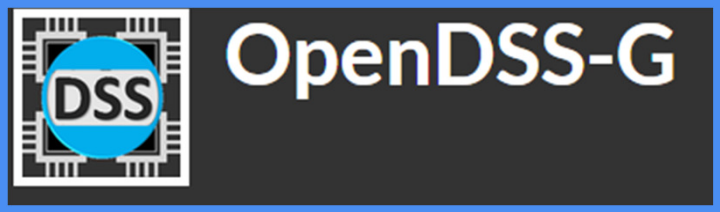


Carlos Frederico Meschini Almeida
cfmalmeida@usp.br
11 987822361

OPENDSS-G TUTORIAL 1

Referência:

https://www.youtube.com/watch?v=UzOFdvpjcZk&list=PLhdRxvt3nJ8zRpfalsBt8vMWwBDcsFJ_N

INTRODUÇÃO AO OPENDSS-G

OpenDSS-G is a tool for allowing users to have rapid and accurate access to OpenDSS without compromising the simulation performance.
Many applications and studies can be implemented using this interface, and it is expected that OpenDSS-G will provide an interactive simulation experience to achieve the maximum performance of simulations for electric power system engineering.

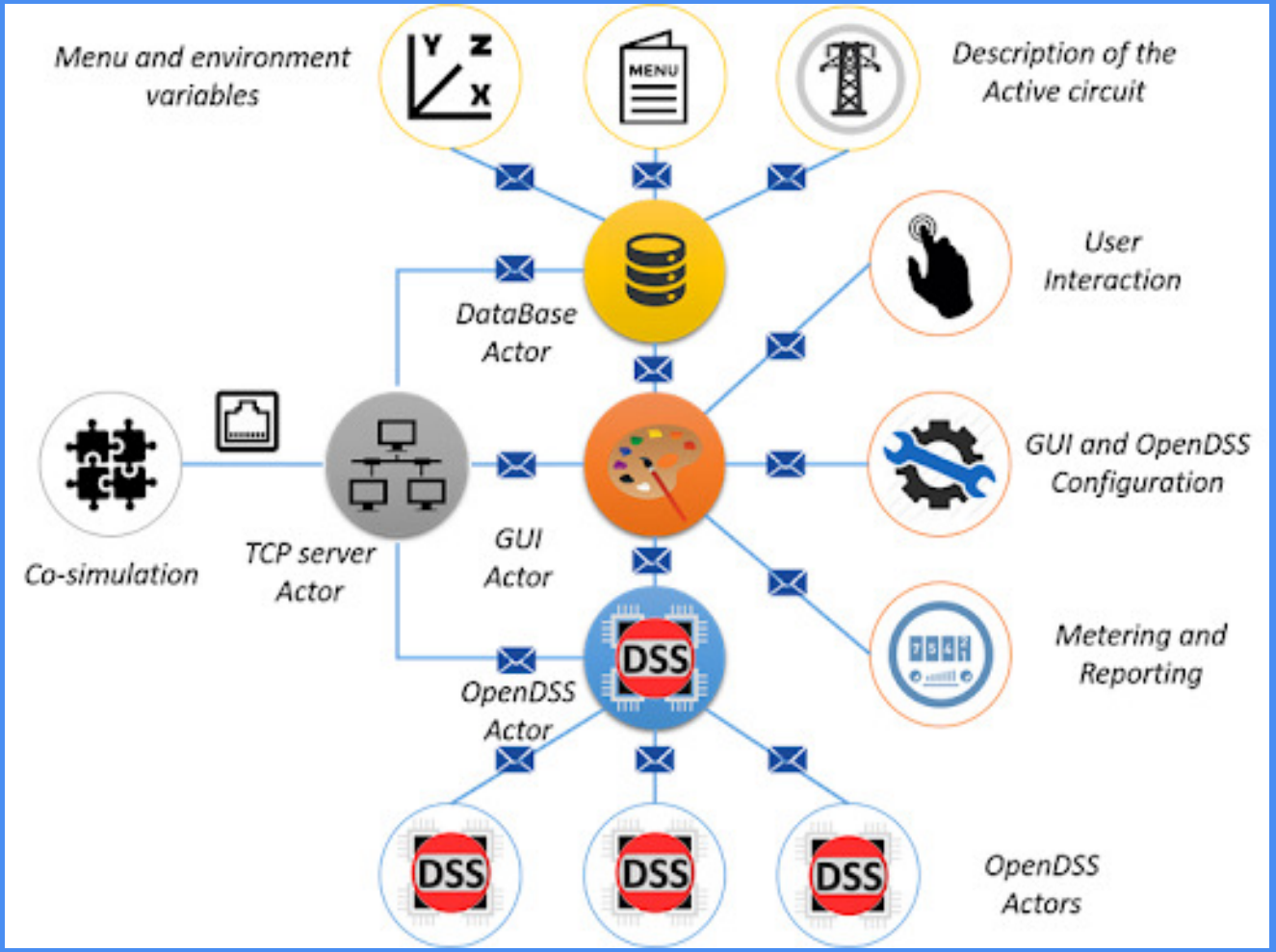
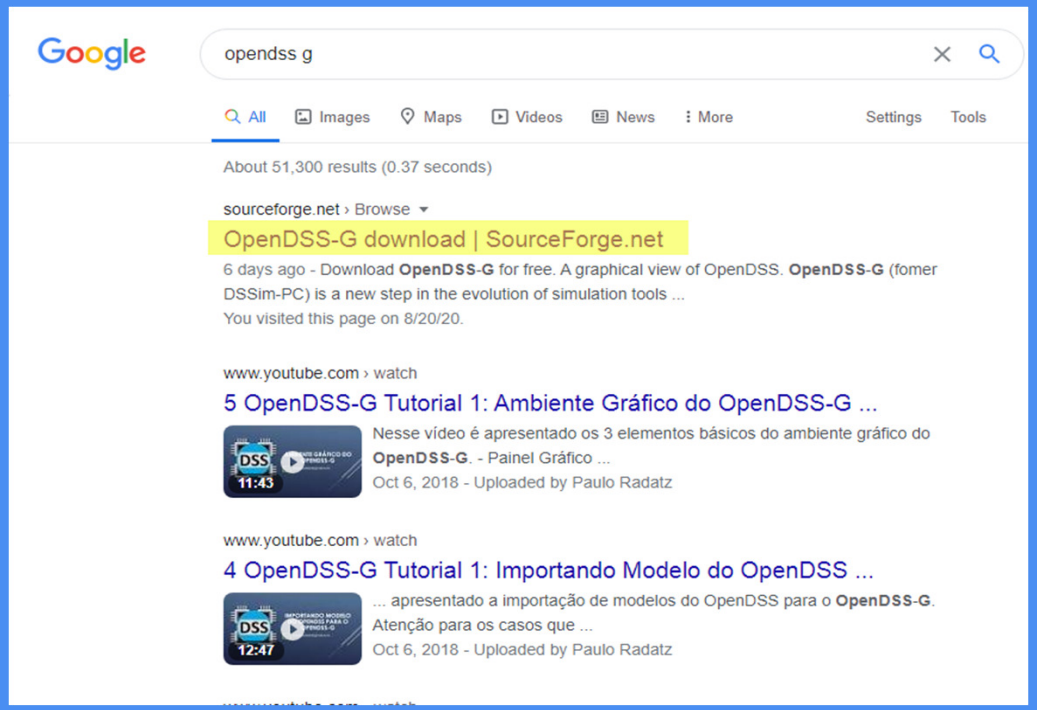
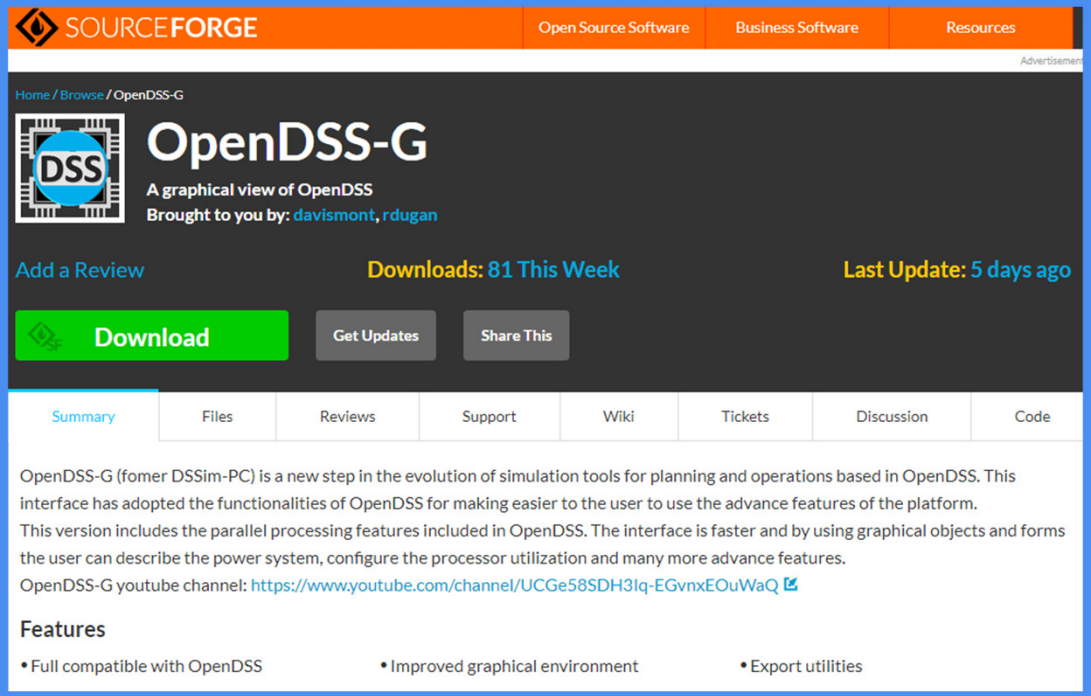


