

1-Line 2026

Load
Calculation
Software

Instruction Manual



User's Manual

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Durand & Associates

1-LINE 2026

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The **1-Line 2026** software is a spreadsheet template software program for calculating main service switchboard, subpanels, feeder sizes and 1-Line drawings. This program may be used for industrial and commercial loads. The **1-Line 2026** software is for reference purposes only, and Durand & Associates cannot assume any responsibility for the accuracy of the program contents. In using this program the user agrees to hold harmless and wave all claims against Durand & Associates.

SOFTWARE REQUIREMENTS

1-Line 2026 was created with Microsoft Excel 2007. To use these templates you must have Microsoft Excel, Version 2007 or later, installed on your computer.

After installation the 1-Line files will be located at C:\1-Line 2026

INTRODUCTION

The **1-Line 2026** software is a spreadsheet template program. The program was designed for use in conjunction with Microsoft Excel on the Windows platform. The program should also work on other platforms that can read and write Microsoft Excel 2007 file formats.

LOADING THE PROGRAM

Insert the CD in your drive and follow the setup instructions.

The installation of 1-Line will create the following folder on your C drive.

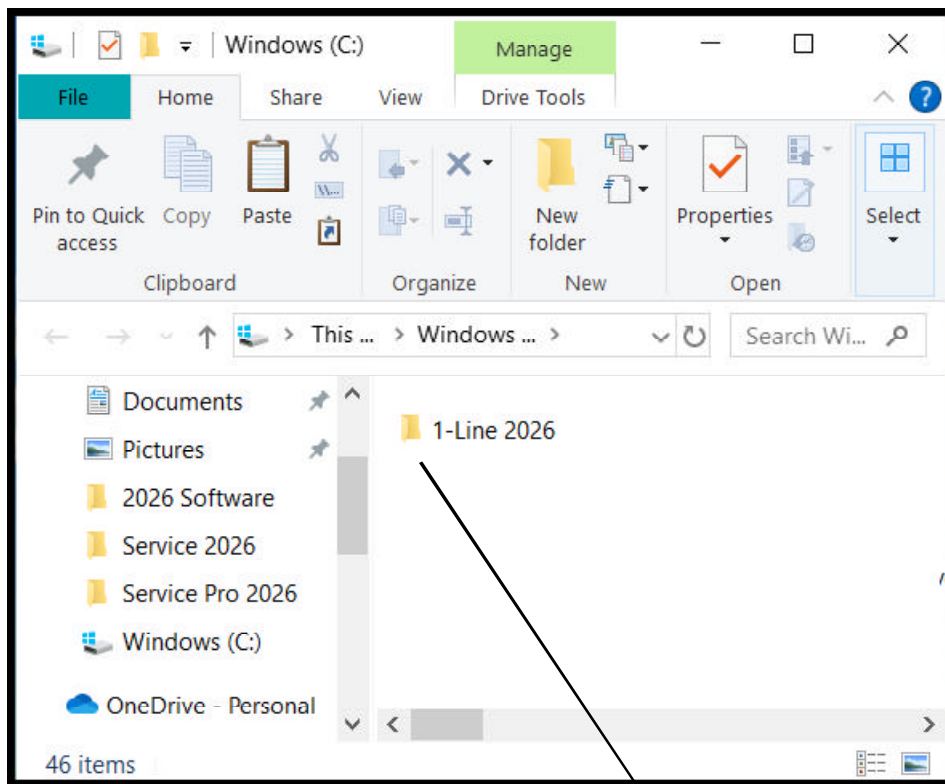
C:\1-Line 2026

EXPLORING THE PROGRAM

1-Line software is a complex spreadsheet template program. The program uses 53 files which link to one another. **DO NOT CHANGE THE FILE NAMES.** If a file name is changed the template can become corrupt.

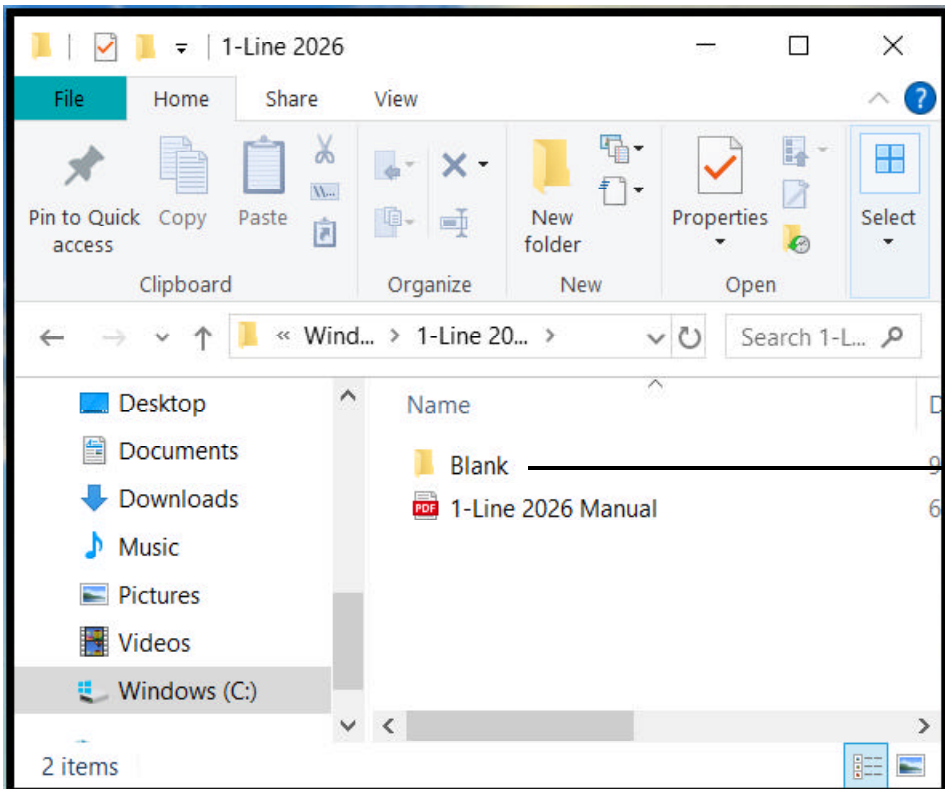
LOCATING THE PROGRAM FILES

The 1-Line templates are located on your C: drive.



1-Line 2026 Excel Folder

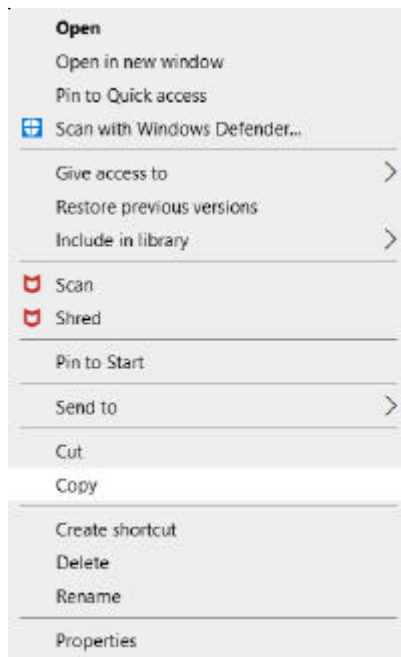
If you double click on the 1-Line folder, you will find 1 folder.



