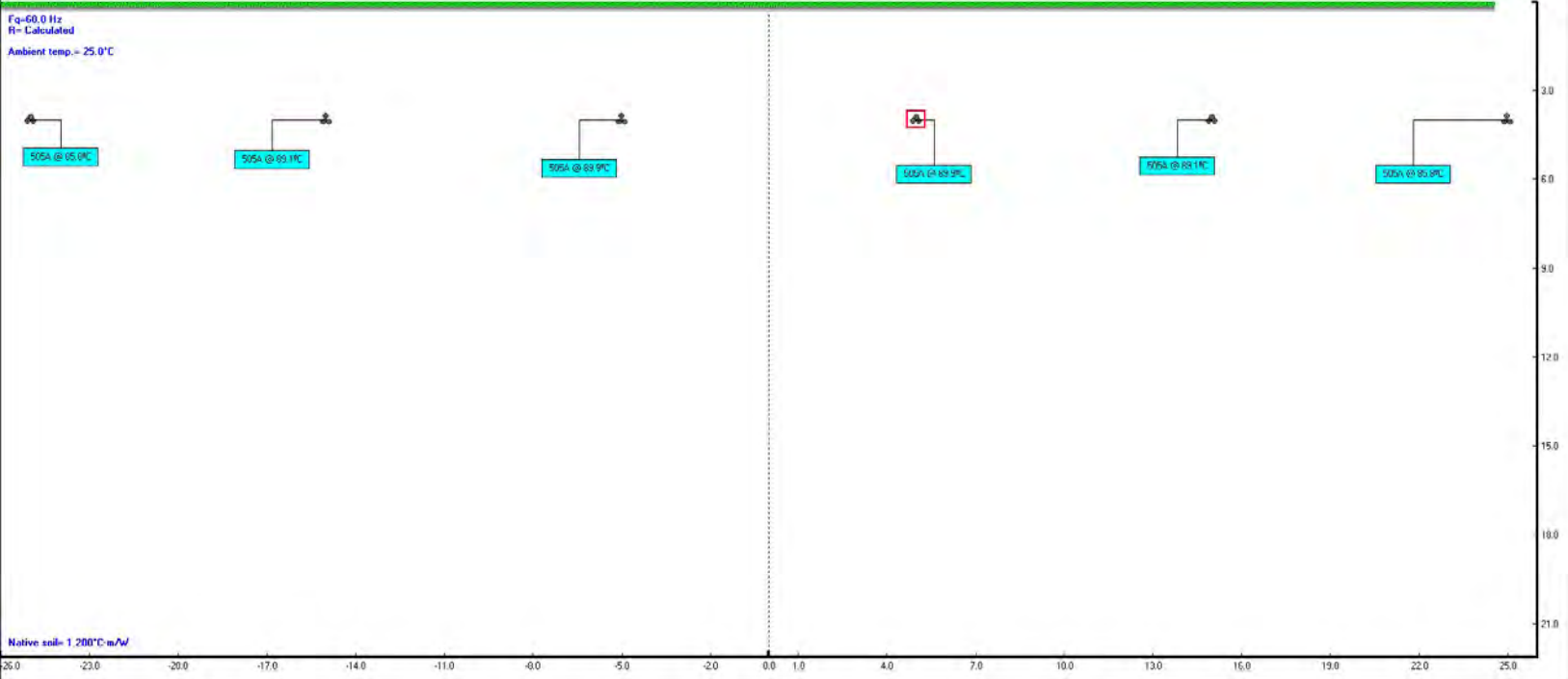
Native soil= 1.200°C·m/W



Fq=60.0 Hz
R= Calculated

Ambient temp.= 25.0°C





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EMF STUDY**

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