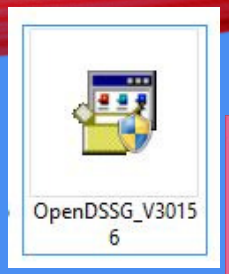
Figure 1: OpenDSS-G architecture

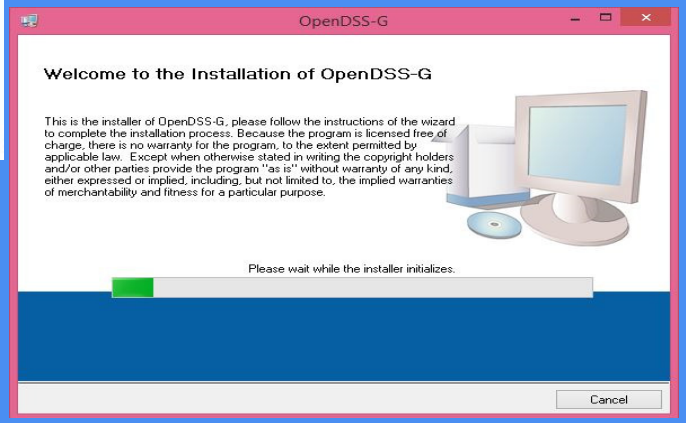
DOWNLOAD E INSTALAÇÃO

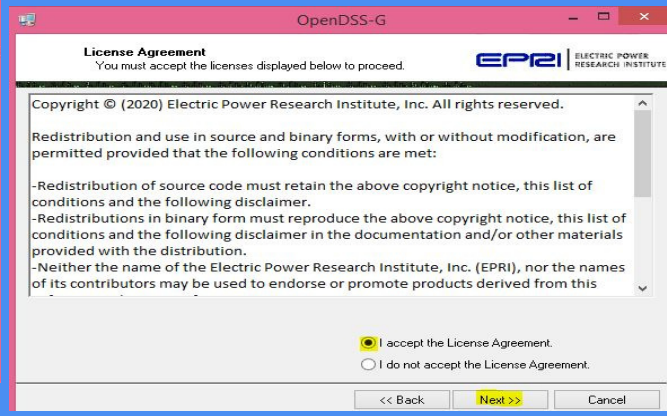


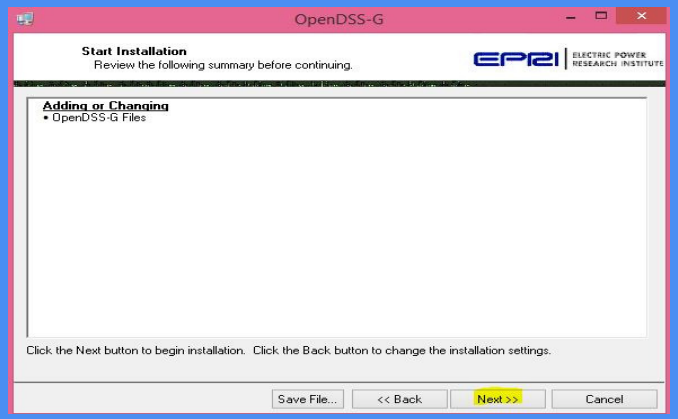


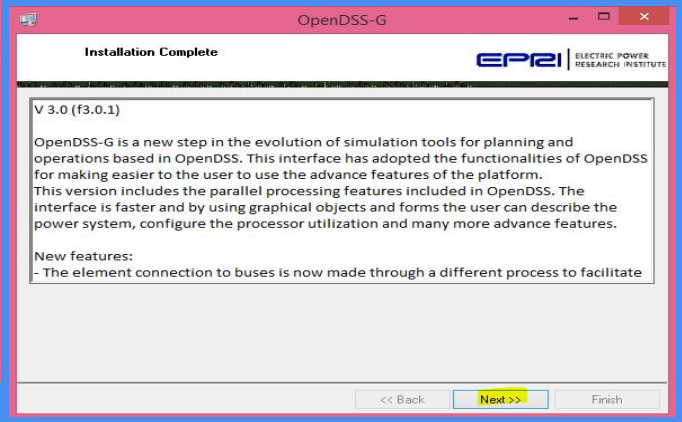
DOWNLOAD E INSTALAÇÃO



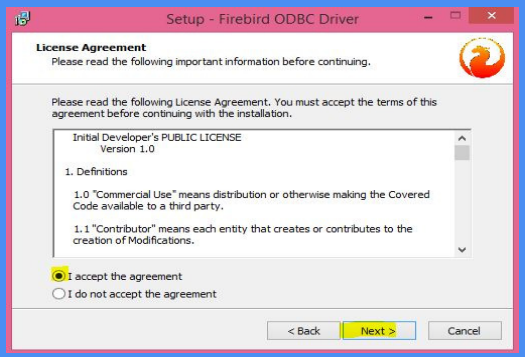


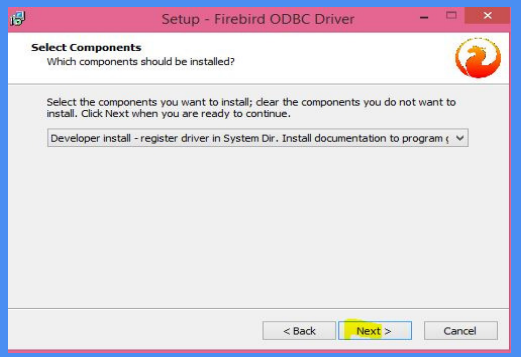


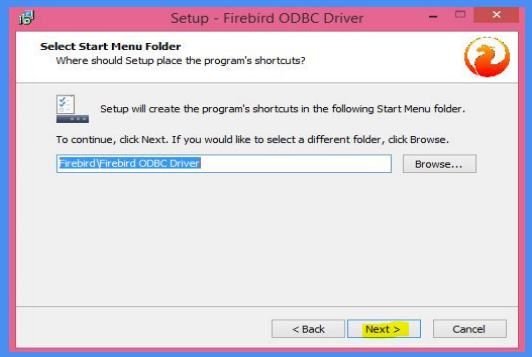


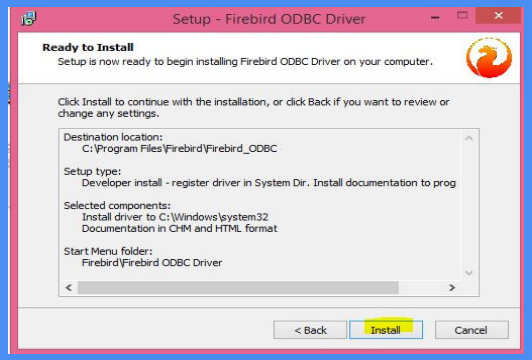


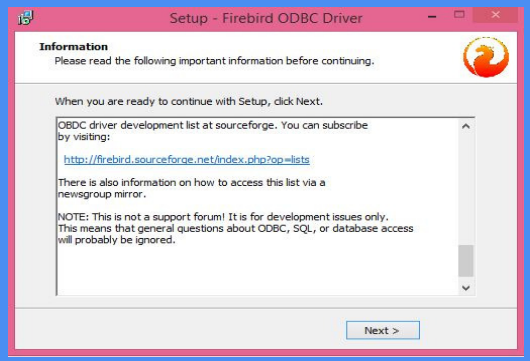
DOWNLOAD E INSTALAÇÃO



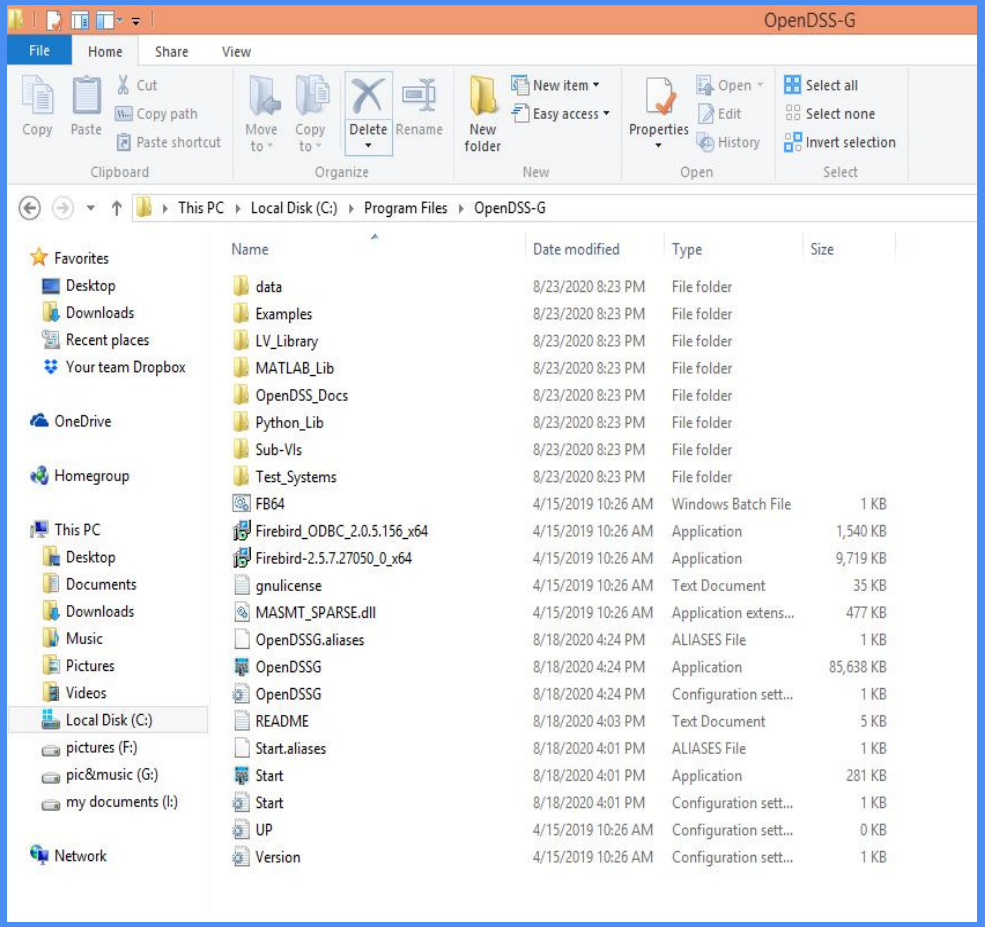




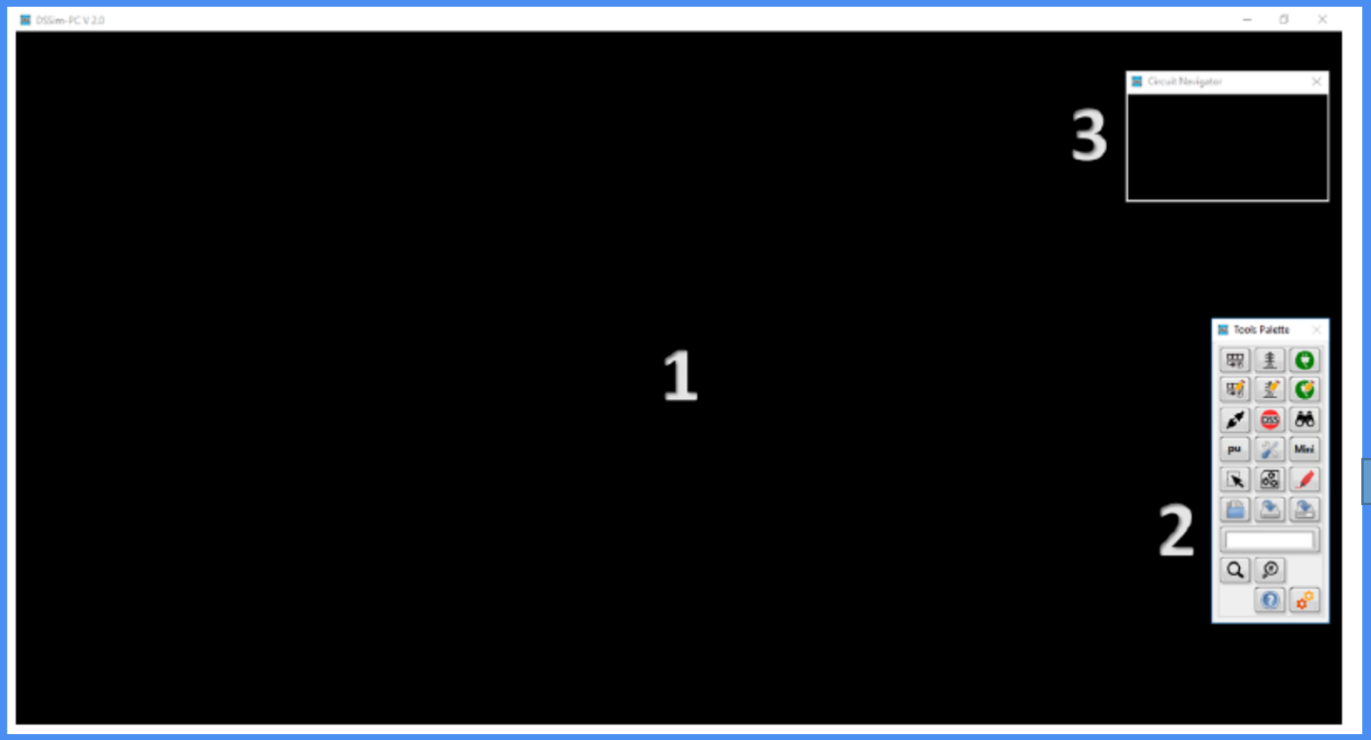




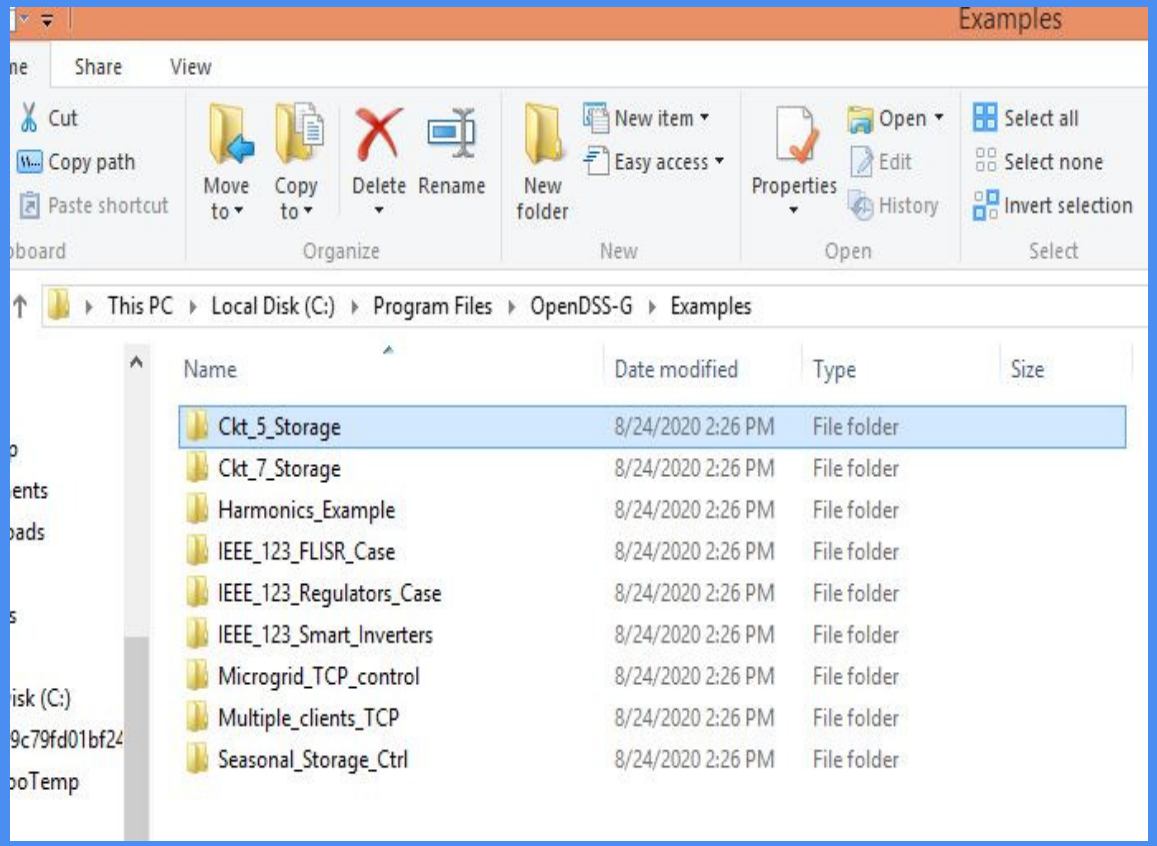
MATERIAL DE APOIO

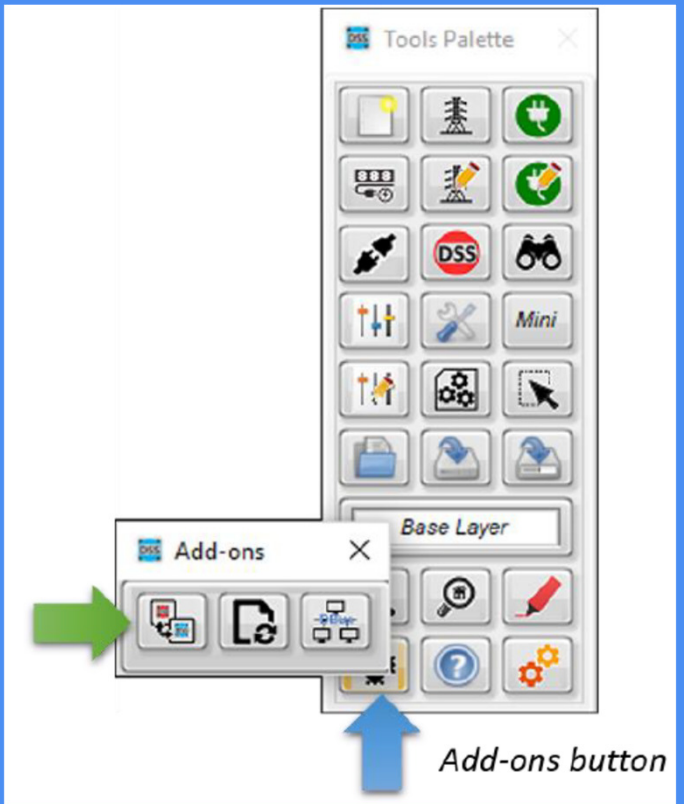


OpenDSS- Front panel

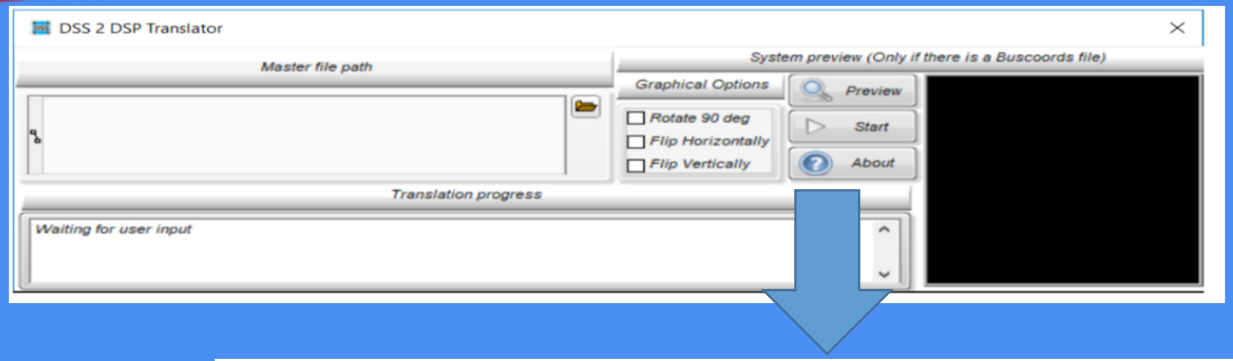


IMPORTANDO MODELO DO OPENDSS PARA O OPENDSS-G



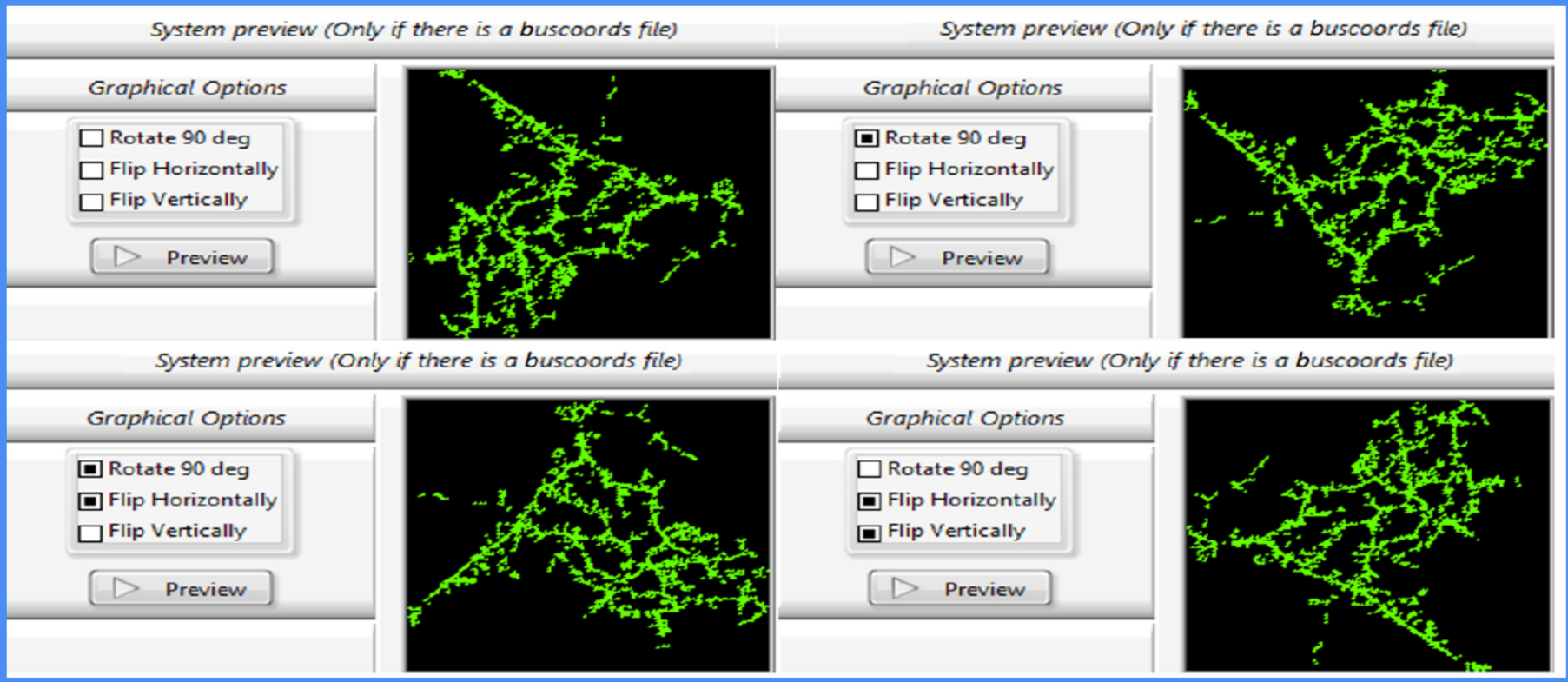


OPENDSS TO OPENDSS-G TRANSLATOR TOOL

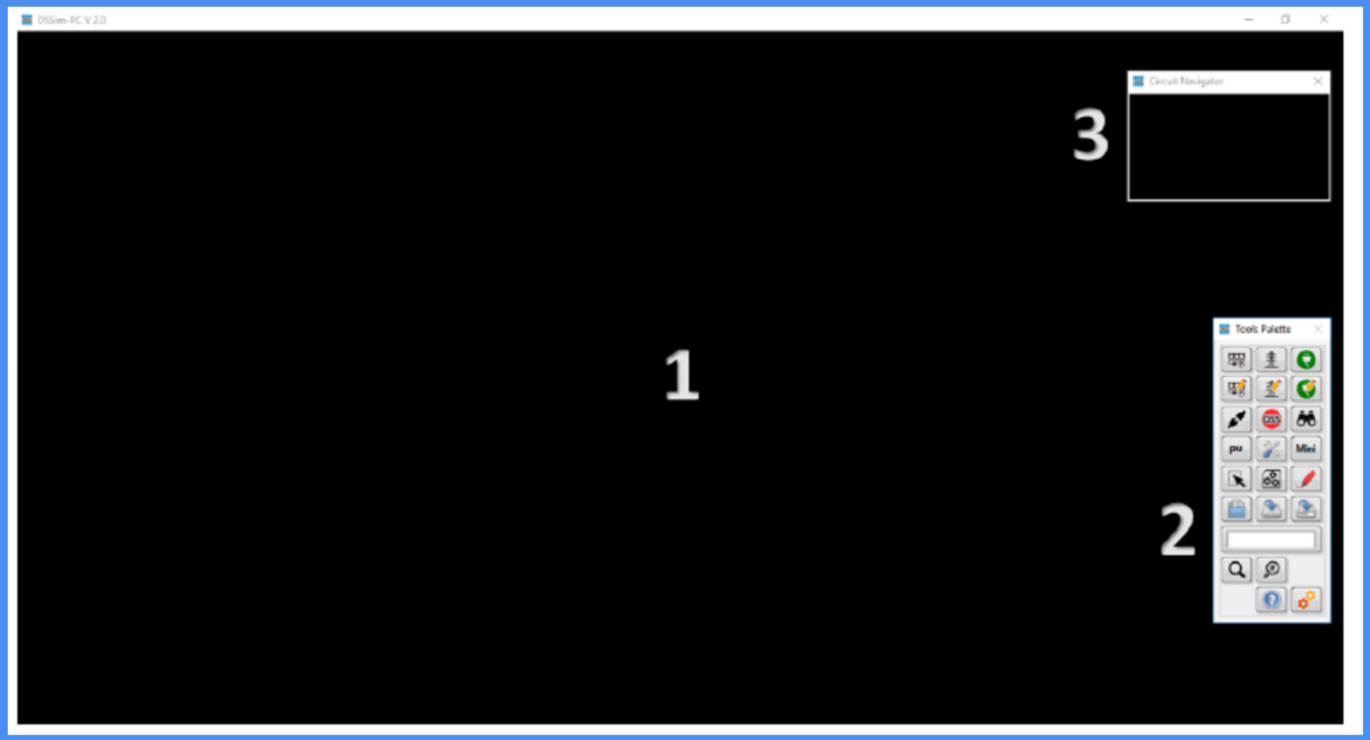


Preview	Draws a preview of the model considering the information provided by the bus coordinates (*buscoords*) file. If the circuit does not have a *buscoords* file, the *Translator* will provide a set of patterns based on the number of buses (the automated pattern option is still under development).
Start	Starts the translation once the reference files have been declared by the user
About	Shows the credits and version of the tool