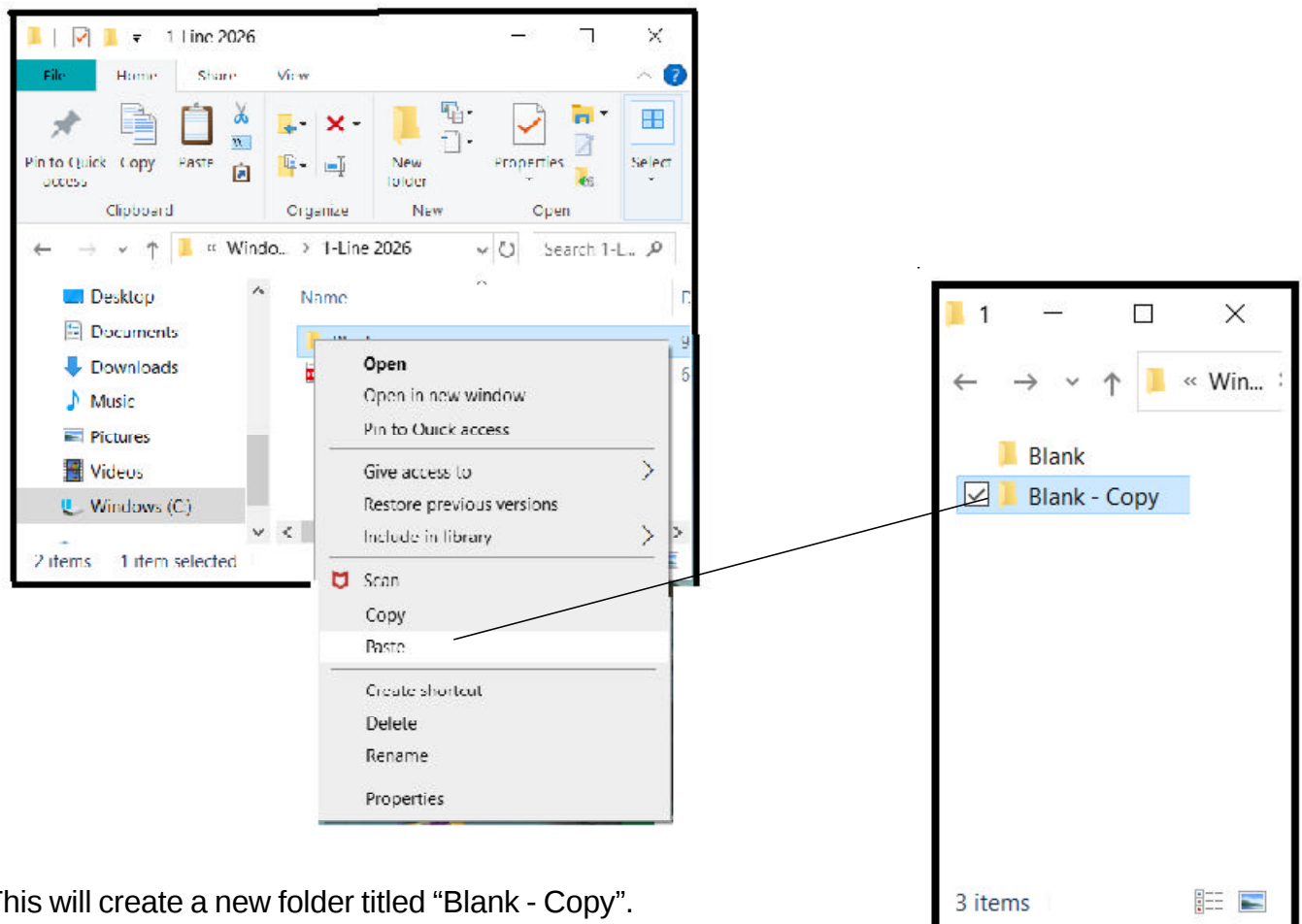
Blank Folder

STARTING A NEW PROJECT

If you want to start a new project, RIGHT CLICK on the blank folder and select COPY.



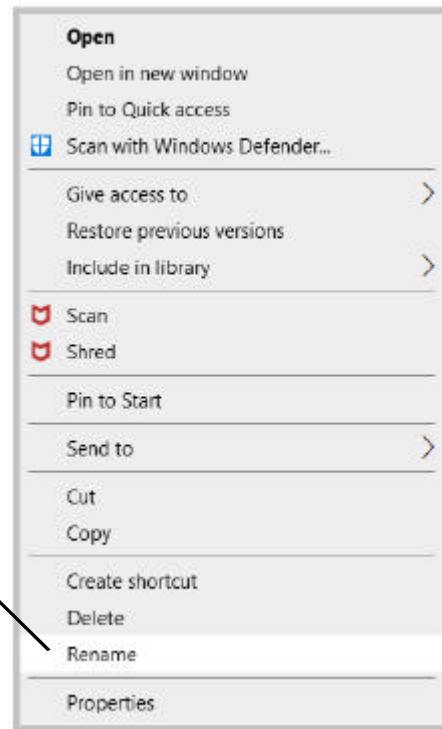
Then RIGHT CLICK on the white area of the window and select PASTE.



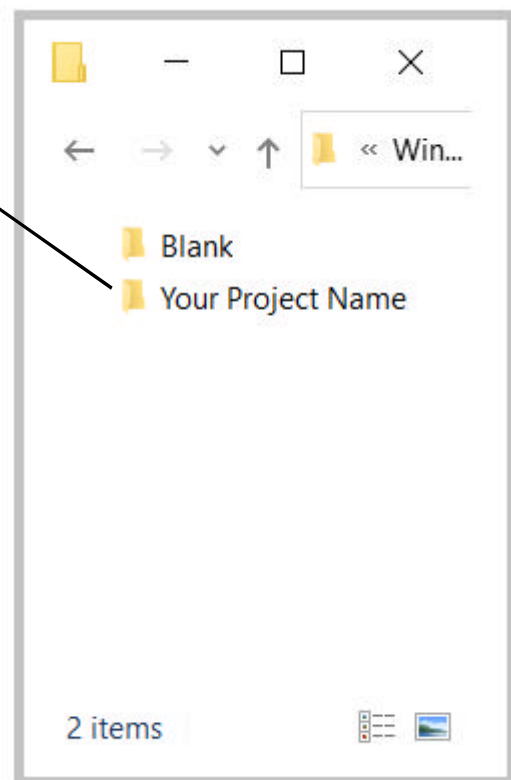
This will create a new folder titled "Blank - Copy".

RENAME THE FOLDER

You can RIGHT CLICK on the new folder and select the RENAME command.



Type in your new project name.

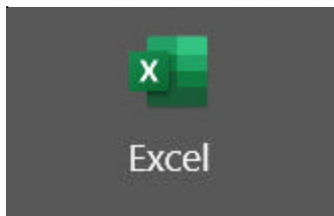


Use this method to create a new project each time you start a new 1-Line.

Now that you have created a new folder close all windows.

USING THE PROGRAM

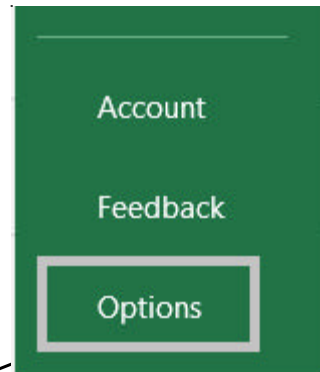
Double click on your Excel icon



This will start your Excel spreadsheet program.