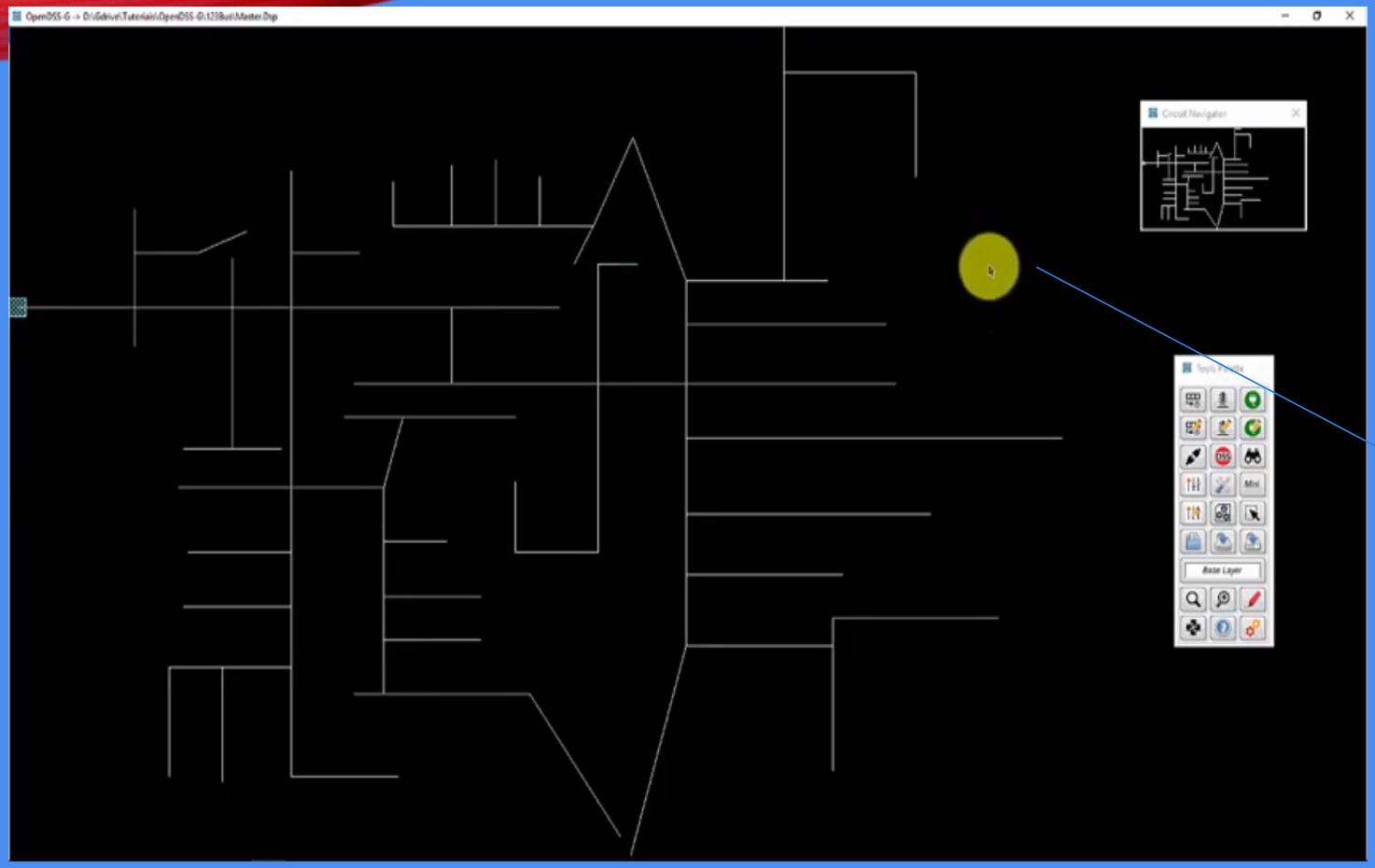
CIRCUIT PREVIEW BEFORE TRANSLATION



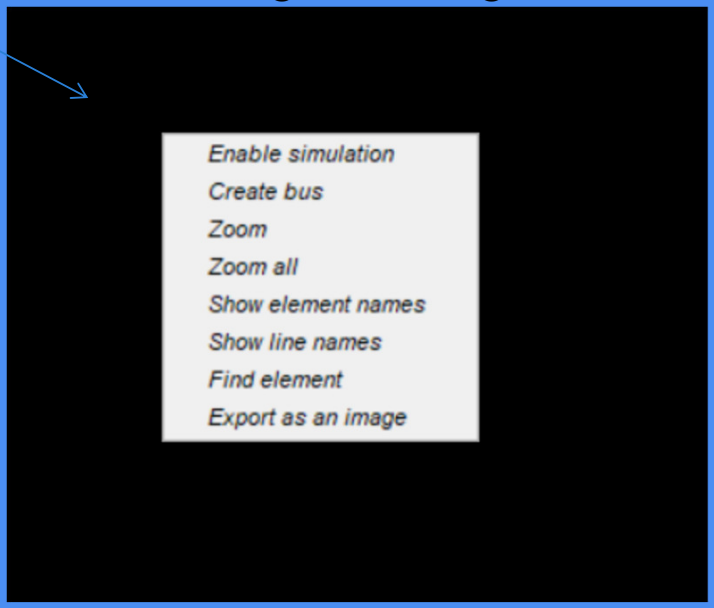
AMBIENTE GRÁFICO DO OPENDSS-G

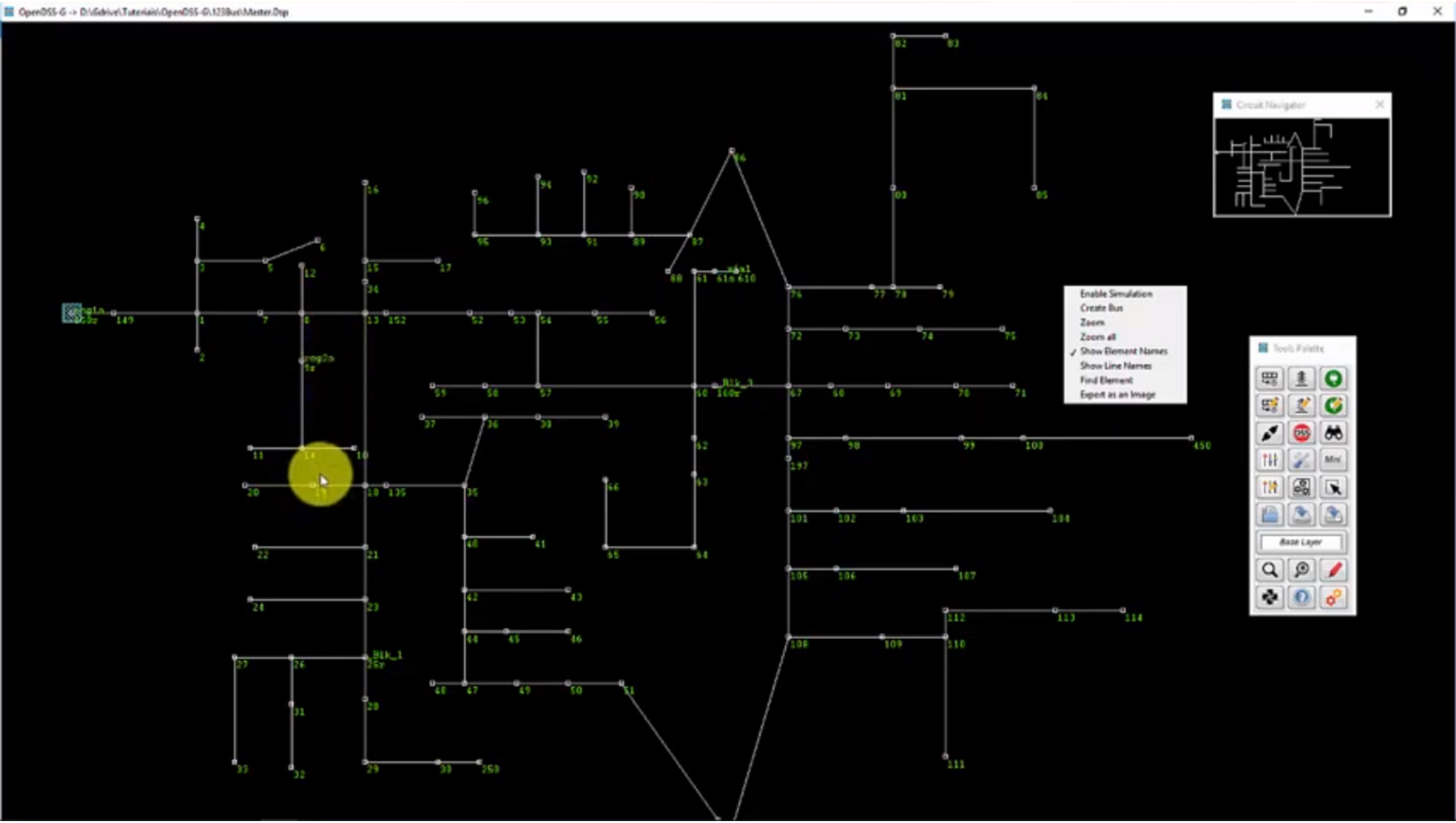


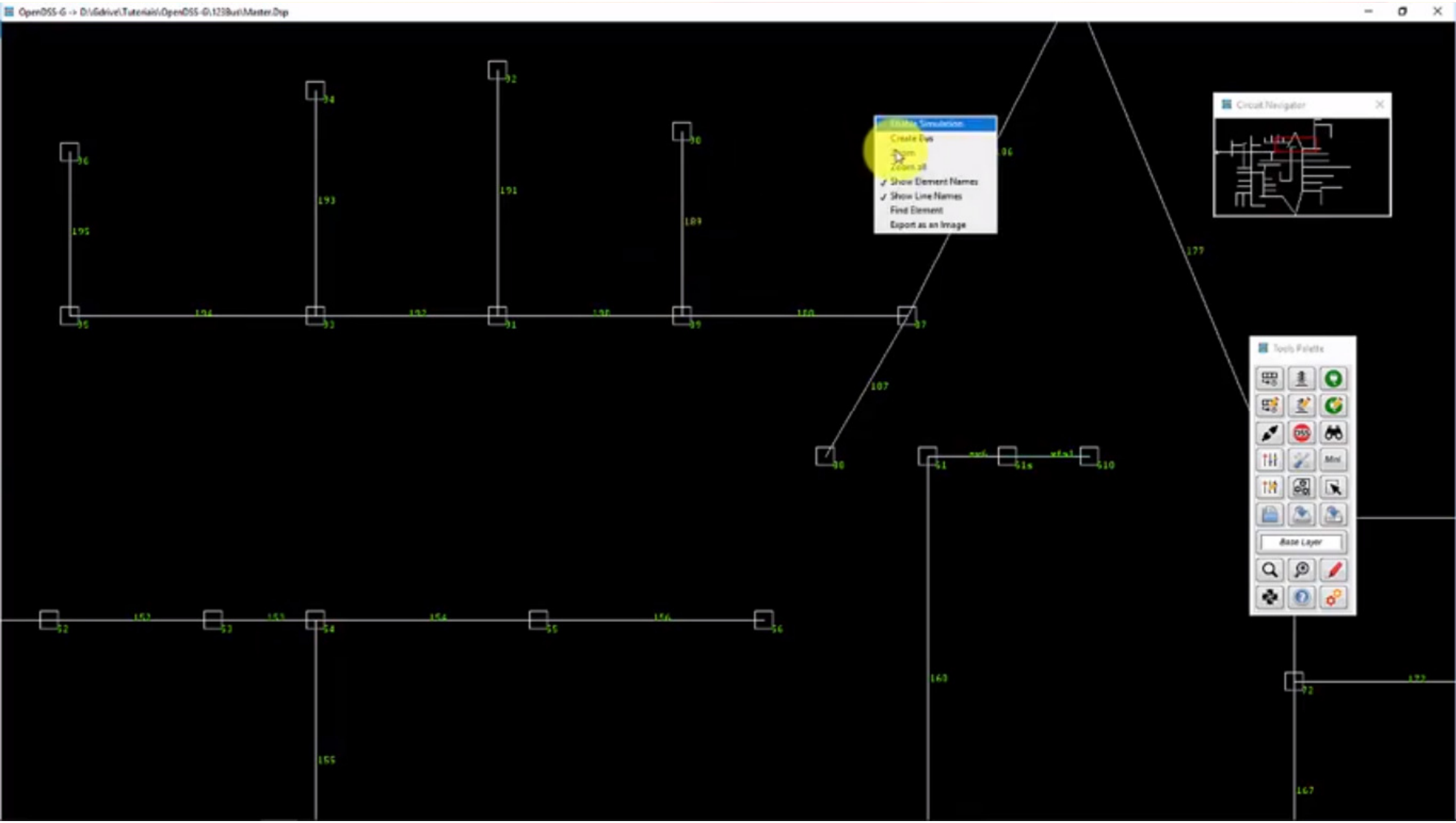
123 bus

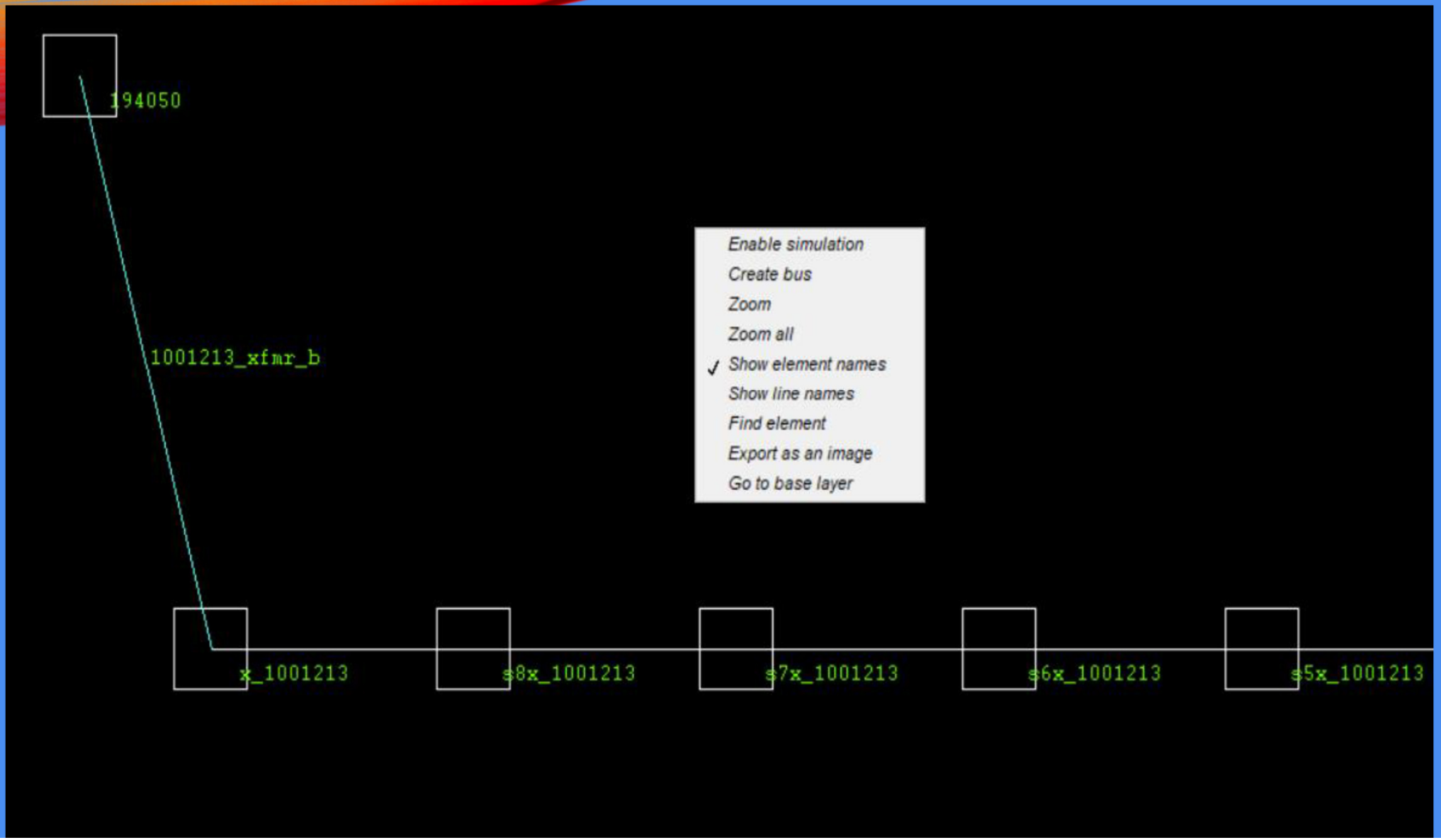


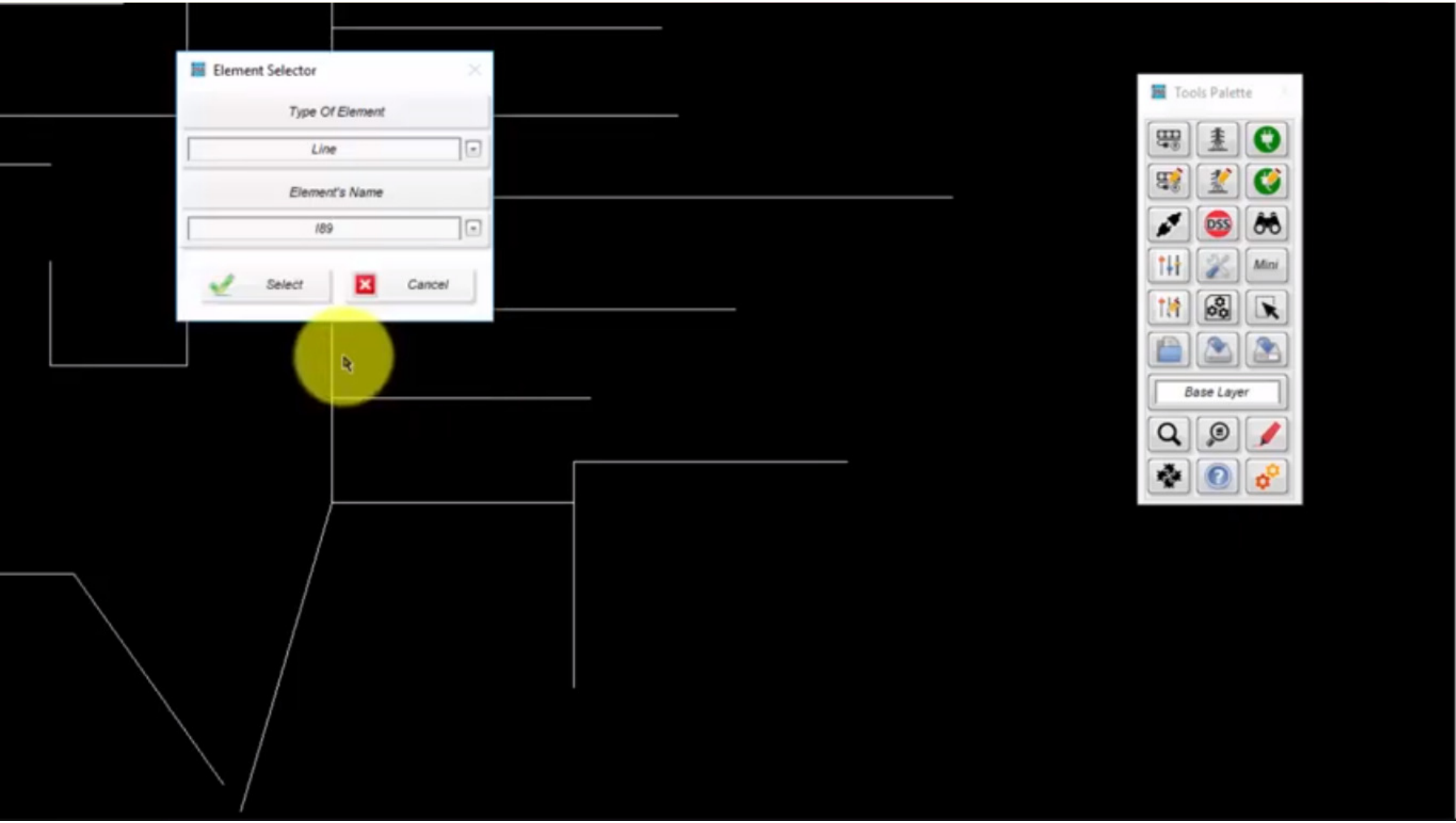
Right-clicking



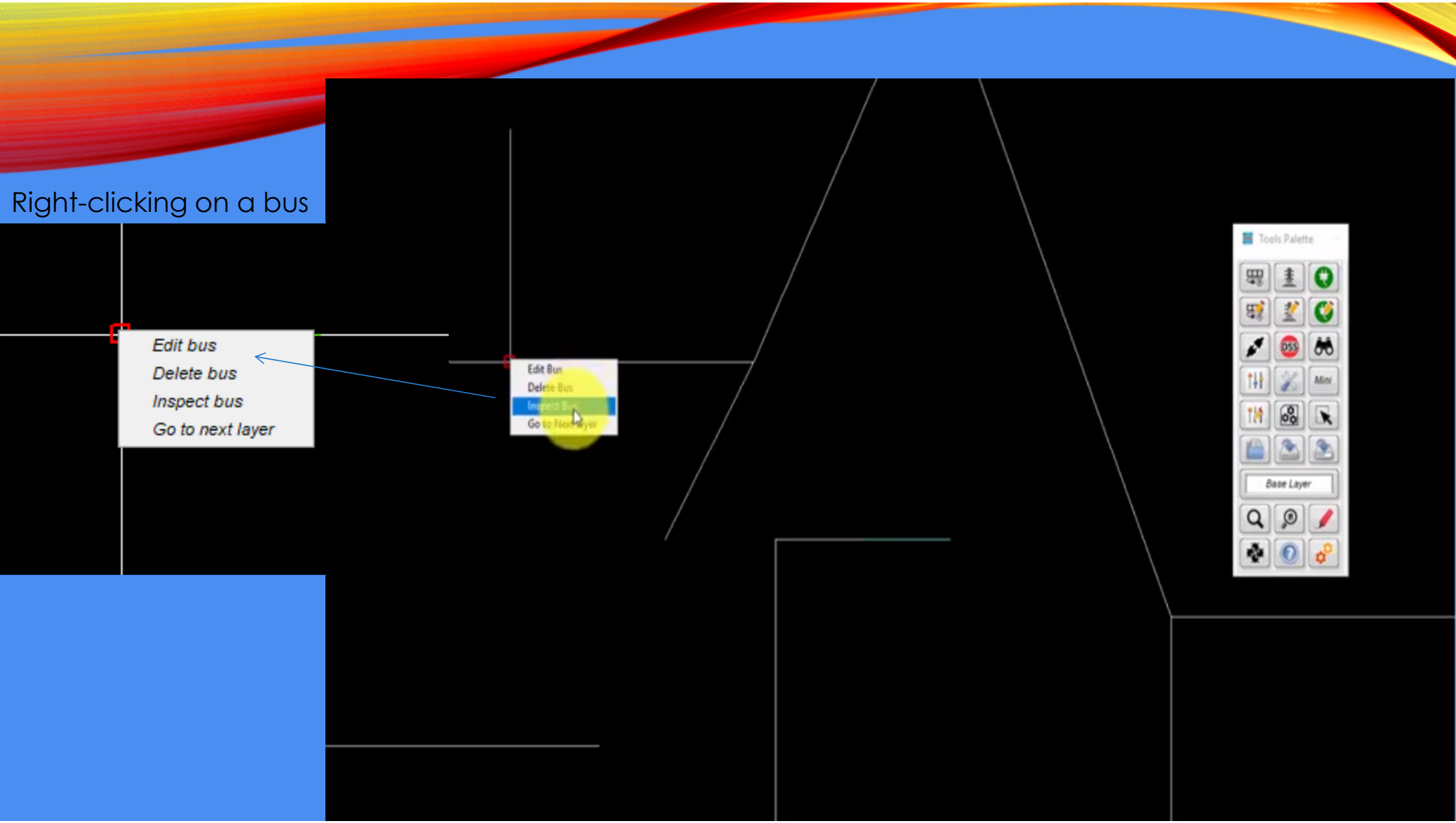

OpenDSS-G -> D:\Gdrive\Tutorials\OpenDSS-G\123Bus\Master.Dss
Circuit Navigator
Enable Simulation
Create Bus
Zoom
Zoom all
Show Element Names
Show Line Names
Find Element
Export as an Image
Tools Palette
Base Layer

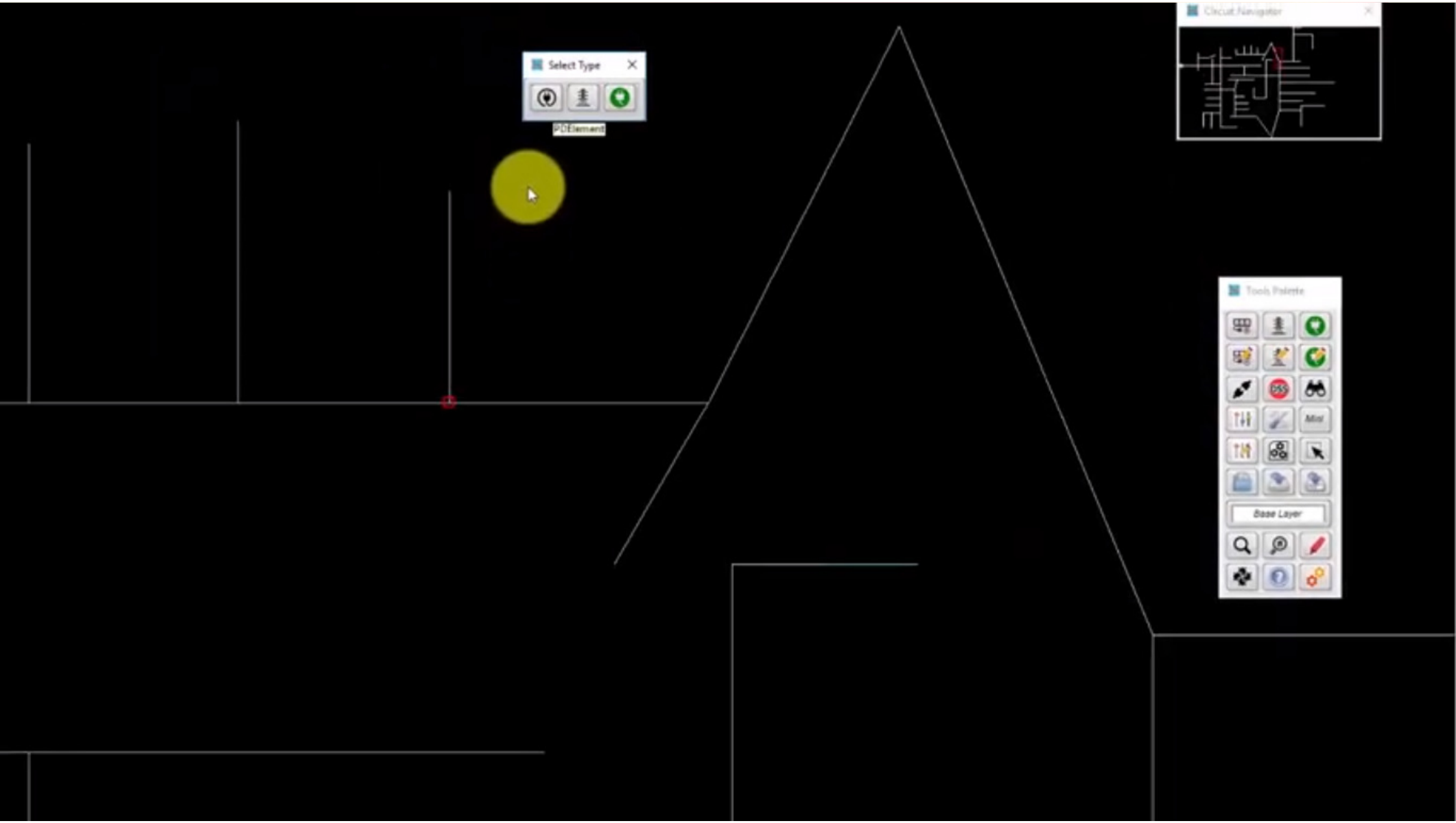

OpenDSS-G -> D:\Gdrive\Tutenlab\OpenDSS-G\123Bus\Master.Dss
Create Bus
Show Element Names
Show Line Names
Find Element
Export as an Image
Circuit Navigator
Tools Palette
Base Layer
Mini