TURNING ON AUTOMATIC UPDATING IN EXCEL

Go to the FILE menu and select OPTIONS

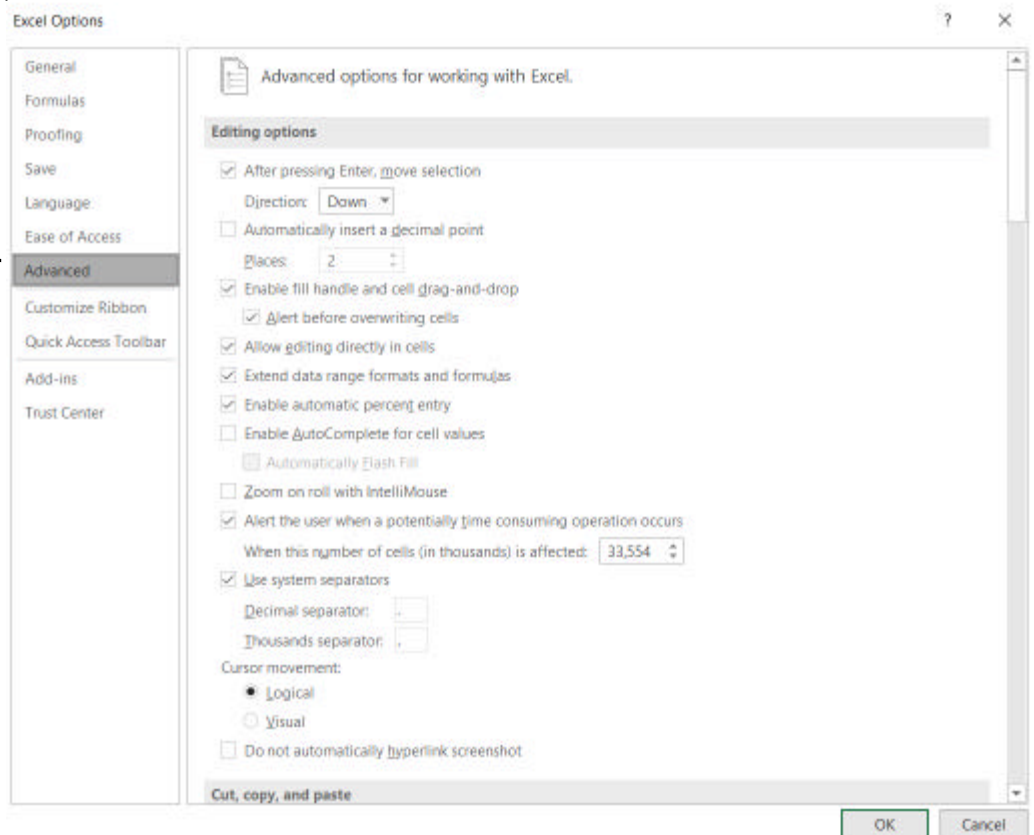


Excel Options

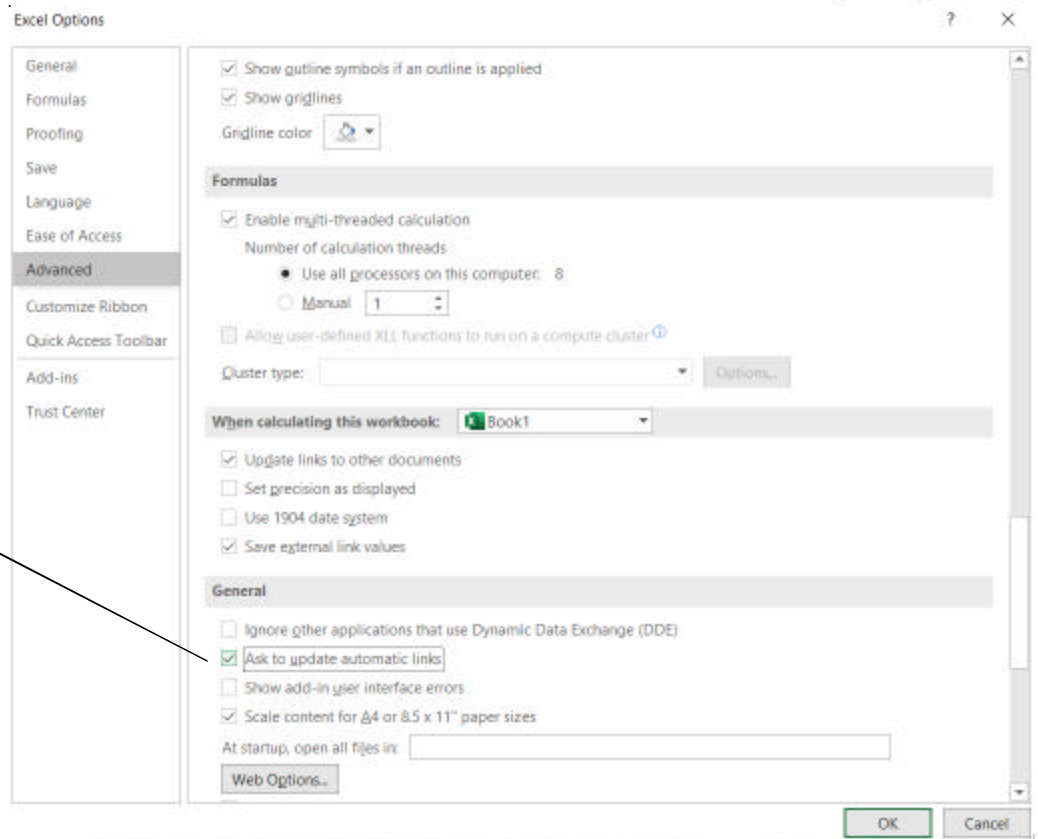
TURNING ON AUTOMATIC UPDATING IN EXCEL (Continued)

Go to the Tools menu and select Options

Click on the
Advanced tab.

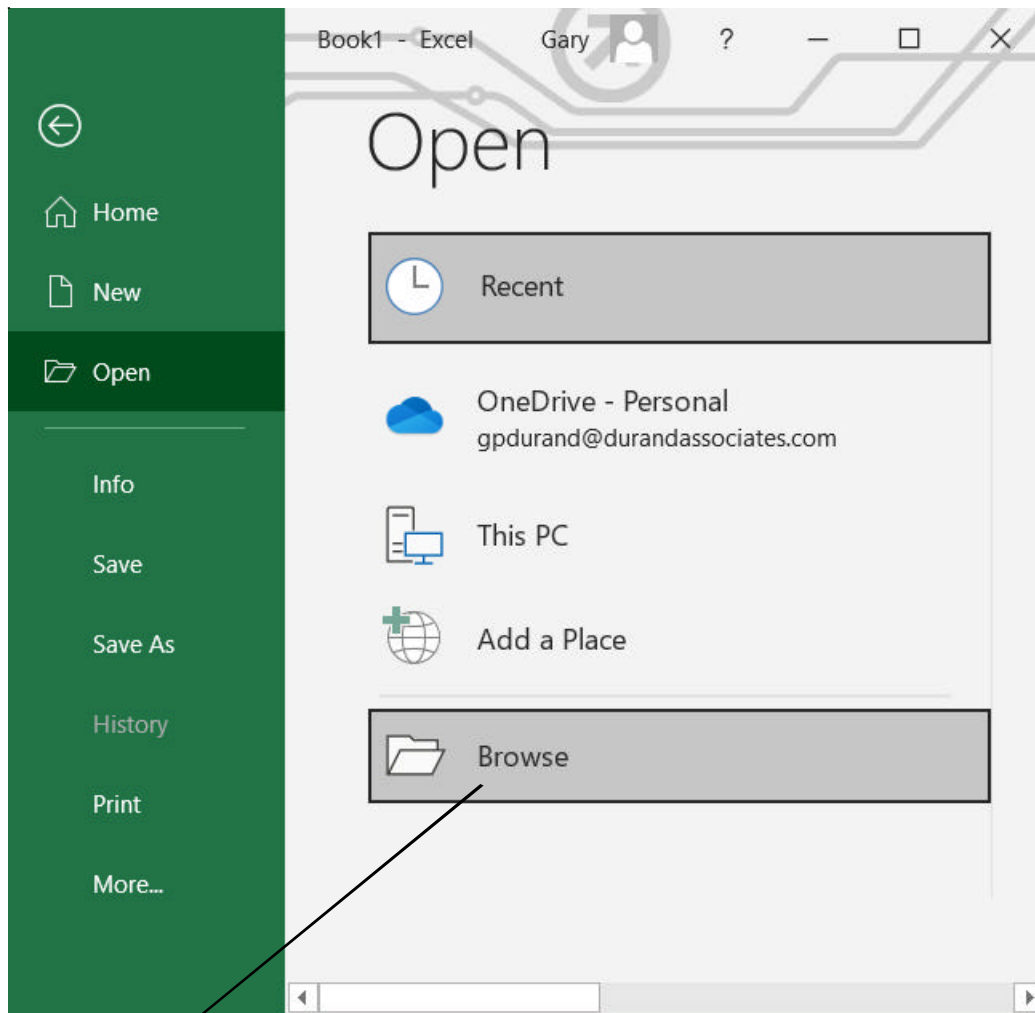


Scroll down to the
General section and
uncheck the "Ask to
update automatic links"