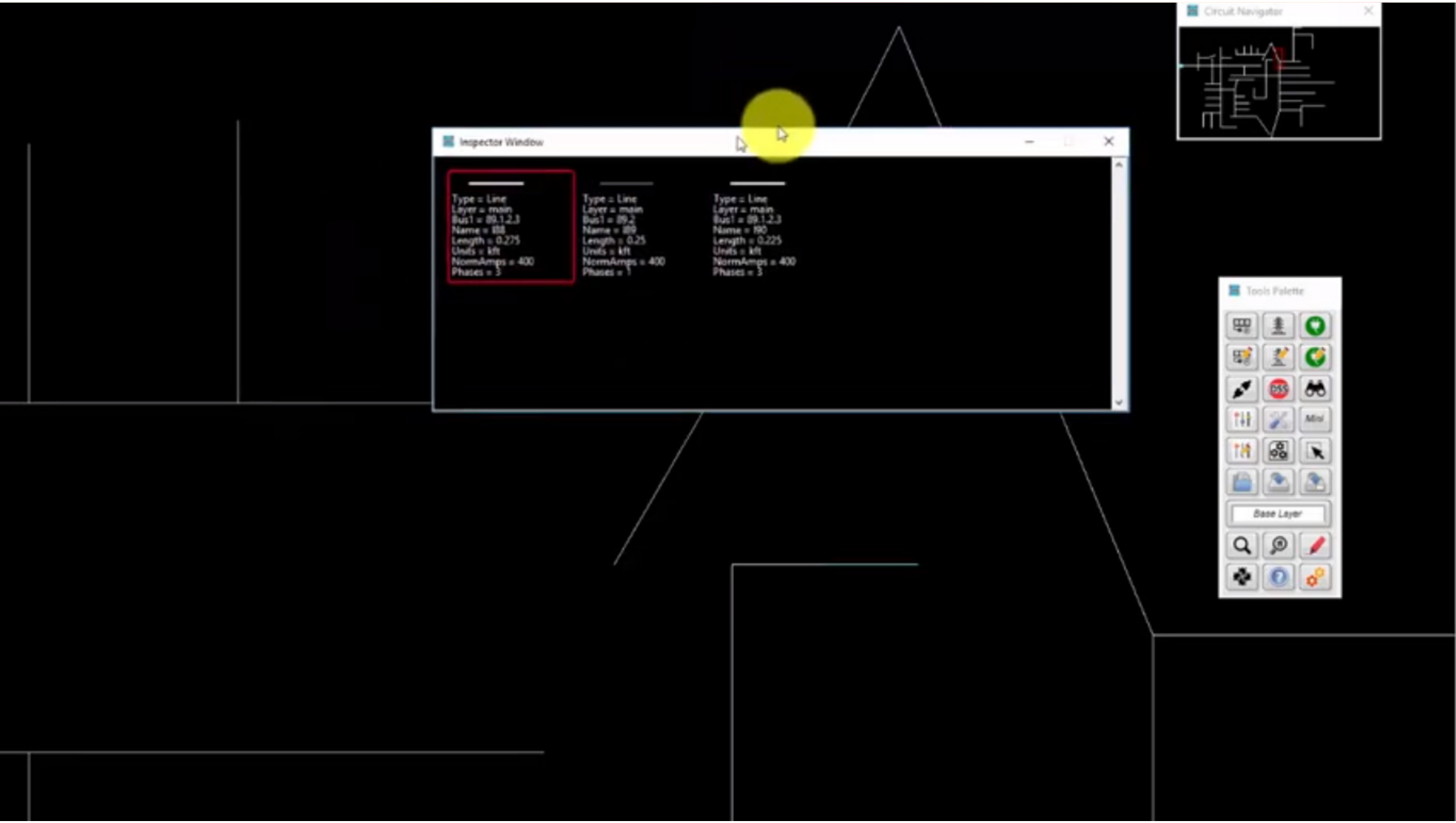

194050
1001213_xfmr_b
Enable simulation
Create bus
Zoom
Zoom all
Show element names
Show line names
Find element
Export as an image
Go to base layer
x_1001213
s8x_1001213
s7x_1001213
s6x_1001213
s5x_1001213


Element Selector
Type Of Element
Line
Element's Name
189
Select
Cancel
Tools Palette
DSS
Mini
Base Layer

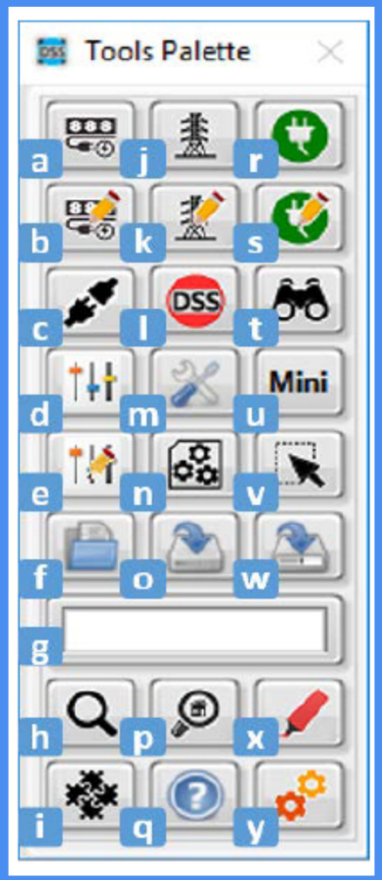
Right-clicking on a bus




Select Type
PDElement
Circuit Navigator
Tools Palette
Base Layer


Circuit Navigator
Inspector Window
Type = Line
Layer = main
Bus1 = 89.1.2.3
Name = 888
Length = 0.275
Units = kft
NormAmps = 400
Phases = 3
Type = Line
Layer = main
Bus1 = 89.2
Name = 889
Length = 0.25
Units = kft
NormAmps = 400
Phases = 1
Type = Line
Layer = main
Bus1 = 89.1.2.3
Name = 890
Length = 0.225
Units = kft
NormAmps = 400
Phases = 3
Tools Palette
Mini
Base Layer

PAINEL DE CONTROLE NO MODO DE CONSTRUÇÃO



- **a.** New Bus: This menu allows users to create a new bus to be placed in the Graphical panel.

- **b.** Edit Bus: With this menu it is possible to edit the name of a bus. This command was inherited from DSSim-PC, and its functionality in the OpenDSS-G architecture is still under development.

- **c.** Move PDE: Using this command, the user can click on a PDE terminal to disconnect it from the current bus and connect it again on a different bus.

- **d.** Controls: This menu includes all of the options for creating a new controller.

- **e.** Edit Controls: This menu includes all of the options for editing existing controllers in the model.

- **f.** Open Project: This command is used to open an existing OpenDSS-G project.

- **g.** Active Layer: This indicator displays the name of the current layer.

- **j.** Create PDE: This menu provides access to the tools needed for graphically creating PDEs in the model such as lines and transformers.

- **k.** Edit PDE: This menu provides access to the tools needed for graphically editing an existing PDE in the model.

- **l.** OpenDSS Command: This command will open the OpenDSS console used to send OpenDSS commands directly to the model (see Section 4 –OpenDSS Console).

- **m.** Configuration: This command will open the Configuration window, where the user can change the simulation features, hardware configuration, and graphical features (see Section 4 – Configuring the Simulation).

- **n.** General OpenDSS Definitions: This menu includes all of the tools needed for creating/editing general OpenDSS definitions such as spectrum, load shape, wire data, and line codes.

- **o.** Save: The user can save the project changes into an OpenDSS project. If the project is a new one, OpenDSS-G will ask the user for the project destination folder; otherwise, OpenDSS-G will save the project changes in the active model's folder.

- **r.** New PCE: This menu provides access to the tools needed for graphically creating a new power conversion element (PCE) such as loads, photovoltaic systems, storage devices, and generators.

- **s.** Edit PCE: This menu provides access to the tools needed for graphically editing an existing PCE in the model.

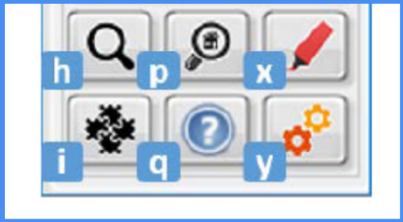
- **t.** Find Element: This tool can be used to localize an existing element in the model (see Section 4 – Finding Elements).

- **u.** Mini Visualizer: This command will bring back the Mini Visualizer panel in case the user previously closed it (see Graphical Environment in OpenDSS-G in this section).

- **v.** Select Options: This menu provides the tools for selecting one or several elements simultaneously when editing the circuit topology (see Navigating in OpenDSS-G in this section).

- **w.** Save as: With this command, the user will be prompted for a new destination folder to save the active model.

- **Exemplo para a aula**



JANELA DE INSPEÇÃO

- **h.** Zoom: This menu contains all of the options for zooming in/out and for zooming an area of the model.

- **i.** Extras: This menu contains all of the options for importing models from OpenDSS, updating models built using DSSim-PC and using the DBus client. (DBus is a co-simulation interface built by EPRI.)

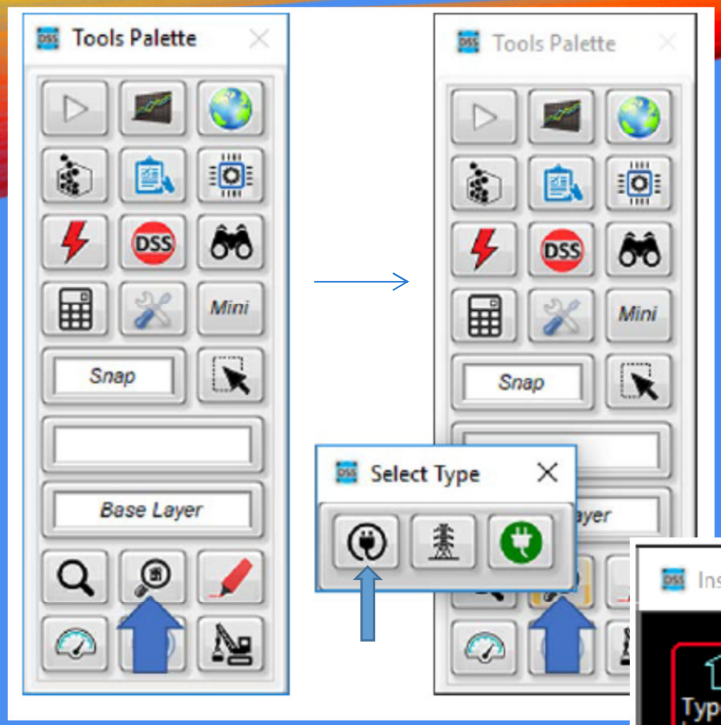
- **p.** Inspector: This command enables use of a new Inspector Window (see Section 3 – Using the Inspector Window).

- **q.** Help: This menu includes the commands for showing the OpenDSS Help window, OpenDSS-G About window, and error report tool.

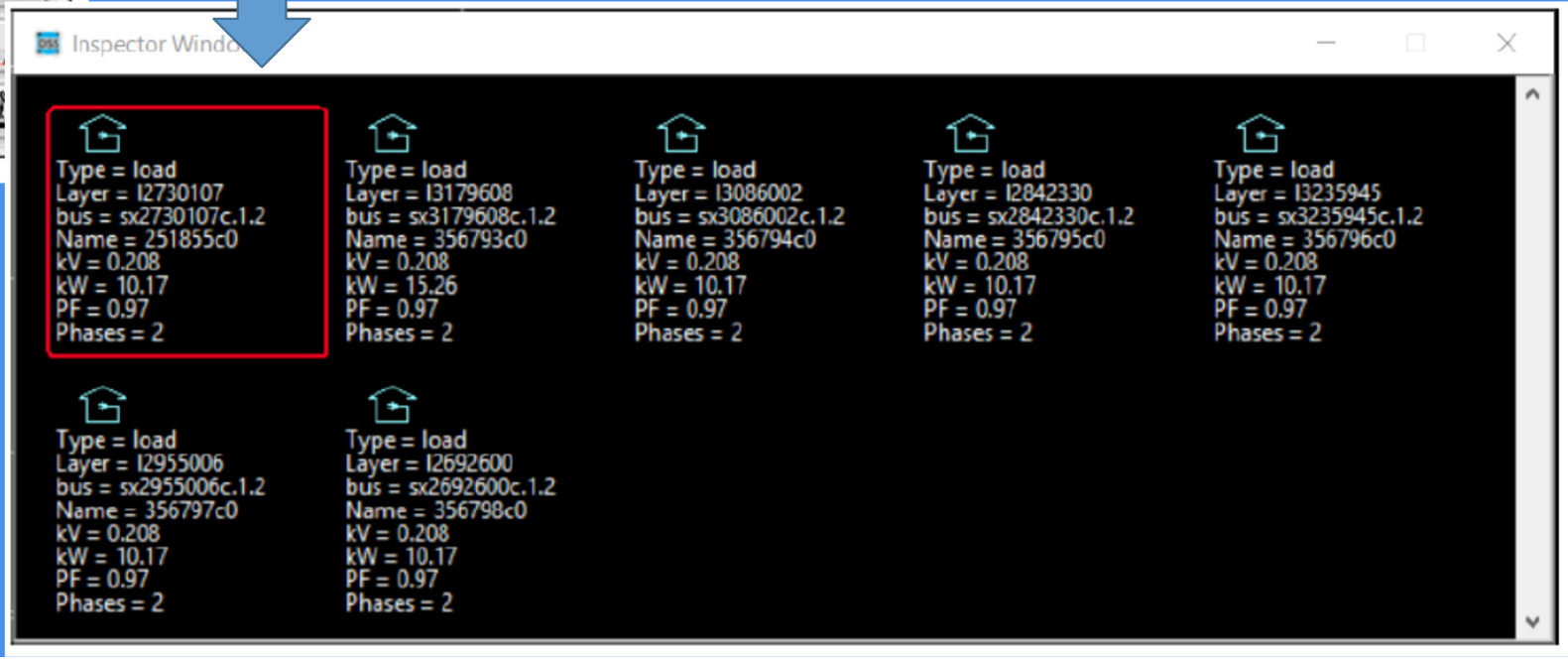
- **x.** Highlight: This menu provides the tools for visualizing PCEs and PDEs in the active model as well as electrical features of the system using a color palette (see Section 3 – ShowingPCE and PDE on the Feeder and Section 5 – Heat Maps).

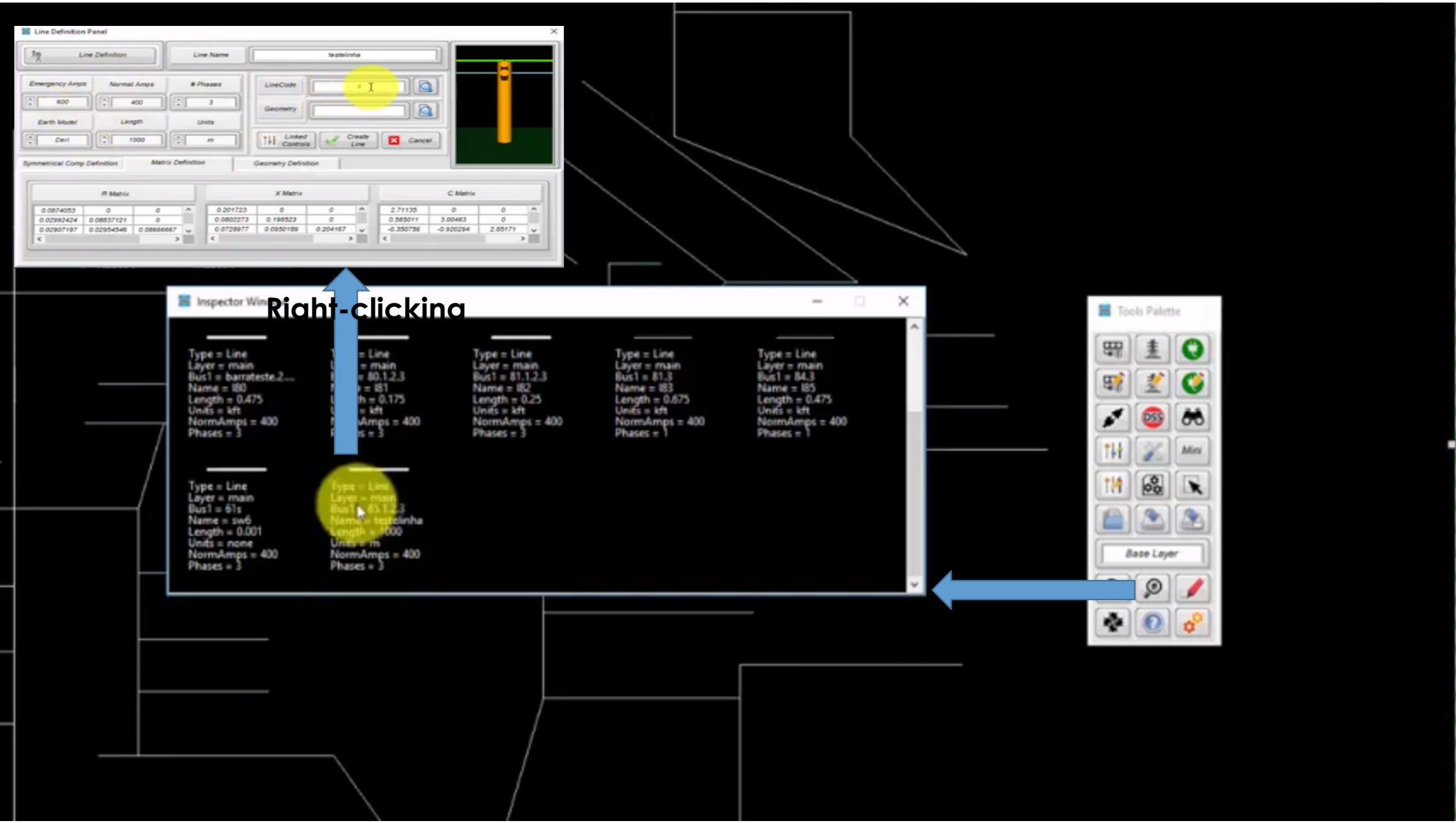
- **y.** Enable Simulator Mode: This command enables the simulator mode.

USING THE INSPECTOR WINDOW

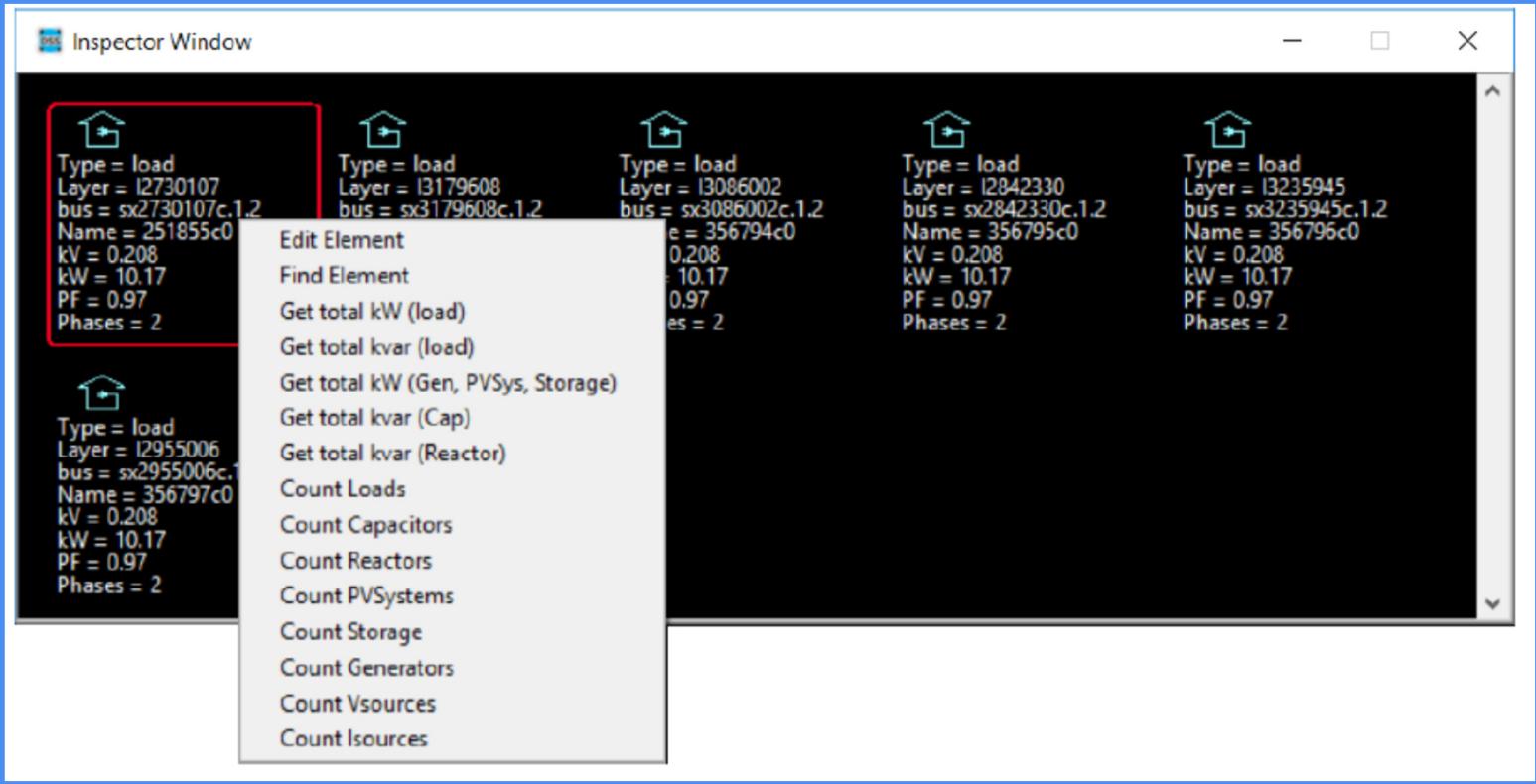


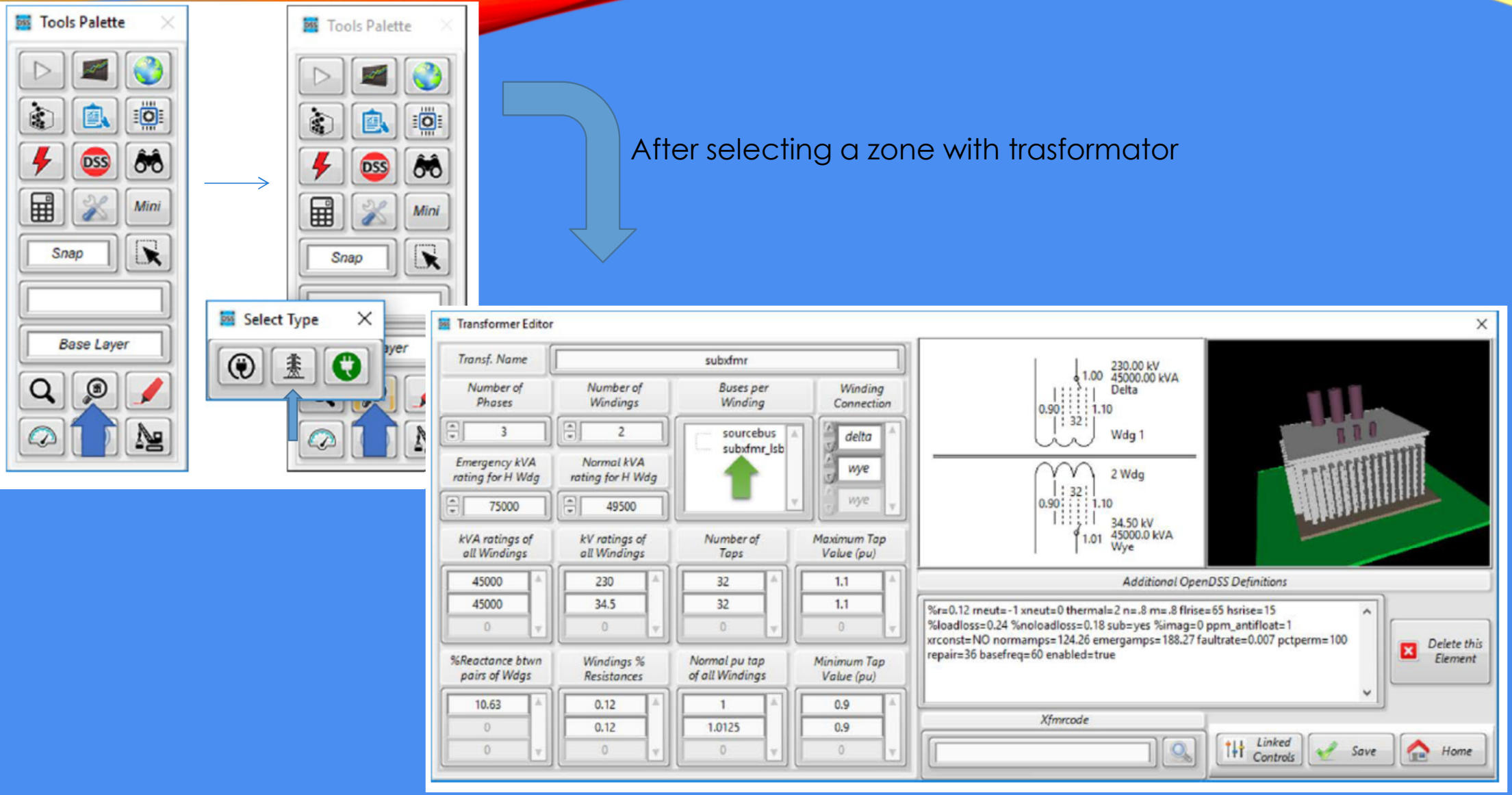
After selecting a zone



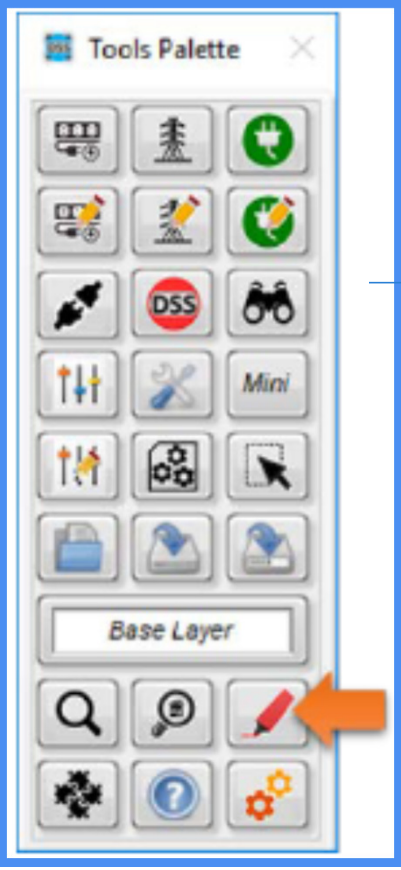

Line Definition Panel
Line Definition
Line Name
testelinha
Emergency Amps
Normal Amps
Phases
600
400
3
LineCode
Geometry
Earth Model
Length
Units
Deri
1000
m
Linked Controls
Create Line
Cancel
Symmetrical Comp Definition
Matrix Definition
Geometry Definition
R Matrix
X Matrix
C Matrix
Right-clicking
Inspector Win
Type = Line
Layer = main
Bus1 = barrateste.2...
Name = l80
Length = 0.475
Units = kft
NormAmps = 400
Phases = 3
Type = Line
Layer = main
Bus1 = 81.1.2.3
Name = l82
Length = 0.25
Units = kft
NormAmps = 400
Phases = 3
Type = Line
Layer = main
Bus1 = 81.3
Name = l83
Length = 0.675
Units = kft
NormAmps = 400
Phases = 1
Type = Line
Layer = main
Bus1 = 84.3
Name = l85
Length = 0.475
Units = kft
NormAmps = 400
Phases = 1
Type = Line
Layer = main
Bus1 = 61s
Name = sw6
Length = 0.001
Units = none
NormAmps = 400
Phases = 3
Type = Line
Layer = main
NormAmps = 400
Phases = 3
Tools Palette
Base Layer

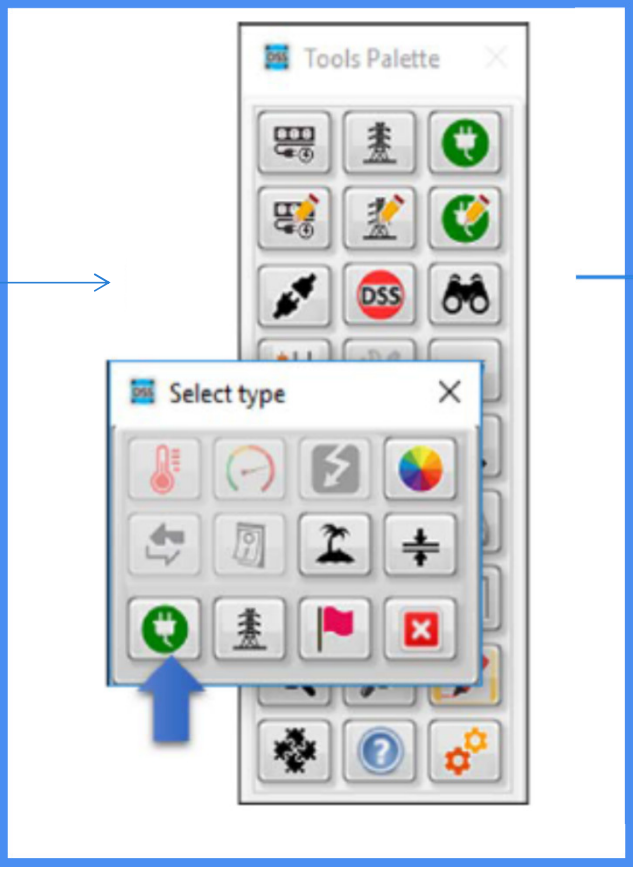
- **Right-clicking**

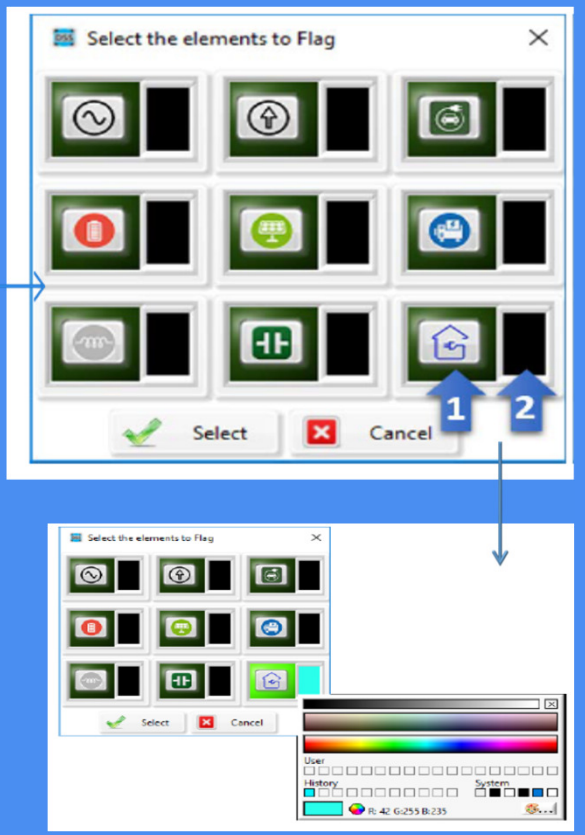


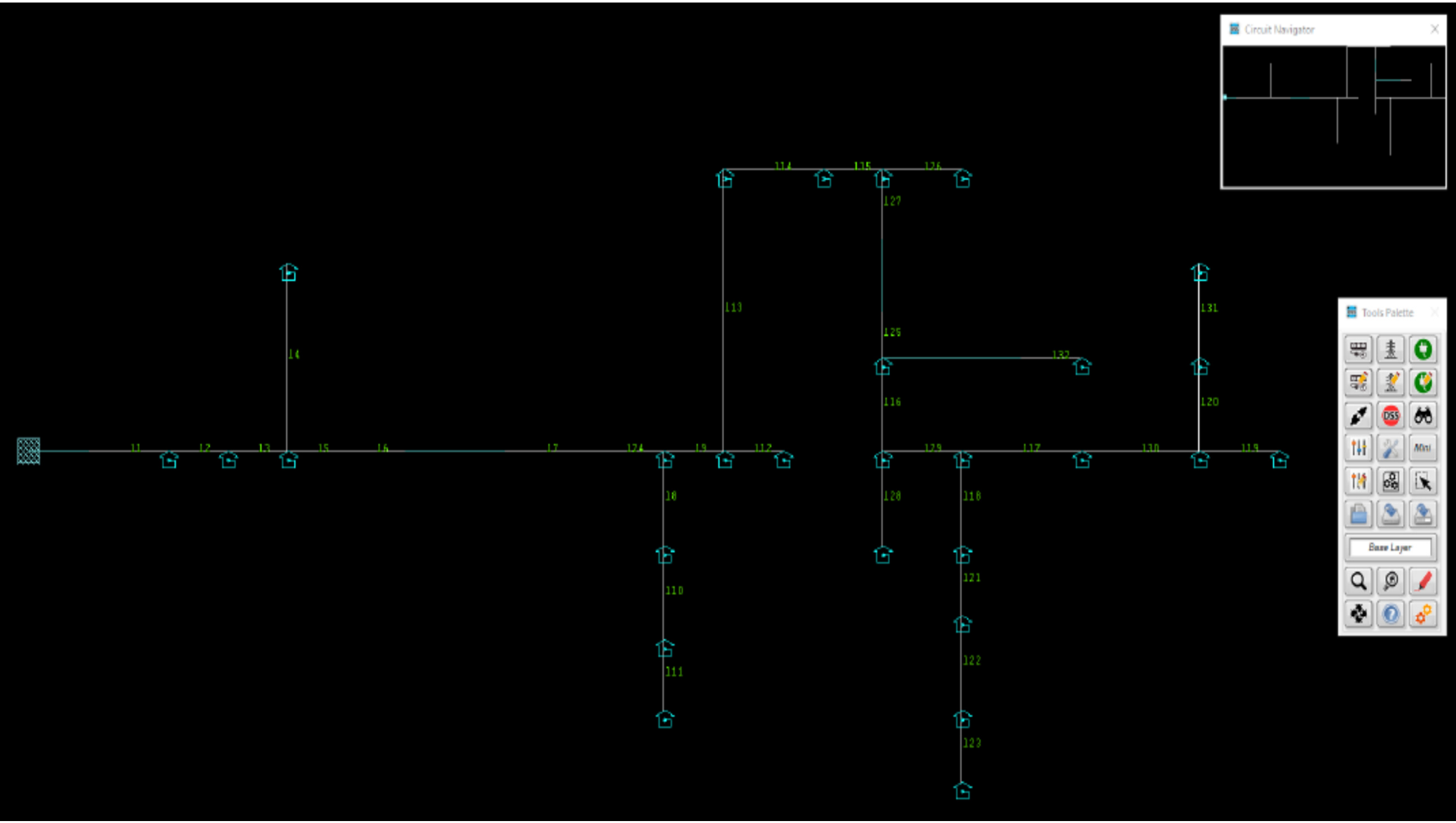

Tools Palette
DSS
Mini
Snap
Base Layer
Tools Palette
DSS
Mini
Snap
Select Type
After selecting a zone with trasformator
Transformer Editor
Transf. Name
subxfmr
Number of Phases
3
Number of Windings
2
Buses per Winding
sourcebus
subxfmr_lsb
Winding Connection
delta
wye
wye
Emergency kVA rating for H Wdg
75000
Normal kVA rating for H Wdg
49500
kVA ratings of all Windings
45000
45000
0
kV ratings of all Windings
230
34.5
0
Number of Taps
32
32
0
Maximum Tap Value (pu)
1.1
1.1
0
%Reactance btwn pairs of Wdgs
10.63
0
0
Windings % Resistances
0.12
0.12
0
Normal pu tap of all Windings
1
1.0125
0
Minimum Tap Value (pu)
0.9
0.9
0
1.00
230.00 kV
45000.00 kVA
Delta
0.90
32
1.10
Wdg 1
2 Wdg
0.90
32
1.10
1.01
34.50 kV
45000.0 kVA
Wye
Additional OpenDSS Definitions
%r=0.12 rneut=-1 xneut=0 thermal=2 n=.8 m=.8 flrise=65 hsrise=15
%loadloss=0.24 %noloadloss=0.18 sub=yes %imag=0 ppm_antifloat=1
xrconst=NO normamps=124.26 emergamps=188.27 faultrate=0.007 pctperm=100
repair=36 basefreq=60 enabled=true
Delete this Element
Xfmrcode
Linked Controls
Save
Home

OPÇÕES DE VISUALIZAÇÃO DE ELEMENTOS

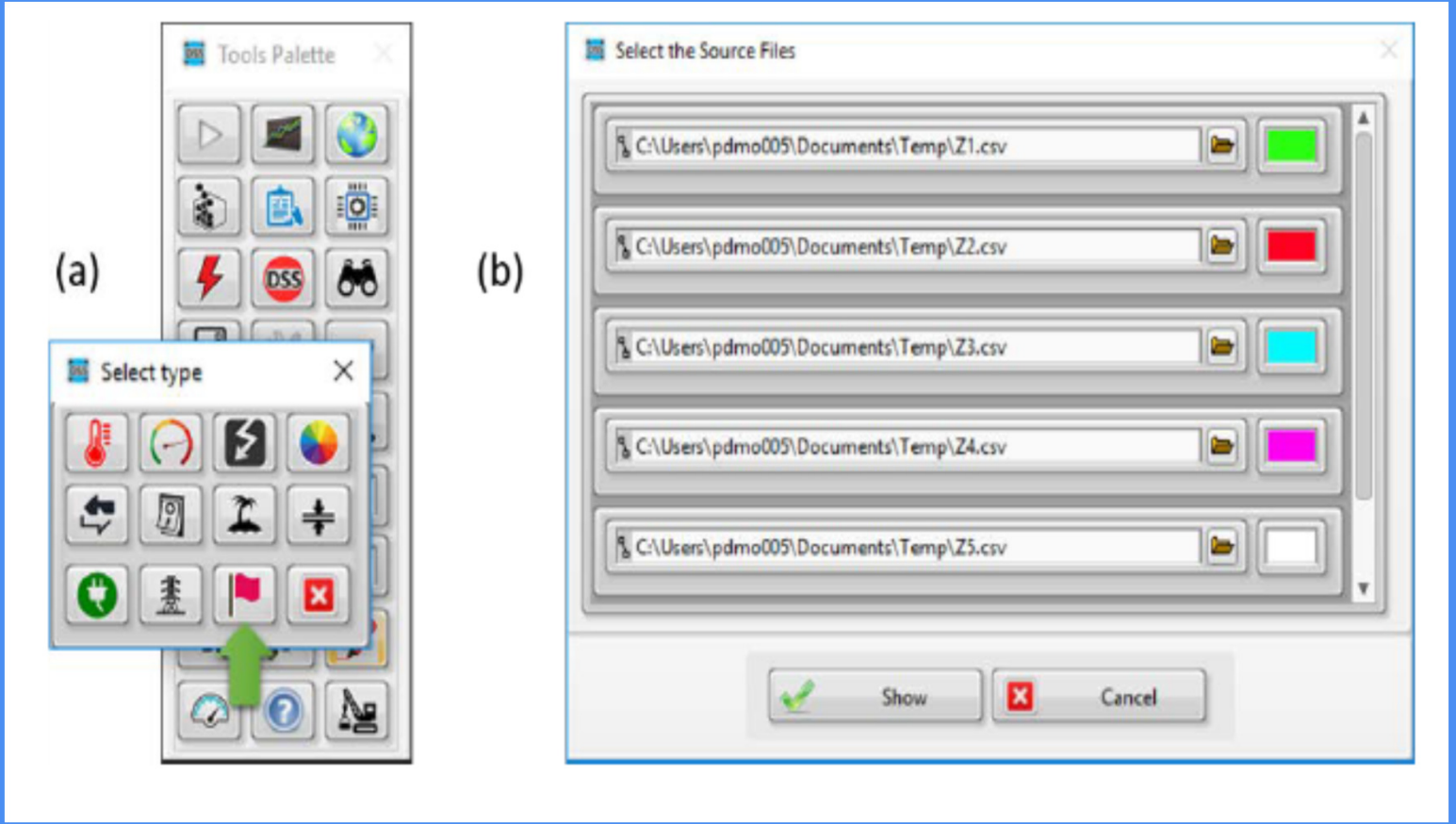




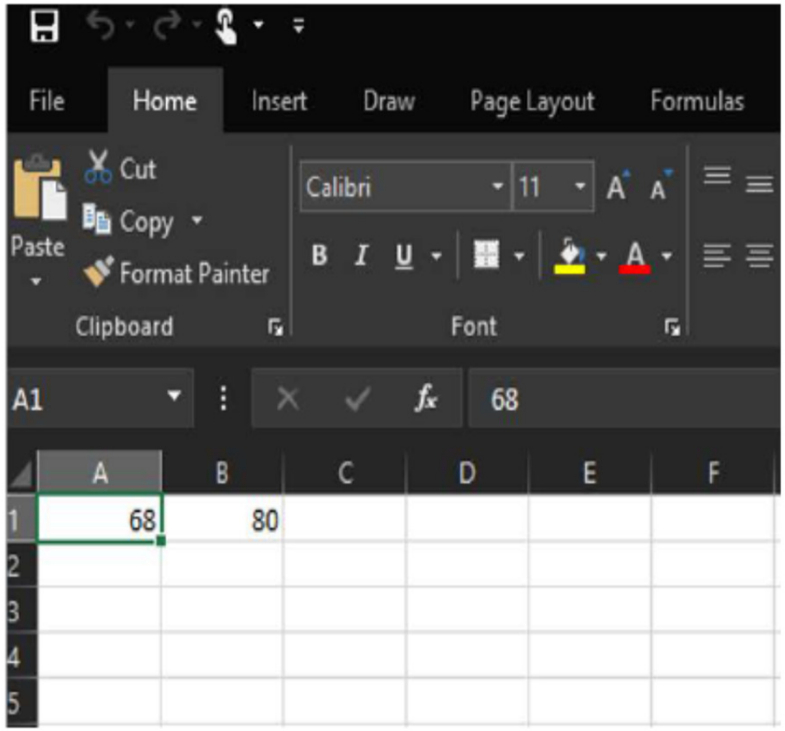



Circuit Navigator
Tools Palette
Base Layer
Mini
DSS
l1
l2
l3
l4
l5
l6
l7
l24
l9
l12
l13
l14
l15
l26
l27
l25
l32
l16
l29
l17
l30
l31
l20
l19
l28
l18
l10
l21
l22
l23
l11

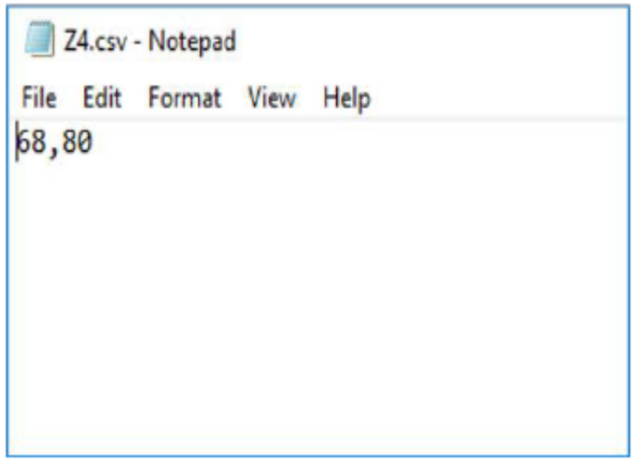
VISUALIZAR BARRAS DESEJADAS

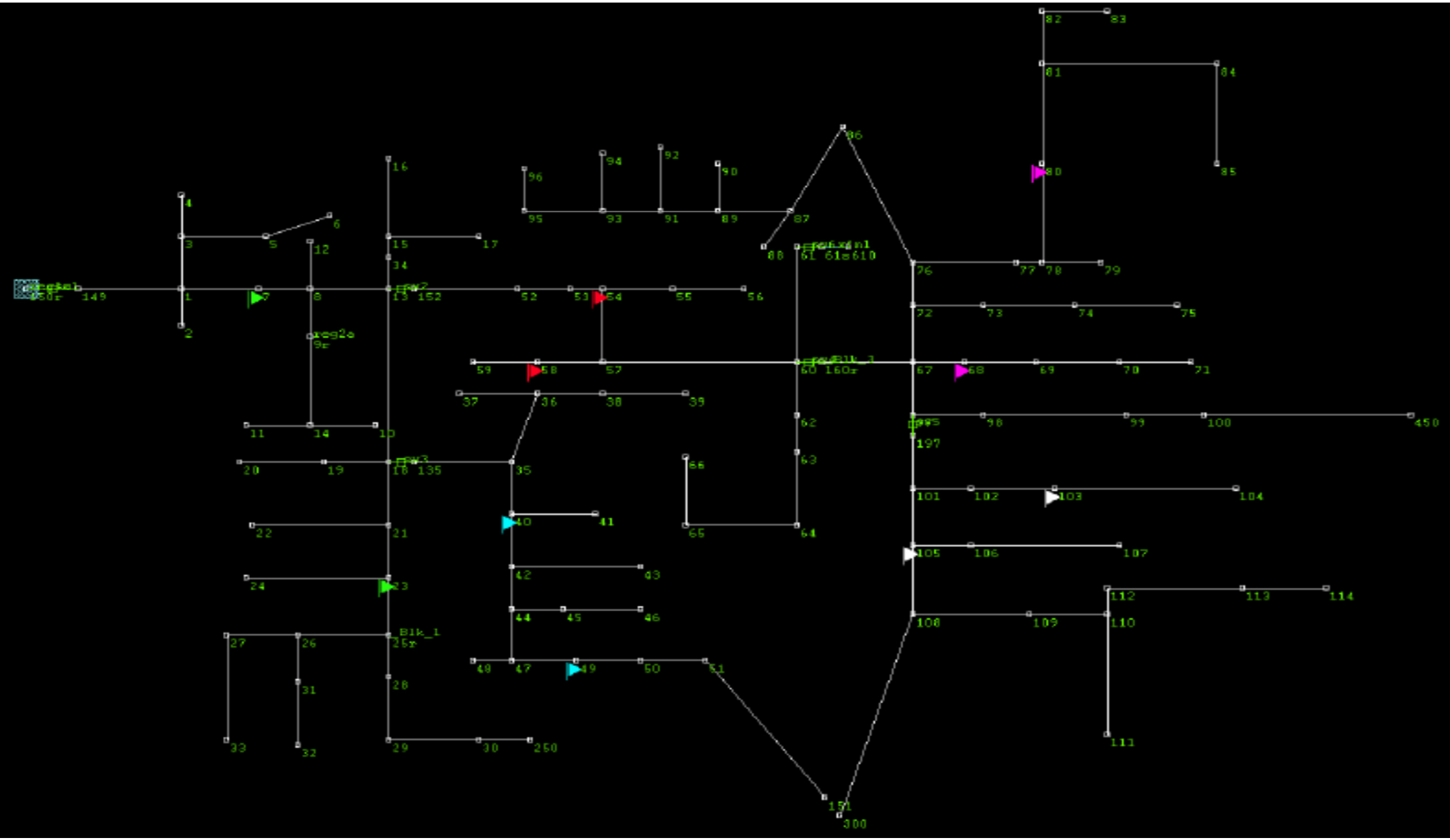


(a)