USING THE PROGRAM

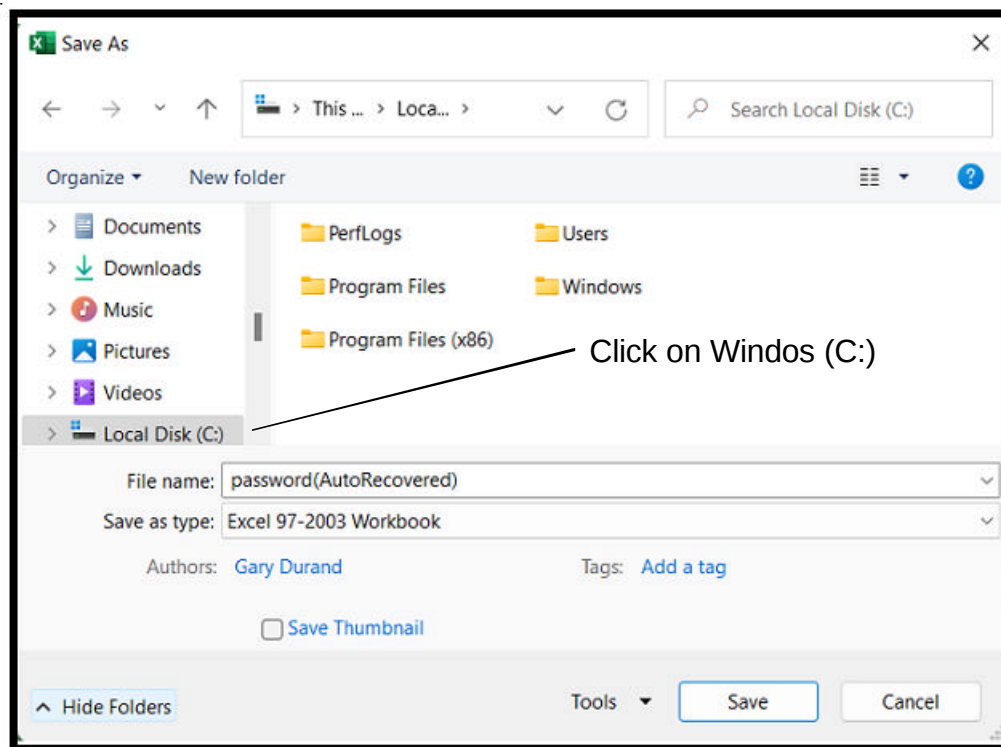
Select the FILE OPEN (Ctrl + O) command and then click BROWSE



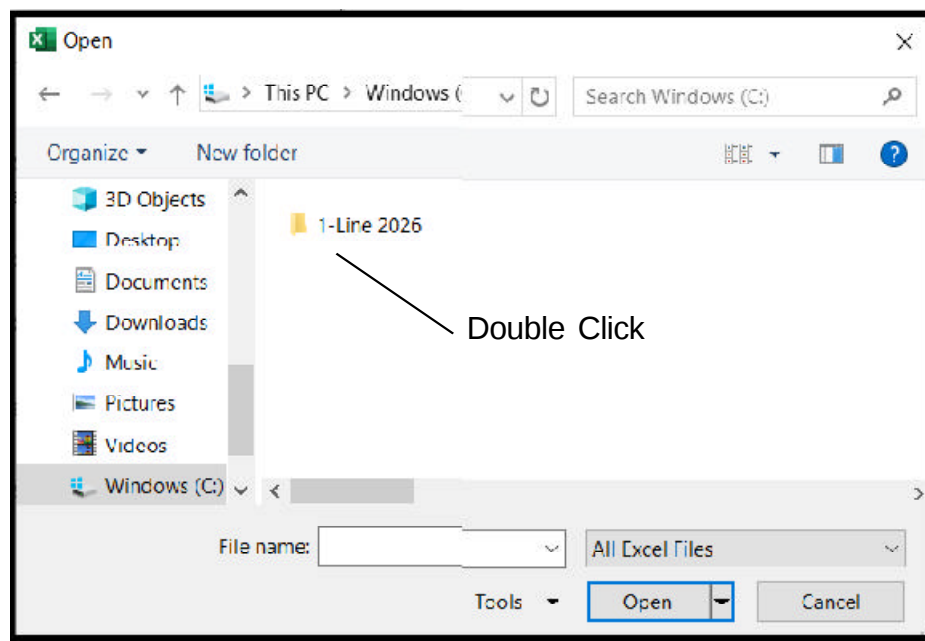
Browsed

USING THE PROGRAM

Click on the Windows (C:) which will display the contents of the C drive.



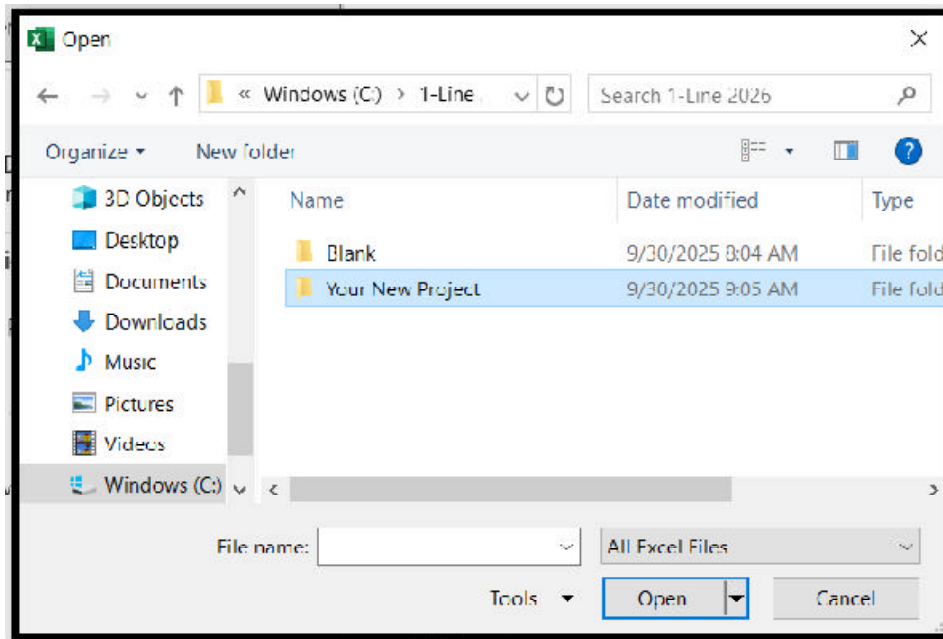
Locate the 1-Line 2026 folder on the C drive and DOUBLE CLICK on that folder.