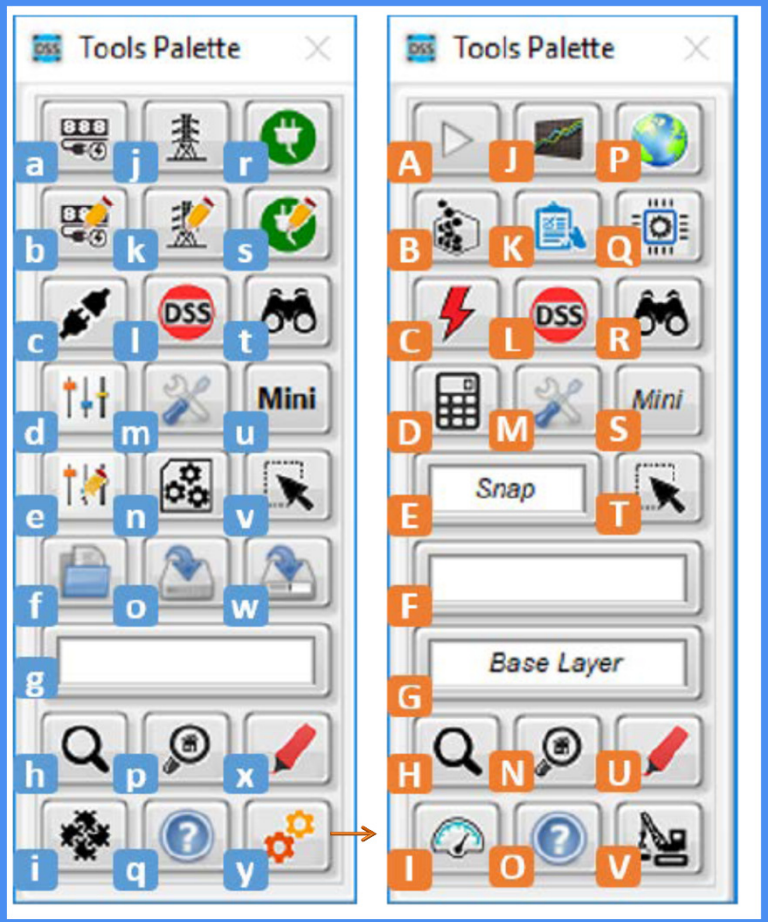

File
Home
Insert
Draw
Page Layout
Formulas
Cut
Copy
Format Painter
Paste
Clipboard
Calibri
11
Font
A1
68
A
B
C
D
E
F
1
2
3
4
5
68
80

(b)


Z4.csv - Notepad
File
Edit
Format
View
Help
68,80


82
83
81
84
85
80
96
94
92
90
95
93
91
89
87
86
88
61
76
77
78
79
72
73
74
75
16
4
6
3
5
12
15
17
34
1
7
8
13
152
52
53
54
55
56
2
reg2a
9r
59
58
57
60
160r
67
68
69
70
71
37
36
38
39
62
11
14
10
98
99
100
450
197
20
19
18
135
35
63
66
101
102
103
104
40
41
22
21
65
64
105
106
107
42
43
24
23
112
113
114
44
45
46
108
109
110
Blk_1
25r
27
26
48
47
49
50
51
31
28
111
33
32
29
30
250
151
300

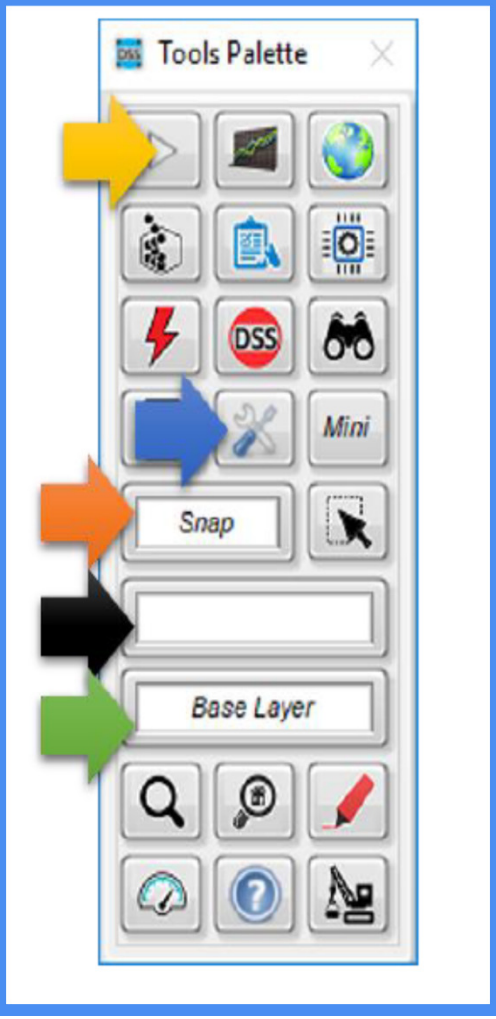
OPÇÕES DE SIMULAÇÃO

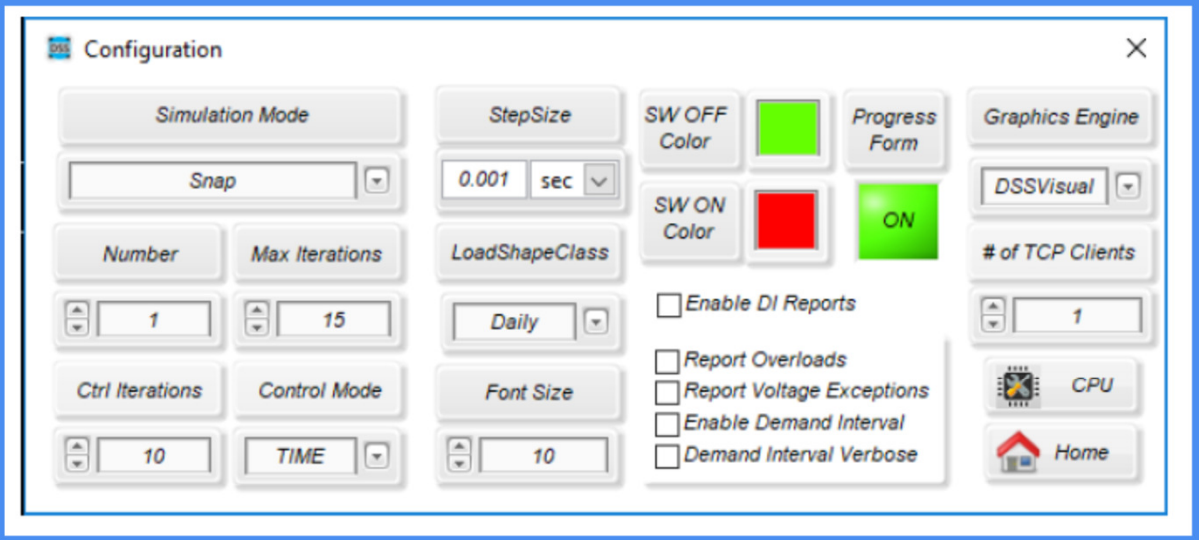


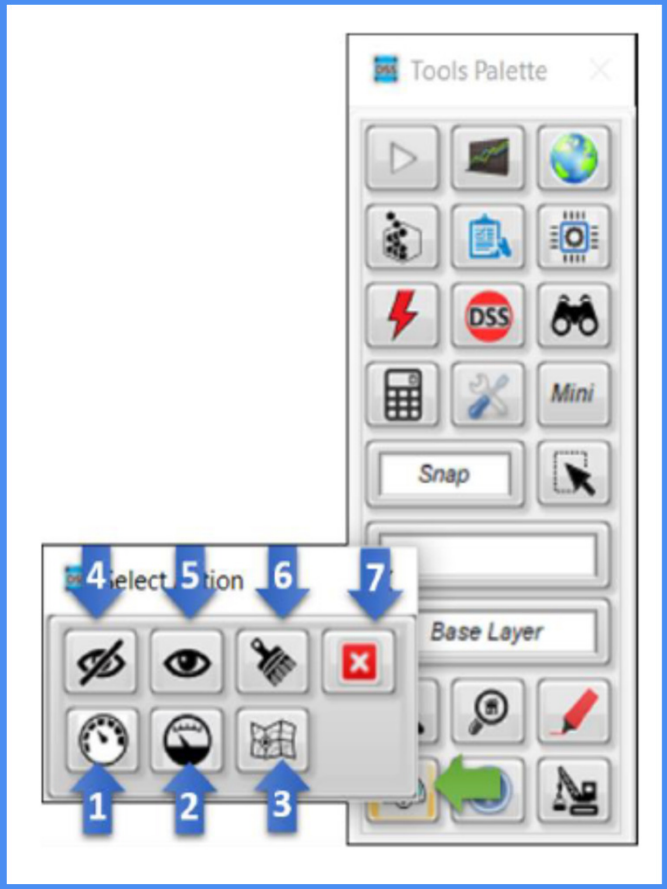
- **A.** Run Simulation: This command will start a simulation considering the features specified in the Configuration window (see Section 4 – Configuring the Simulation).
- **B.** Program Control: This menu provides access to the tools for recompiling the model and setting the simulation time (see Section 4 – Setting Simulation Time and Starting Over).
- **C.** Generate Fault: This menu provides access to the tools needed for graphically generating a fault in the model (see Section 4 – Adding Faults).
- **D.** Extras: This menu provides access to a set of analysis tools provided with OpenDSS-G (see Section 5 – The Simulation Explorer and Section 4 –Test Cases Provided).
- **E.** Simulation Mode: This indicator displays the current simulation mode in OpenDSS-G.
- **F.** Status: This indicator displays the status of the latest simulation performed: Simulating, Solved or Not Solved.
- **G.** Active Layer: This indicator displays the name of the current layer.

- **H**. Zoom: This menu contains all the options for zooming in/out and for zooming an area of the model.
- **I**. Meter: This menu provides access to the tools needed to graphically create, show, hide, and localize monitors and energy meters.
- **J.** Graphics: This menu provides access to the different graphics that can be generated using OpenDSS-G.
- **K.** Reports: This menu provides access to different reports and reporting tools that can be used in OpenDSS-G to obtain instantaneous information about the model status (see Section 5 – Quick Reports).
- **L.** OpenDSS Command: This command will open the OpenDSS console used to send OpenDSS commands directly to the model (see Section 4 –OpenDSS Console).
- **M.** Configuration: This command will open the Configuration window, where the user can change the simulation features, hardware configuration, and graphical features.
- **N.** Inspector: This command enables use of a new Inspector Window.
- **O**. Help: This menu includes the commands for showing the OpenDSS Help window, OpenDSS-G About window, and error report tool.

- **P.** GIS Options: This menu provides access to the GIS tool, which is not provided with the standard installation of OpenDSS-G. q. Automatic Simulation: This menu provides access to the automated simulation and real-time simulation tools included in OpenDSS-G.
- **R**. Find Element: This tool can be used to localize an existing element in the model.
- **S.** Mini View: This command will bring back the Mini Visualizer panel in case the user previously closed it.
- **T.** Highlight: This menu provides the tools for visualizing PCEs and PDEs in the active model as well as electrical features of the system using a color palette.


Tools Palette
DSS
Mini
Snap
Base Layer

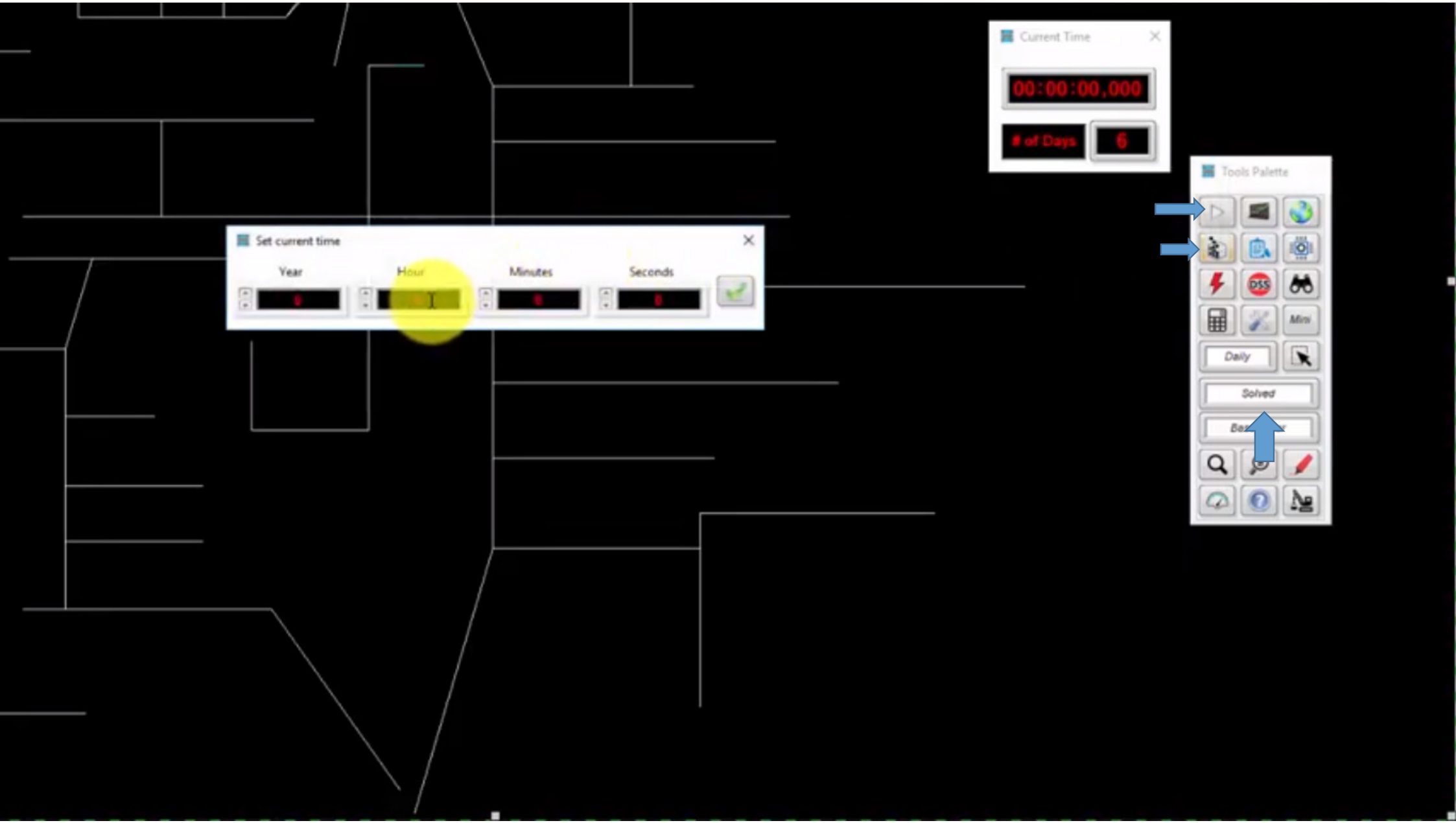

Configuration
Simulation Mode
Snap
StepSize
0.001
sec
SW OFF Color
Progress Form
Graphics Engine
DSSVisual
SW ON Color
ON
Number
1
Max Iterations
15
LoadShapeClass
Daily
# of TCP Clients
1
Enable DI Reports
Report Overloads
Report Voltage Exceptions
Enable Demand Interval
Demand Interval Verbose
Ctrl Iterations
10
Control Mode
TIME
Font Size
10
CPU
Home


Tools Palette
DSS
Mini
Snap
Base Layer
1
2
3
4
5
6
7

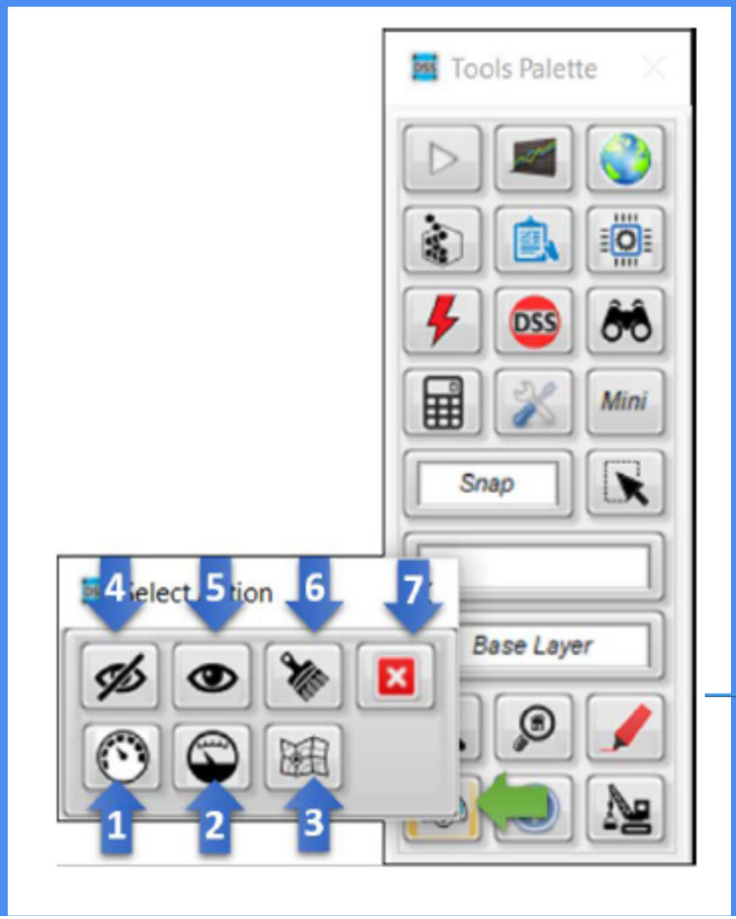
CONFIGURAÇÃO DE SIMULAÇÃO

Configuration

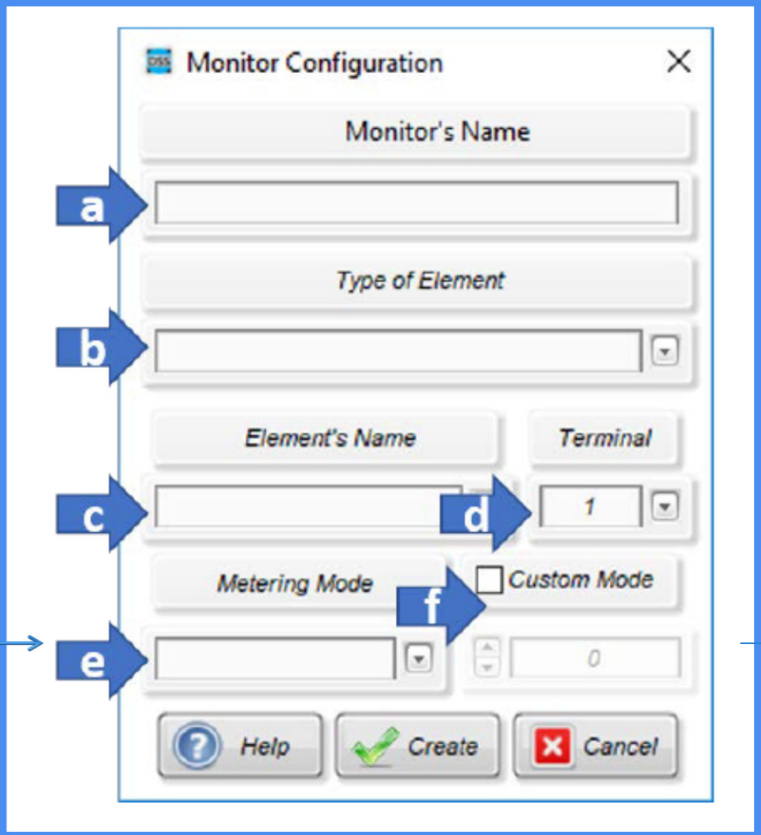
Simulation Mode
Snap
Number
1
Max Iterations
15
Ctrl Iterations
10
Control Mode
TIME
StepSize
0.001
sec
LoadShapeClass
Daily
Font Size
10
SW OFF Color
SW ON Color
Progress Form
ON
Enable DI Reports
Report Overloads
Report Voltage Exceptions
Enable Demand Interval
Demand Interval Verbose
Graphics Engine
DSSVisual
# of TCP Clients
1
CPU
Home

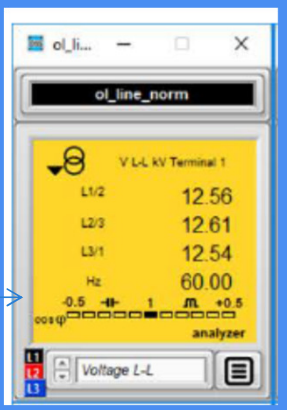

Current Time
00:00:00,000
# of Days
6
Tools Palette
Daily
Solved
Set current time
Year
Hour
Minutes
Seconds

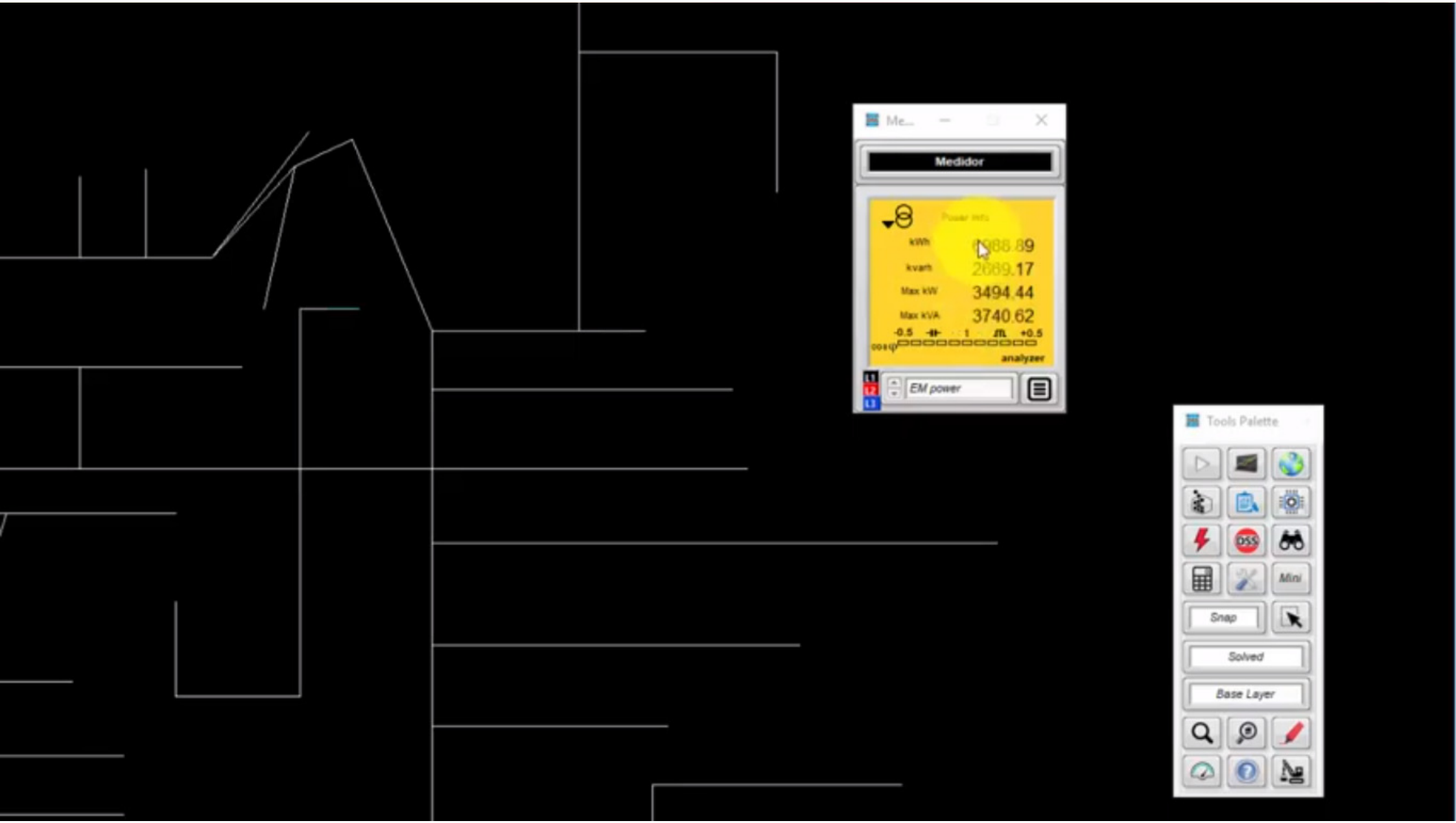
ENERGY METER

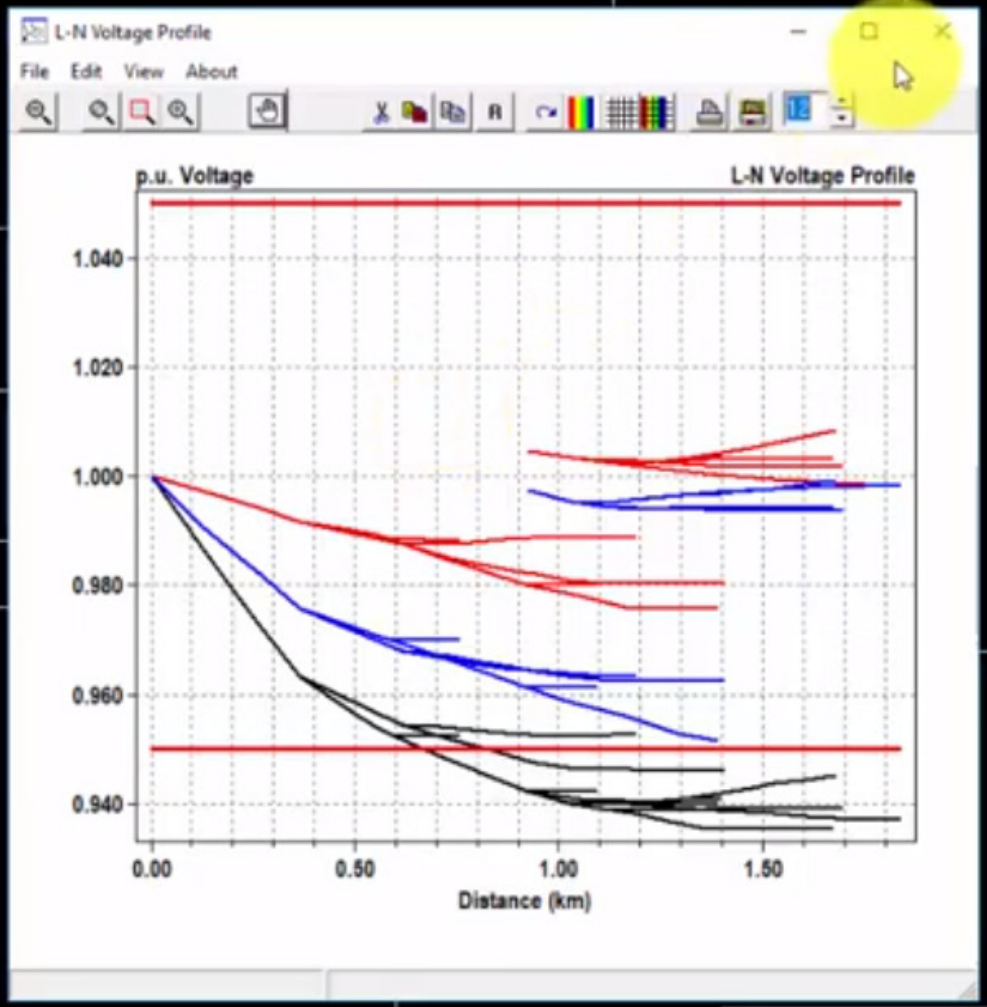


2





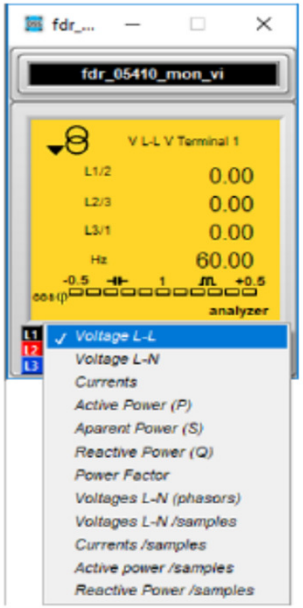

Medidor
kWh
kvarh
Max kW
Max kVA
3494.44
3740.62
analyzer
EM power
Tools Palette
Mini
Snap
Solved
Base Layer


L-N Voltage Profile
File Edit View About
p.u. Voltage
L-N Voltage Profile
1.040
1.020
1.000
0.980
0.960
0.940
0.00
0.50
1.00
1.50
Distance (km)

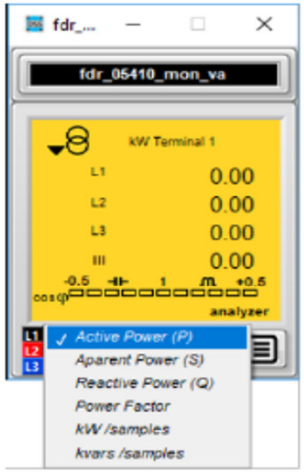

Tools Palette
Snap
Solved
Base Layer

MONITOR

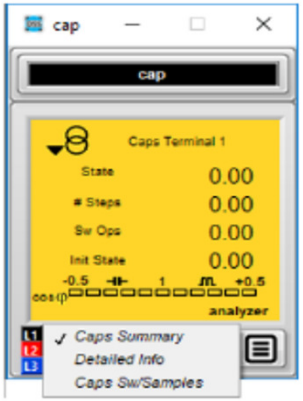
(a)



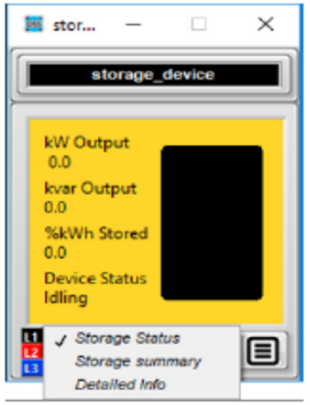
(b)



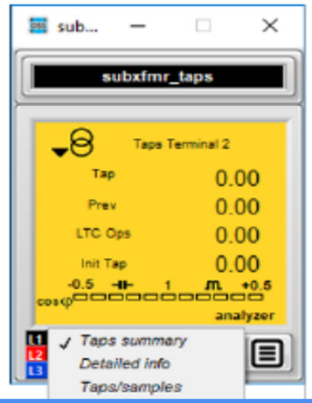
(c)



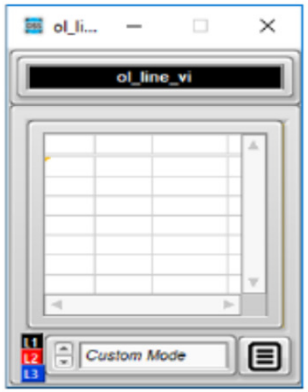
(d)

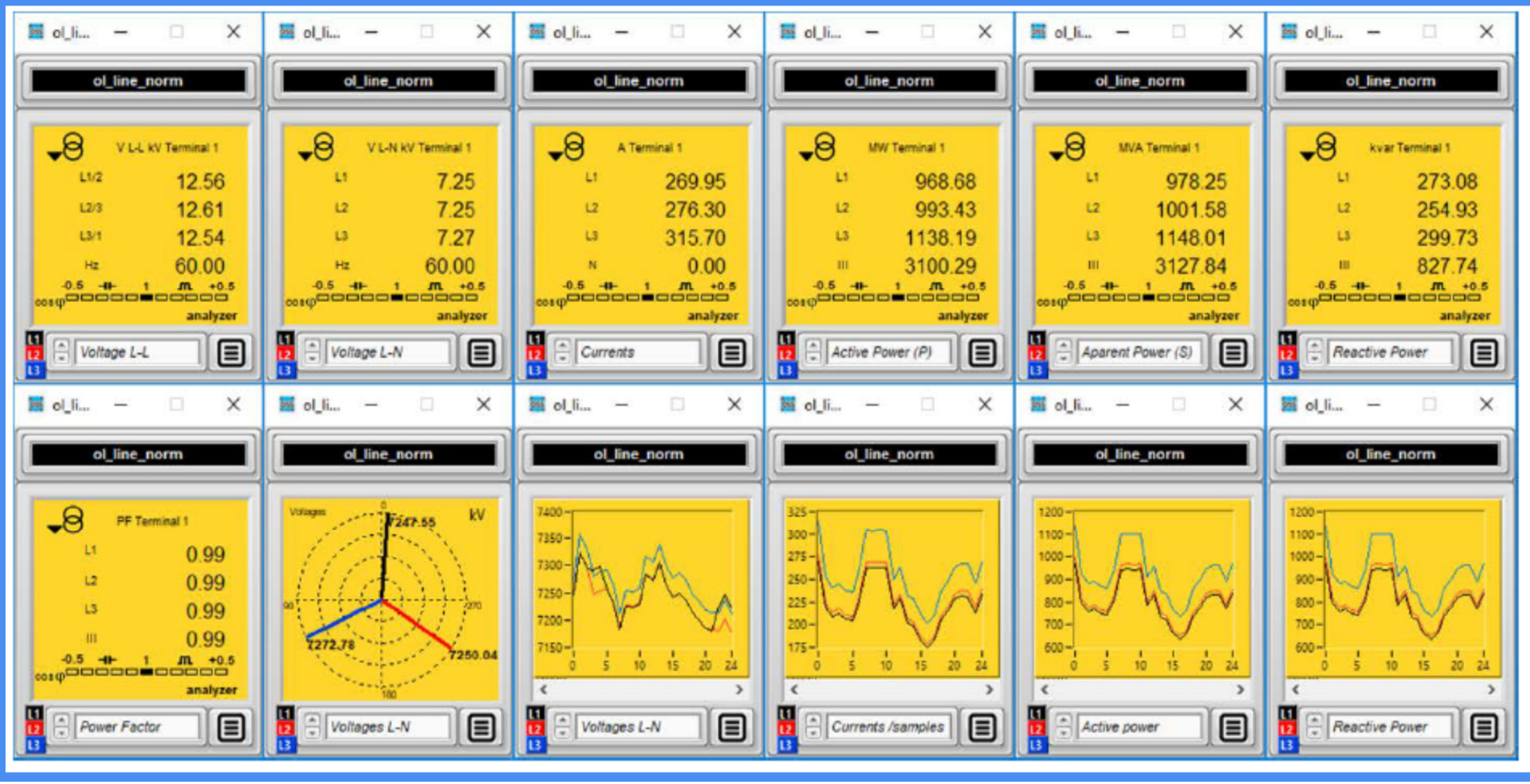


(e)



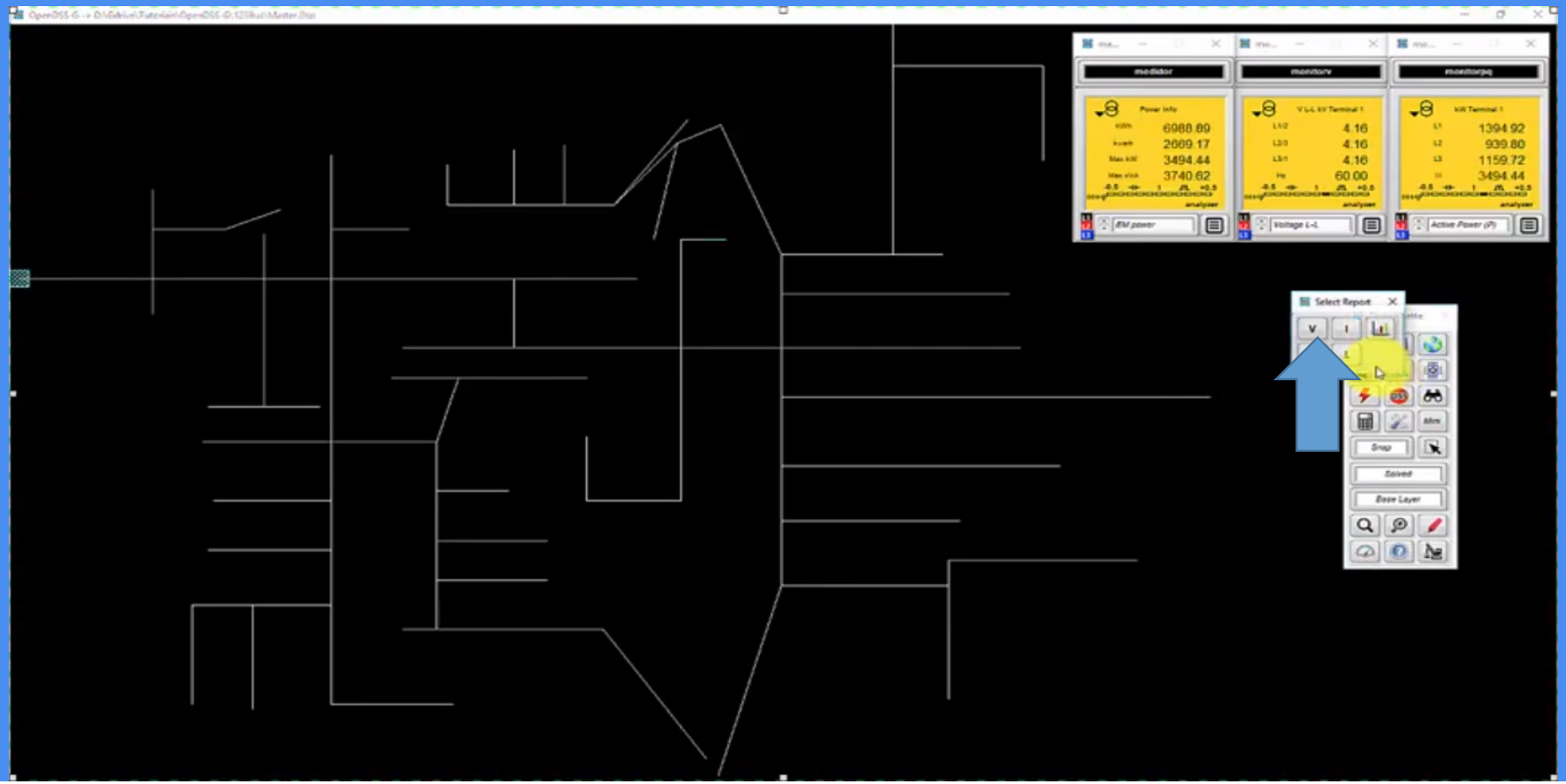
(f)




ol_line_norm
V L-L kV Terminal 1
L1/2 12.56
L2/3 12.61
L3/1 12.54
Hz 60.00
analyzer
Voltage L-L
V L-N kV Terminal 1
L1 7.25
L2 7.25
L3 7.27
Hz 60.00
analyzer
Voltage L-N
A Terminal 1
L1 269.95
L2 276.30
L3 315.70
N 0.00
analyzer
Currents
MW Terminal 1
L1 968.68
L2 993.43
L3 1138.19
III 3100.29
analyzer
Active Power (P)
MVA Terminal 1
L1 978.25
L2 1001.58
L3 1148.01
III 3127.84
analyzer
Aparent Power (S)
kvar Terminal 1
L1 273.08
L2 254.93
L3 299.73
III 827.74
analyzer
Reactive Power
PF Terminal 1
L1 0.99
L2 0.99
L3 0.99
III 0.99
analyzer
Power Factor
Voltages
kV
7247.55
7272.78
7250.04
Voltages L-N
Currents /samples
Active power
Reactive Power


MonitorPQ
kW Terminal 1
L1 1394.92
L2 939.80
L3 1159.72
III 3494.44
-0.5 1 +0.5
cosφ
analyzer
Active Power (P)
medidor
Power Info
kWh 6988.89
kvarh 2669.17
Max kW 3494.44
Max kVA 3740.62
-0.5 1 +0.5
cosφ
analyzer
EM power
MonitorV
Voltages
kV
2401.74
90
270
2401.75
2401.76
180
Voltages L-N
Tools Palette
DSS
Mini
Snap
Solved
Base Layer

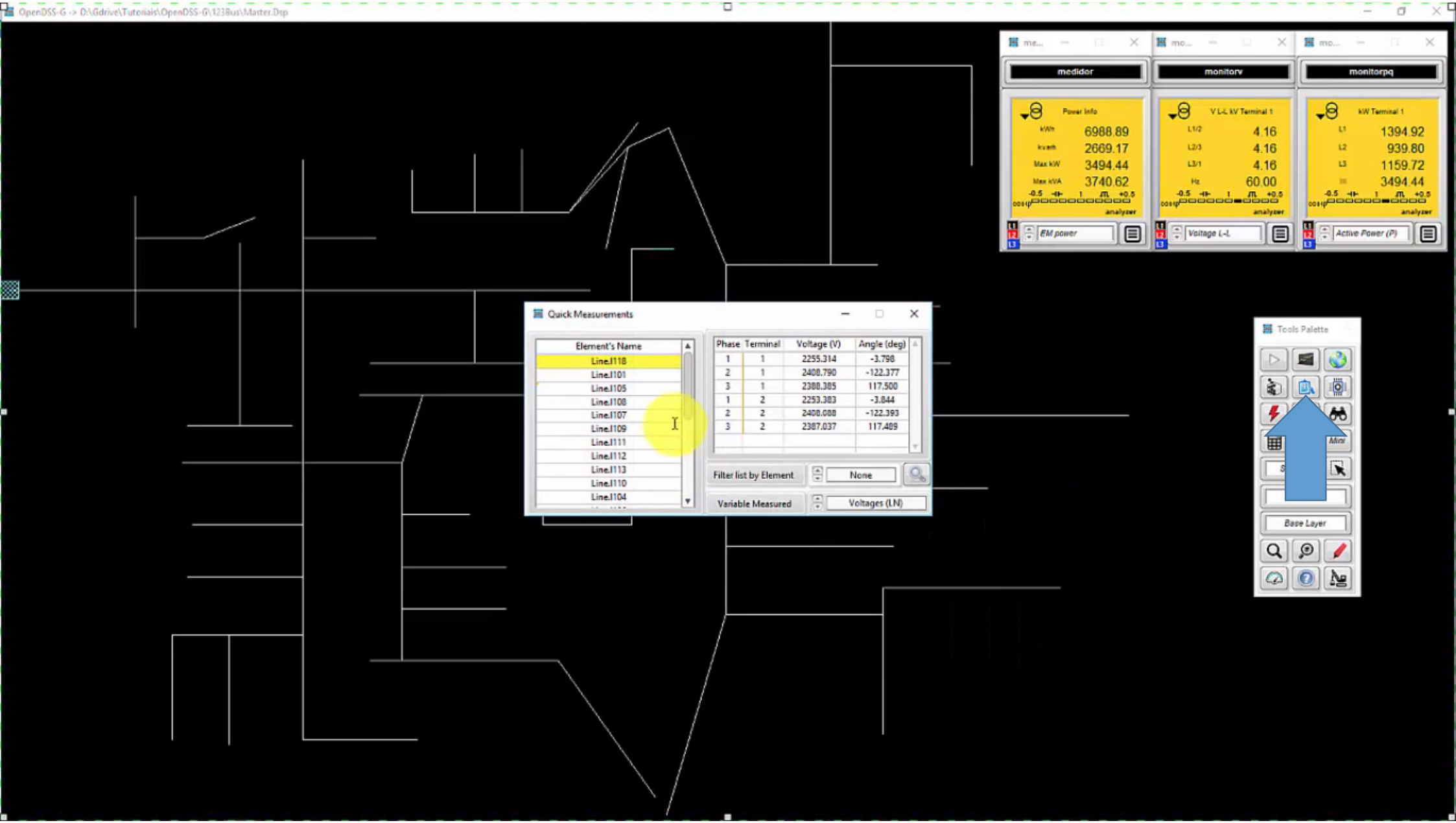
ARQUIVOS DE RESULTADOS E OPENDSS CONSOLE