USING THE PROGRAM

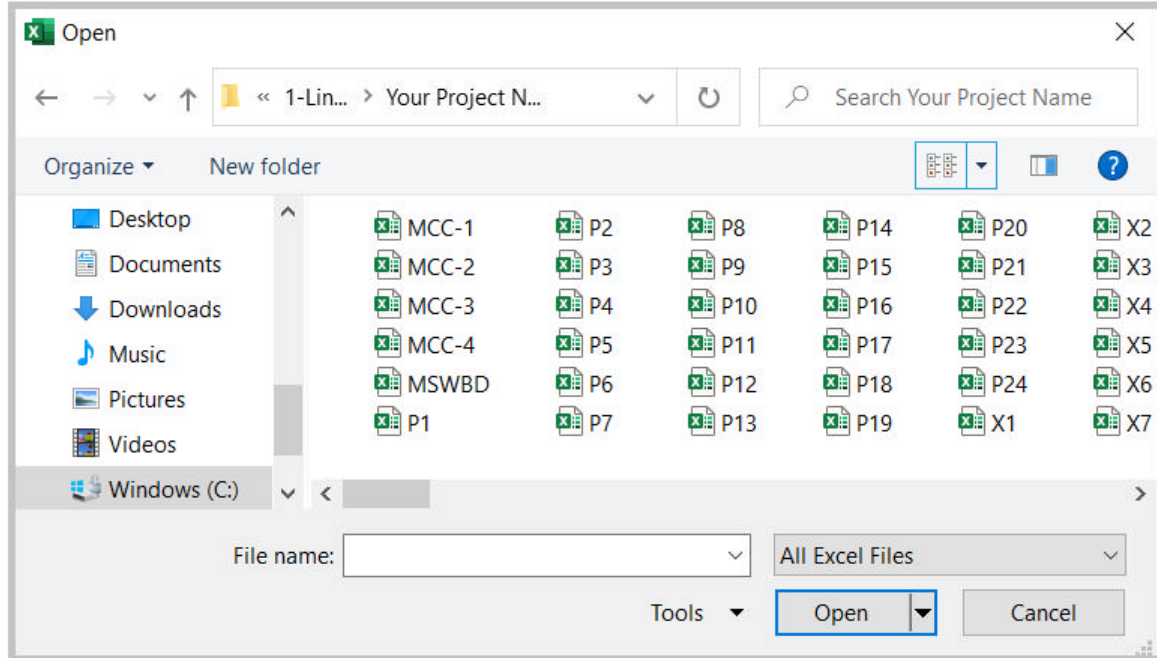
Now displayed are two folders.

1. Blank
2. Your New Project (This is the folder you just created.)



EXPLORING THE SAMPLE PROJECT

Double click on the YOUR NEW FOLDER to display the contents.



The files in this folder are MSWBD, P1-P24, X1-X24, and MCC 1-4.

MSWBD (Main Switchboard)

P1 - P24 (Panels)

X1 - X24 (Transformer/Panels)

MCC 1-4 (Motor Control Centers)

DO NOT RENAME THESE FILES (This will corrupt the files).

WORKING WITH THE MAIN SWITCHBOARD (MSWBD)

Double click on the MSWBD file to display the Main Switchboard Template.

This may take a few seconds to open as Excel updates the links to the Panel files.

1-Line 2026 (Version 26.0A) - Copyright Durand & Associates

Main Switch Board

CODE YEAR **2026**

General Information

PANEL NAME	MAIN SWITCHBOARD
FED FROM	SERVICE
# OF CIRCUITS	4
HIGH VOLTAGE	208
LOW VOLTAGE	120
PHASE	3Y
NEUTRAL SIZE	FULL
HERTZ	60
MIN AMPS	100
% FACTOR	0
MAIN BREAKER SIZING	AUTO
MAIN BREAKER POSITION	AFTER CT

GENERAL INFORMATION

- **Code Year** (Select 2026, 2023, 2020, or 2017)
- **Panel Name** (Enter the name of the Main Switchboard)
- **Fed From** (Enter the power source for the Main Switchboard)
- **# Of Circuits** (Enter the number of Panels 1-24)
- **High Voltage** (Enter high voltage)
- **Low Voltage** (Enter low voltage)
- **Phase** (Select the phase from the pulldown menu)
 - 1 = 1-Phase
 - 3D = 3-Phase Delta
 - 3Y = 3-Phase Wye
- **Hi-Leg Size** (Select size from pulldown menu)

This option only appears when using a 3-phase delta service. If you select AUTO, the program will size the L2 (Hi-Leg) to the load. If you select FULL, the program will size L2 the same as L1 & L3.
- **Neutral Size** (Select size from pulldown menu)

When MINIMUM is selected, the line to neutral load must be identified with an (N) in the panel templates.
- **Hertz** (Enter Hertz)
- **Minimum Amps** (Enter the minimum amps)

The minimum amps is the smallest size allowed for the service. If the load exceeds the minimum amps, the program will automatically size the service to the correct size.

GENERAL INFORMATION (continued)

- **Minimum Amps L2** (Enter the minimum amps for L2)
This option only appears when using a 3-phase delta service and when AUTO is selected for L2 (Hi-Leg). If the load exceeds the minimum amps, the program will automatically size L2 to the correct size.
- **Minimum Neutral Amps** (Enter the minimum neutral amps)
This option only appears when AUTO is selected for neutral size. If the load exceeds the minimum amps, the program will automatically size the neutral to the correct size.
- **% Factor** (Enter percent factor)
This factor is used two ways. If you enter 20%, the ampacity of the panel and conductors will be increased 20%. You can also use this factor to correct for voltage drop.
- **% Factor L2** (Enter percent factor for L2)
This option only appears when using a 3-phase delta service and when AUTO is selected for L2 (Hi-Leg). This factor is used two ways. If you enter 20%, the ampacity of the L2 conductor will be increased 20%. You can also use this factor to correct for voltage drop.
- **Main Breaker Sizing** (Select method)

AUTO	Program will automatically size main breaker and feeder conductors. When load exceeds 1200 amps, the MANUAL method must be used.
MANUAL	You enter the conductor and conduit size.
NONE	If you have seven (7) or more circuits, you must have a main breaker.
- **Main Breaker Amps** (Enter amps)
This option only appears when the main breaker sizing is set for MANUAL
- **Main Breaker Position** (Select position)
This option only appears when a main breaker is used.

DISPLAY OPTIONS

1-Line Display Options	
SHOW MAIN METER	YES
SHOW CURRENT TRANSFORMER	YES
SHOW FAULT CURRENT	YES
SHOW VOLTAGE DROP %	YES
SHOW CONDUIT LENGTH	YES
SHOW UFFR GROUND	YES
SHOW TRUE PHASE CONNECTION	YES

- **Show Meter** (Yes/No)
If YES is selected, a meter will appear on the 1-Line drawing.
- **Show Current Transformer** (Yes/No)
If YES is selected, a CT will appear on the 1-Line drawing.
- **Show Fault Current** (Yes/No)
If YES is selected, fault current will appear on the 1-Line drawing.

DISPLAY OPTIONS (continued)

- **Show Voltage Drop** (Yes/No)
If YES is selected, voltage drop % will appear on the 1-Line drawing.
- **Show Conduit Length** (Yes/No)
If YES is selected, conduit length will appear on the 1-Line drawing.
- **Show Ufer Ground** (Yes/No)
If YES is selected, Ufer ground will appear on the 1-Line drawing.
- **Show True Phase Connection** (Yes/No)
If YES is selected, directories and panel schedules will display actual phase.

SERVICE ENTRANCE FEEDER OPTIONS (AUTO)

When AUTO is selected, the following will be displayed.

Service Entrance Feeder Options	
SERVICE FEEDER SIZING	AUTO
WIRE TYPE	THHN
WIRE CU/AL	CU
WIRE TEMP C	75
WIRE LENGTH	50'
CONDUIT TYPE	EMT
OVERHEAD \ UNDERGROUND	UNDERGROUND

- **Service Feeder Sizing** (Select Method)
 - AUTO Program will automatically size service entrance conductors.
When load exceeds 1200 amps, the MANUAL method must be used.
 - MANUAL You enter the conductor and conduit sizes.
 - NONE No service entrance conductors will be shown.
- **Wire Type** (Select Type)
- **Wire CU/AL** (Select Type)
- **Wire Temp C** (Select Temp)
- **Wire Length** (Enter Wire Length)
- **Conduit Type** (Select Conduit Type)
- **Overhead/Underground** (Select Method)

SERVICE ENTRANCE FEEDER OPTIONS (MANUAL & CONDUIT)

When MANUAL and CONDUIT are selected the following will be displayed.

OVERHEAD \ UNDERGROUND	UNDERGROUND
CONDUIT / BUSWAY	CONDUIT
CONDUIT LENGTH	100'
CONDUIT SIZE	4"
WIRE CU/AL	CU
WIRE TYPE	THHN
WIRE SIZE (L1, L2, L3)	#500
WIRE SIZE NEUTRAL	#500
CONDUIT TYPE	EMT
NUMBER OF CONDUITS	1

- **Overhead/Underground** (Select Method)
- **Conduit/Busway** (Select Method)
- **Conduit Length** (Enter Conduit Length)
- **Conduit Size** (Select Size)
- **Wire CU/AL** (Select Type)
- **Wire Type** (Select Type)
- **Wire Size** (Select Size)
- **Wire Size (Hi-Leg) L2** (Select Size)
This option only appears in the 3-Phase Delta Mode.
- **Neutral Size** (Select Size)
- **Conduit Type** (Select Type)
- **Number of Conduits** (Enter Number)

SERVICE ENTRANCE FEEDER OPTIONS (MANUAL & BUSWAY)

When MANUAL and BUSWAY are selected the following will be displayed.

OVERHEAD \ UNDERGROUND CONDUIT / BUSWAY BUSWAY LENGTH	OVERHEAD BUSWAY 100'
BUSWAY SIZE	3000 A
BUSWAY CU/AL	CU

- **Overhead/Underground** (Select Method)
- **Conduit/Busway** (Select Method)
- **Busway Length** (Enter Busway Length)
- **Busway Size** (Select Size)
- **Busway CU/AL** (Select Type)

FAULT CURRENT CALCULATIONS (NONE)

Fault Current Calculations for Incoming Power	
SELECT METHOD	NONE

- **Select Method** (Select Method)

FAULT CURRENT CALCULATIONS (UTILITY TRANSFORMER INFINITE BUS)

Fault Current Calculations for Incoming Power

SELECT METHOD	UTILITY TRANSFORMER INFINITE BUS
UTILITY VOLTAGE ADJUSTMENT	1.1
TRANSFORMER KVA	500
TRANSFORMER %Z RATING	3.0%
PRIMARY VOLTAGE	13,200

Use this method when the Available Fault Current is not known and the transformer KVA is known.

- **Select Method** (Select Method)
- **Utility Voltage Adjustment** (Enter 1.0 or 1.1)
- **Transformer KVA** (Enter KVA)
- **Transformer % Z Rating** (Enter Rating)

Utility voltages may vary +/- 10% for power. Therefore for worst case conditions enter 1.1 as the utility voltage adjustment.

FAULT CURRENT CALCULATIONS (TRANSFORMER KNOWN AFC)

Use this method when the primary fault current is known and the transformer KVA is known.

Fault Current Calculations for Incoming Power

SELECT METHOD	TRANSFORMER KNOWN AFC
AVAILABLE FAULT CURRENT	35,000
UTILITY VOLTAGE ADJUSTMENT	1.1
TRANSFORMER KVA	500
TRANSFORMER %Z RATING	3.0%
PRIMARY VOLTAGE	13,200

- **Select Method** (Select Method)
- **Available Fault Current** (Enter AFC)
- **Utility Voltage Adjustment** (Enter 1.0 or 1.1)
- **Transformer KVA** (Enter KVA)
- **Transformer % Z Rating** (Enter Rating)
- **Primary Voltage** (Enter Voltage)

Utility voltages may vary +/- 10% for power. Therefore for worst case conditions enter 1.1 as the utility voltage adjustment.

FAULT CURRENT CALCULATIONS (NO TRANSFORMER KNOWN AFC)

This is the most common method and should be used in most projects.

Use this method when the utility provides the Available Fault Current.

Even if there is a utility transformer, most utilities will give you the fault current on the secondary side and you should use this method.

Fault Current Calculations for Incoming Power	
SELECT METHOD	NO TRANSFORMER KNOWN AFC
AVAILABLE FAULT CURRENT	35,000
UTILITY VOLTAGE ADJUSTMENT	1.1

- **Select Method** (Select Method)
- **Available Fault Current** (Enter AFC)
- **Utility Voltage Adjustment** (Enter 1.0 or 1.1)

Utility voltages may vary +/- 10% for power. Therefore for worst case conditions enter 1.1 as the utility voltage adjustment.

AUTOMATIC TRANSFER SWITCH & ENGINE GENERATOR

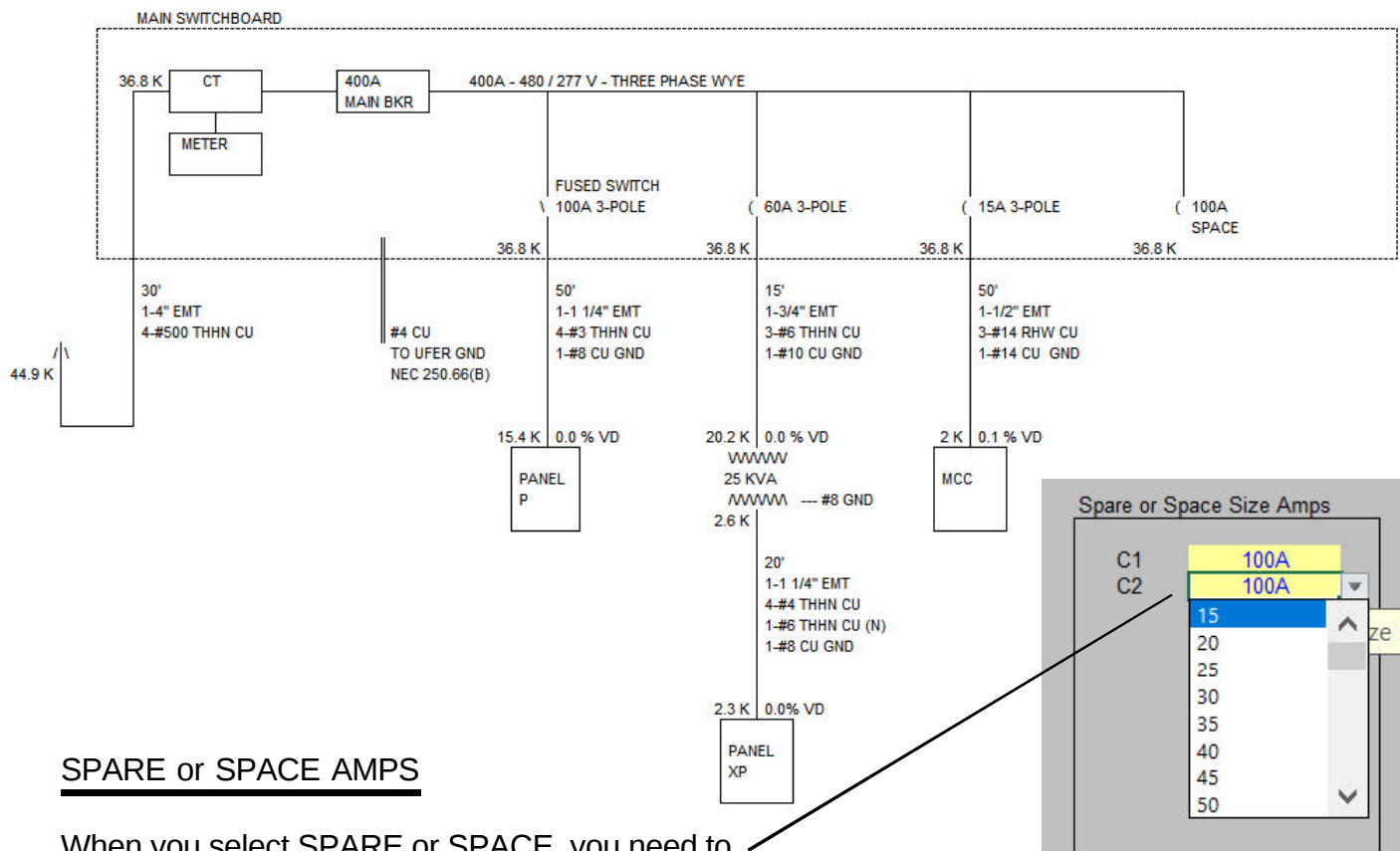
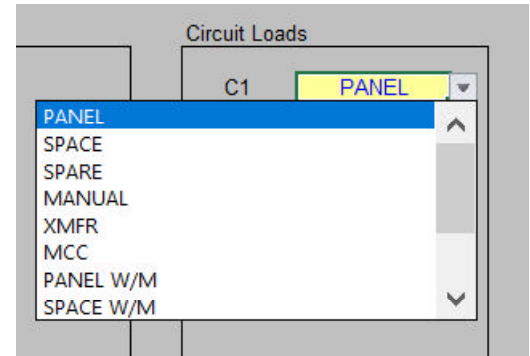
Automatic Transfer Switch & Engine Generator (Located at Circuit Position C1)	
AUTOTRANSFERSWITCH	YES
TRANSFER SWITCH SIZING	MANUAL
SIZE OF TRANSFER SWITCH (AMPS)	125
ATS DISTANCE FROM MSWBD	50'
ENGINE GENERATOR	YES
GENERATOR SIZING	MANUAL
KW OF GENERATOR	100
GEN-SET DISTANCE FROM ATS	30'