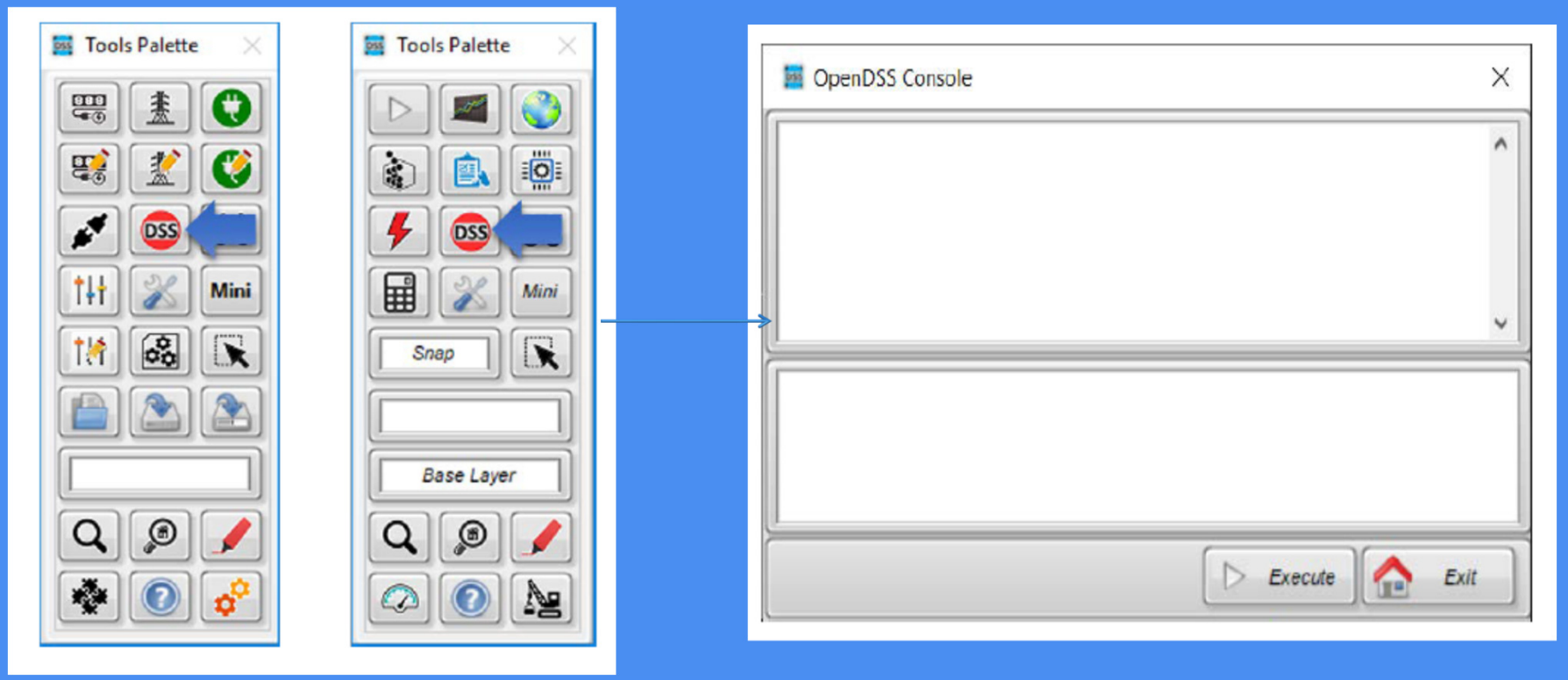


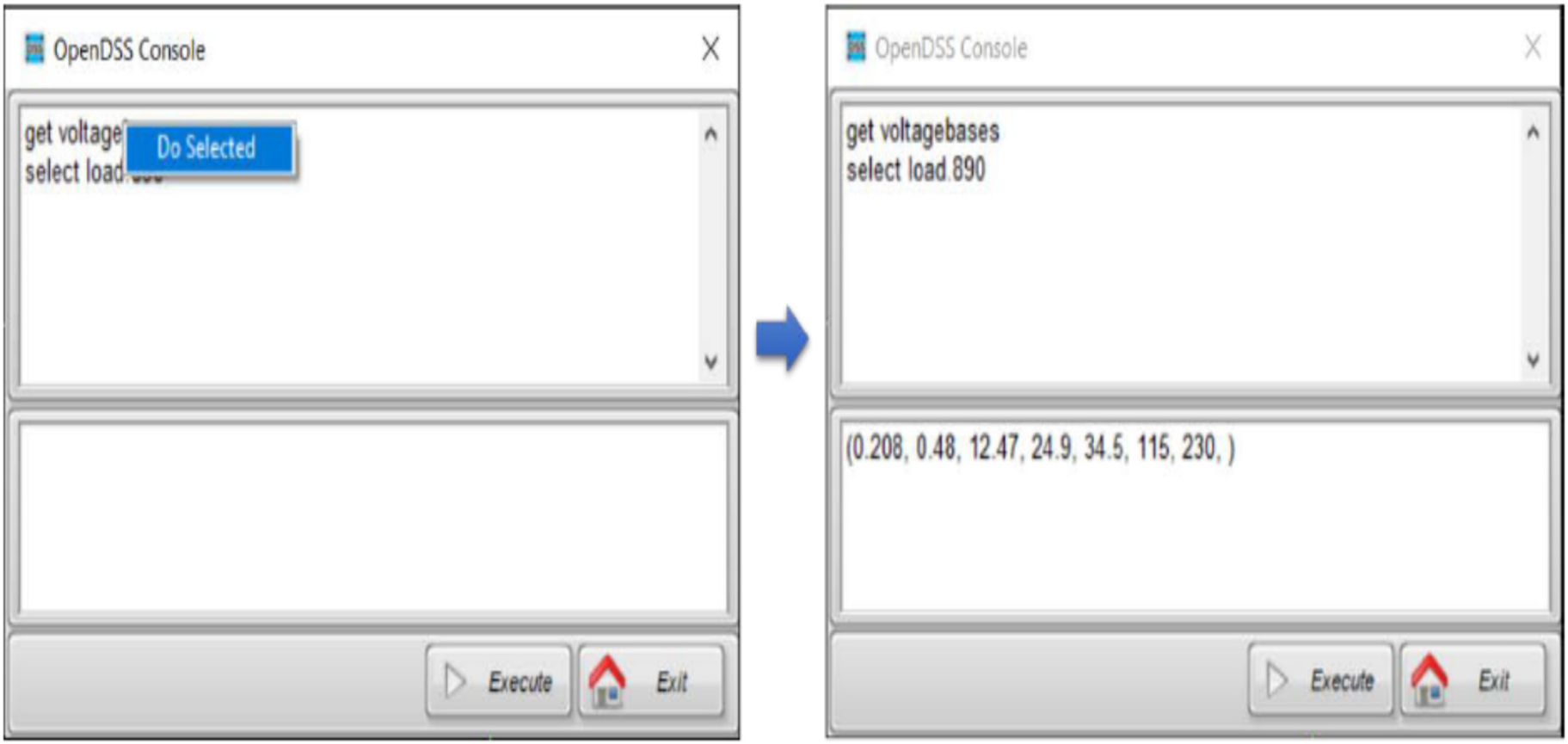
ieee123_VLN_elem.Txt - Bloco de notas

Arquivo Editar Formatar Exibir Ajuda

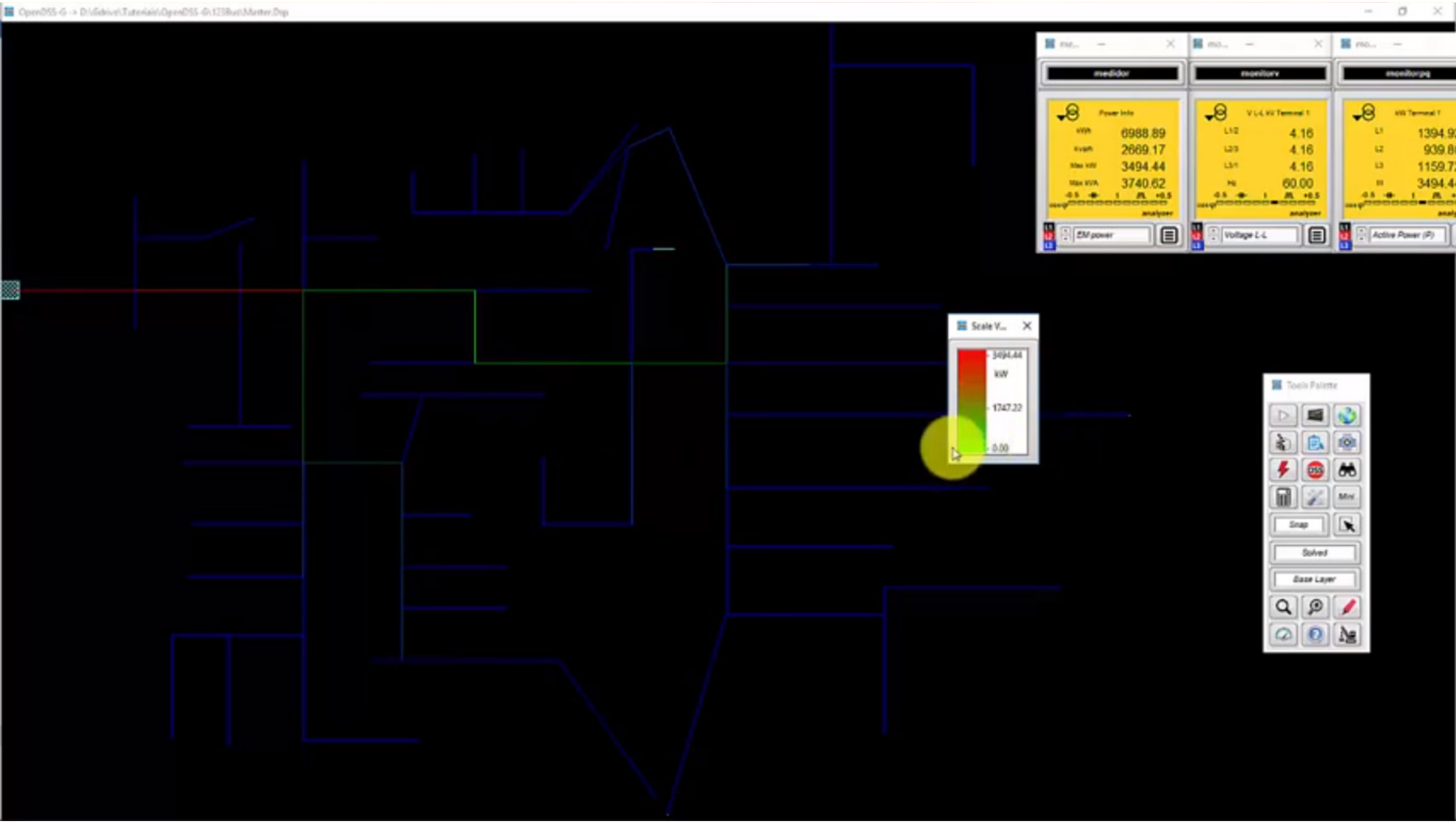
```
NODE-GROUND VOLTAGES BY CIRCUIT ELEMENT

Power Delivery Elements

Bus      (node ref)  Phase    Magnitude, kV (pu)    Angle

ELEMENT = "Vsource.SOURCE"
150        (  1)    1          2.4018 (       1) /_    0.0
150        (  2)    2          2.4018 (       1) /_ -120.0
150        (  3)    3          2.4018 (       1) /_  120.0
------------
150        (  0)    0               0 (       0) /_    0.0
150        (  0)    0               0 (       0) /_    0.0
150        (  0)    0               0 (       0) /_    0.0

ELEMENT = "Line.L115"
149        (  4)    1          2.4017 (       1) /_    0.0
149        (  5)    2          2.4018 (       1) /_ -120.0
149        (  6)    3          2.4018 (       1) /_  120.0
------------
1          (  7)    1          2.3711 (  0.9872) /_   -0.6
1          (  8)    2          2.3952 (  0.9973) /_ -120.3
1          (  9)    3          2.3802 (   0.991) /_  119.6

ELEMENT = "Line.L3"
1          (  7)    1          2.3711 (  0.9872) /_   -0.6
1          (  8)    2          2.3952 (  0.9973) /_ -120.3
1          (  9)    3          2.3802 (   0.991) /_  119.6
------------
7          ( 10)    1          2.3483 (  0.9777) /_   -1.1
7          ( 11)    2          2.3906 (  0.9953) /_ -120.6
7          ( 12)    3          2.3663 (  0.9852) /_  119.3

ELEMENT = "Line.L7"
7          ( 10)    1          2.3483 (  0.9777) /_   -1.1
7          ( 11)    2          2.3906 (  0.9953) /_ -120.6
7          ( 12)    3          2.3663 (  0.9852) /_  119.3
------------
8          ( 13)    1          2.3335 (  0.9716) /_   -1.4
8          ( 14)    2          2.3873 (   0.994) /_ -120.8
8          ( 15)    3          2.3571 (  0.9814) /_  119.2
```


OpenDSS-G -> D:\Gdrive\Tutoriais\OpenDSS-G\123Bus\Master.Dsp
medidor
monitorv
monitorpq
Power Info
kWh 6988.89
kvarh 2669.17
Max kW 3494.44
Max kVA 3740.62
analyzer
EM power
V L-L kV Terminal 1
L1/2 4.16
L2/3 4.16
L3/1 4.16
Hz 60.00
analyzer
Voltage L-L
kW Terminal 1
L1 1394.92
L2 939.80
L3 1159.72
3494.44
analyzer
Active Power (P)
Quick Measurements
Element's Name
Line.l118
Line.l101
Line.l105
Line.l108
Line.l107
Line.l109
Line.l111
Line.l112
Line.l113
Line.l110
Line.l104
Phase Terminal Voltage (V) Angle (deg)
1 1 2255.314 -3.798
2 1 2400.790 -122.377
3 1 2380.385 117.500
1 2 2253.383 -3.844
2 2 2400.088 -122.393
3 2 2387.037 117.489
Filter list by Element
None
Variable Measured
Voltages (LN)
Tools Palette
Base Layer

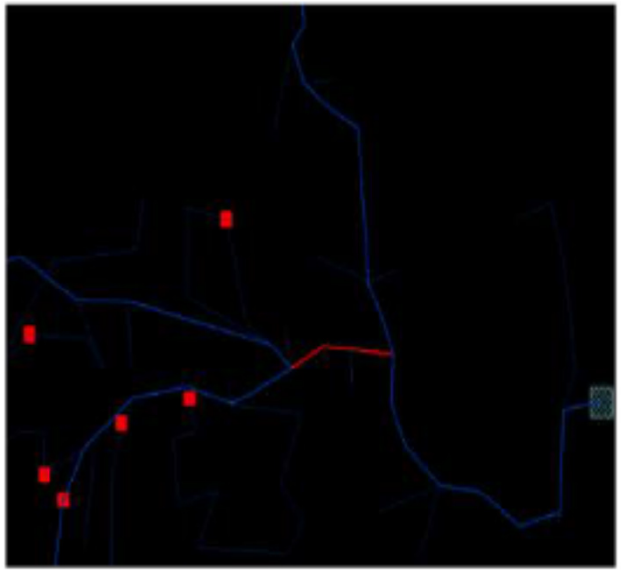

Tools Palette
DSS
Mini
Tools Palette
DSS
Mini
Snap
Base Layer
OpenDSS Console
Execute
Exit


OpenDSS Console
get voltage
Do Selected
select load
Execute
Exit
OpenDSS Console
get voltagebases
select load.890
(0.208, 0.48, 12.47, 24.9, 34.5, 115, 230,)
Execute
Exit

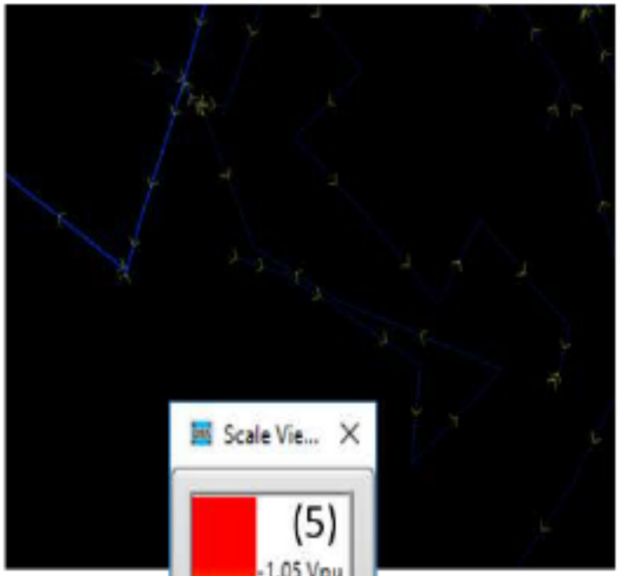
OPÇÕES DE VISUALIZAÇÃO DE RESULTADOS


medidor
monitorv
monitorpq
Power Info
VWh 6988.89
Kvarh 2669.17
Max kW 3494.44
Max kVA 3740.62
analyzer
EM power
V L-L kV Terminal 1
L1-2 4.16
L2-3 4.16
L3-1 4.16
Hz 60.00
analyzer
Voltage L-L
kW Terminal 1
L1 1394.9
L2 939.8
L3 1159.7
III 3494.4
Active Power (P)
Scale V...
3494.44
kW
1747.22
0.00
Tools Palette
Snap
Solved
Base Layer

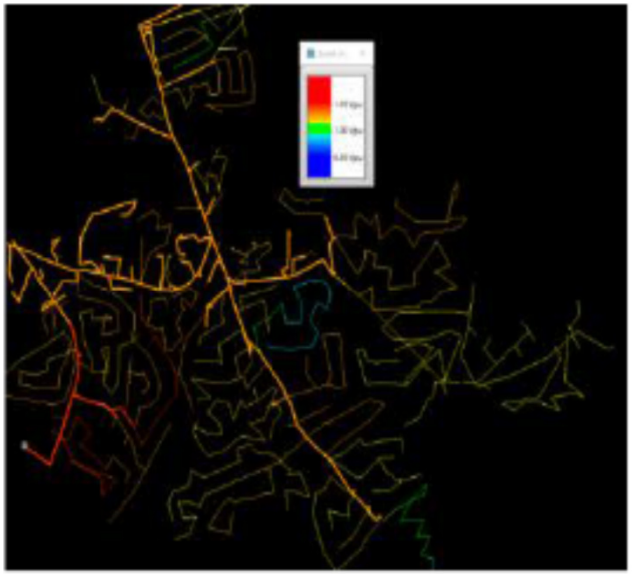
(1)



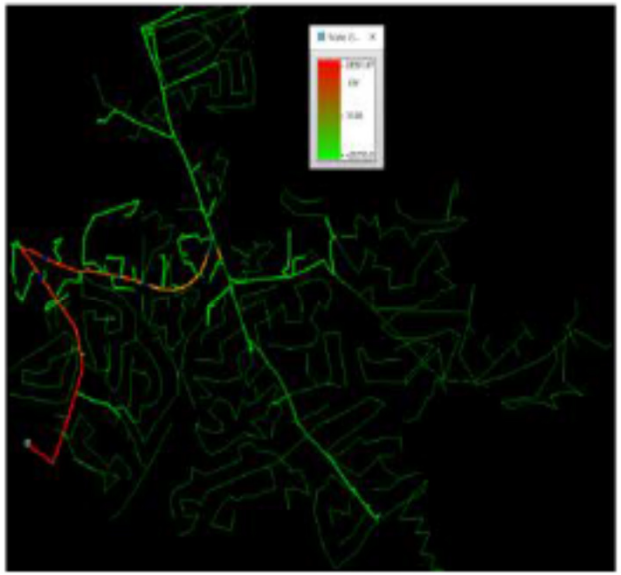
(2)



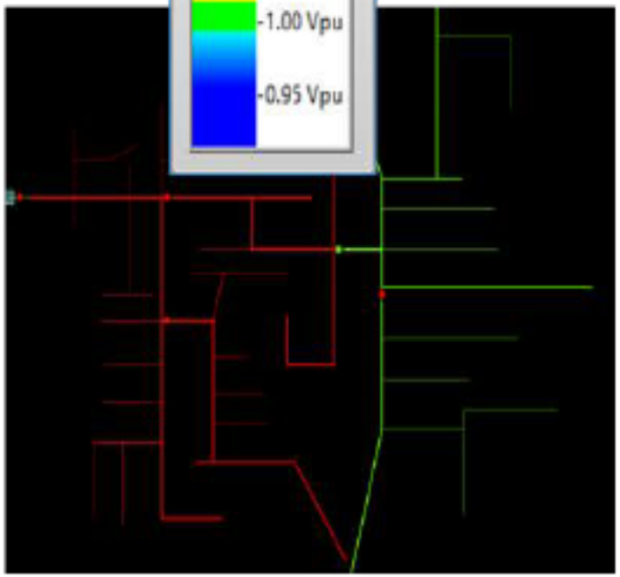
(3)



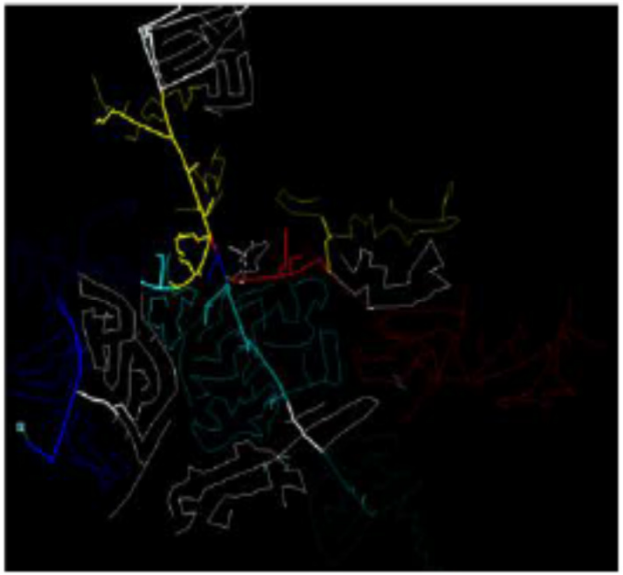
(4)



(6)



(7)



- **Exemplo para relatório**