- **Auto Transfer Switch** (Select Yes or No)
- **Size of Transfer Switch** (Enter Amps)
- **ATS Distance from MSWBD** (Enter Distance in Feet)
- **Engine Generator** (Select Yes or No)
- **Generator Sizing** (Select Manual or Auto)
- **KW of Generator** (Enter KW)
- **Genset Distance from ATS** (Enter Distance in Feet)

IDENTIFY CIRCUIT LOADS

Use the pulldown menu to identify your circuit loads.

- **Panel** When you choose Panel, all load calculations forward from the Panel Template.
- **Xmfr** When you choose Xmfr, all load calculations forward from the Xmfr Panel Template.
- **Space** When you choose Space, a space is shown on the 1-Line.
- **Spare** When you choose Spare a spare circuit breaker is shown on the 1-Line.
- **Manual** When you choose Manual, you may input manual load on the M-Loads tab and the M-Feeders tab.
- **MCC** May be selected for the first four (4) circuits. C1, C2, C3, or C4
When you choose MCC, all load calculations forward from the Motor Control Center Template.



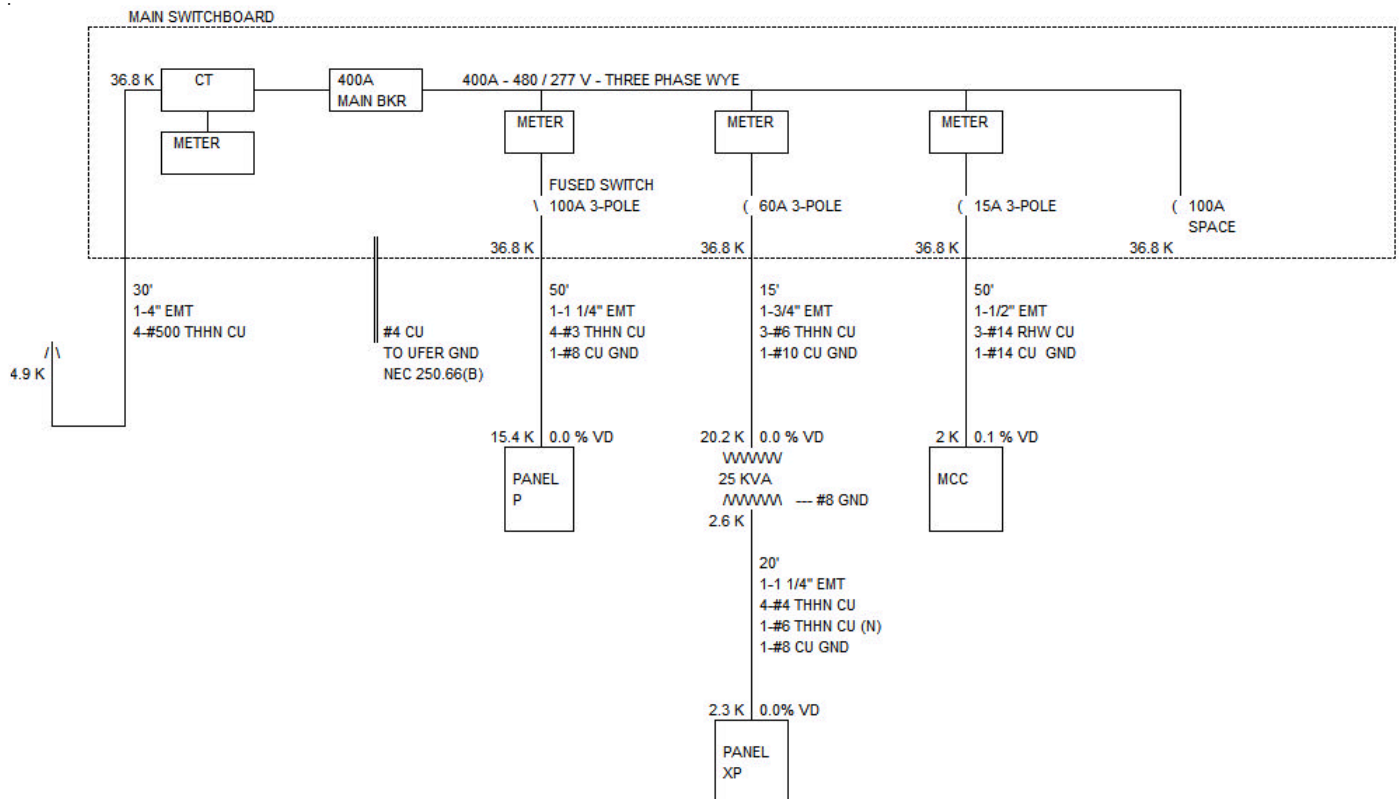
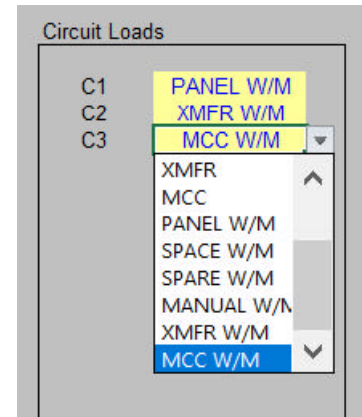
SPARE or SPACE AMPS

When you select SPARE or SPACE, you need to select the amp rating for each.

IDENTIFY CIRCUIT LOADS - WITH METERS SHOWN

Use the pulldown menu to identify your circuit loads with meters.

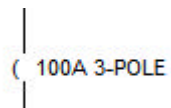
- **Panel w/m** When you choose Panel w/m, all load calculations forward from the Panel Template.
- **Xmfr w/m** When you choose Xmfr w/m, all load calculations forward from the Xmfr Panel Template.
- **Space w/m** When you choose Space w/m, a space is shown on the 1-Line.
- **Spare w/m** When you choose Spare w/m a spare circuit breaker is shown on the 1-Line.
- **Manual w/m** When you choose Manual w/m, you may input manual load on the M-Loads tab and the M-Feeders tab.
- **MCC** May be selected for the first four (4) circuits. C1, C2, C3, or C4
When you choose MCC w/m, all load calculations forward from the Motor Control Center Template.



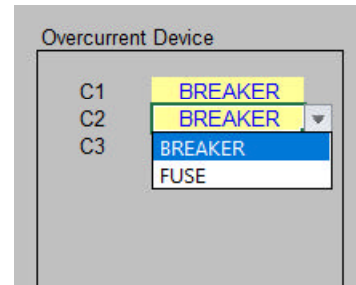
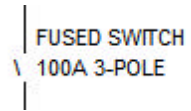
IDENTIFY OVERCURRENT DEVICE

Use the pulldown menu to identify your overcurrent device

- **Breaker**



- **Fuse**



MANUAL LOADS

If you select MANUAL, you may enter the load and feeder information on the M Load tab and the M Feeder tab.

M Load Tab

Manual Loads Input									
CIR	DESCRIPTION OF LOAD	SYMBOL	PHASE	BREAKER OR FUSE	BREAKER OR FUSE AMPS	(L2) HI-LEG FUSE AMPS	VA CONNECTED LOAD		
							L1	L2	L3
1									
2		COMBO STARTER	3Y	BREAKER	30		0	0	0
3									
4									
5									
6									
7									
8									
9									
10									

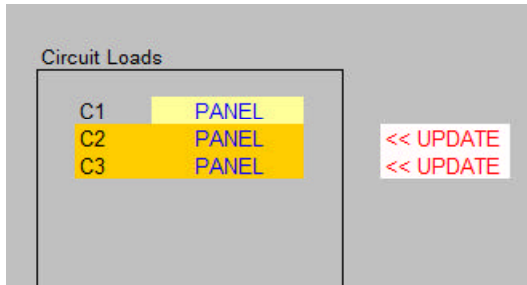
M Feeder Tab

Manual Feeder Input											
CIR	DESCRIPTION OF LOAD	NUMBER OF CONDUITS	LENGTH OF CONDUIT	CONDUIT SIZE	CONDUIT TYPE	WIRE TYPE	WIRE C/L or AL	WIRE SIZE	WIRE SIZE (L2)	WIRE SIZE NEUTRAL	WIRE SIZE GROUND
1											
2		1	10'	1/2"	EMT	THHN	CU	#12		#12	#12
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

LINKED FILES

The MSWBD file and all Panel files are linked back and forth. File links are only updated when the files are open. If the file is closed and information is change, the closed file will not update formula calculations. When this happens a link update color of orange will appear on your MSWBD template.

Example



The screenshot shows a software window titled "Circuit Loads". Inside, there is a table with three rows. The first row has "C1" and "PANEL" (with a yellow highlight). The second row has "C2" and "PANEL" (with an orange highlight). The third row has "C3" and "PANEL" (with an orange highlight). To the right of the table, there are two red text labels: "<< UPDATE" and "<< UPDATE".

Circuit Loads	
C1	PANEL
C2	PANEL
C3	PANEL

<< UPDATE
<< UPDATE

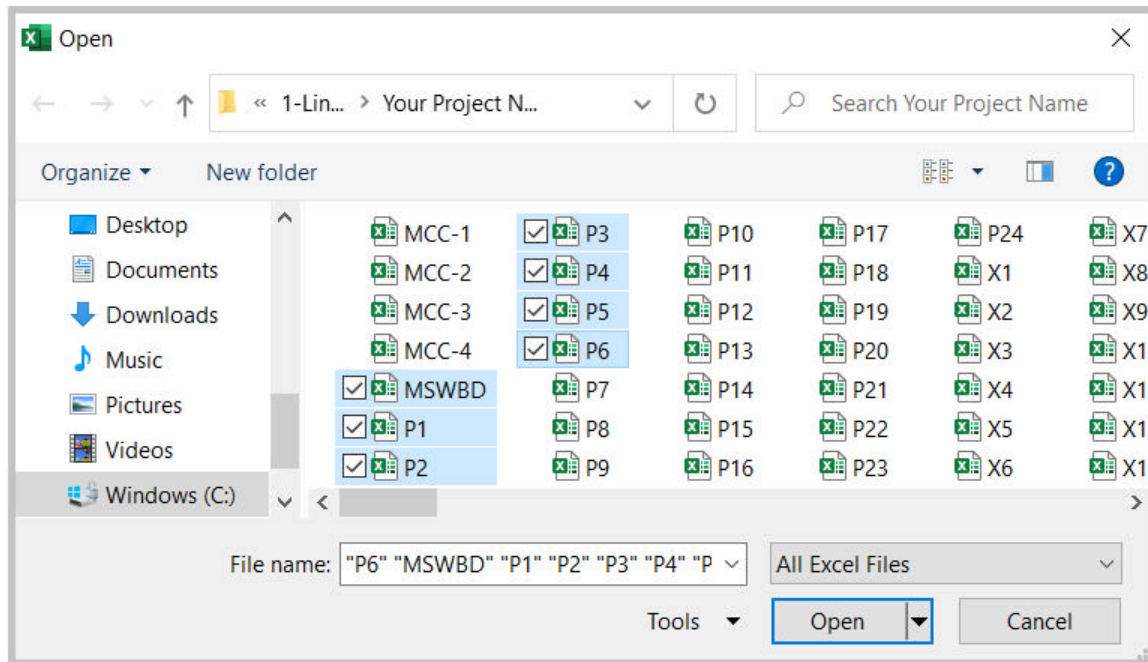
To avoid this you may want to open all active files.

(SEE NEXT PAGE)

OPENING MORE THAN ONE FILE

Let's say you have a main switchboard and 6 panels.

1. Start your Excel program.
2. Select Open
3. When the files appear, use the mouse to select the MSWBD files and P1-P6 files.



4. Then click on OPEN.

When these files are open, all linked formulas will update automatically.

PRINTING LOAD CALCS

If you want to print the load calculations, click on the CALCS tab and use the FILE and PRINT command.

PRINTING THE 1-LINE

If you want to print the 1-Line calculations, click on the 1-LINE tab and use the FILE and PRINT command.

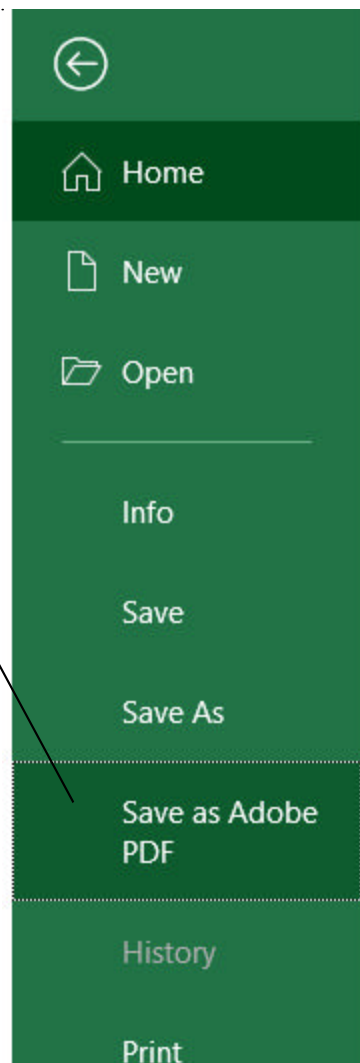
You may want to use the PRINT PREVIEW command to make sure the 1-Line fits on the page. If it prints on more than one page, you may have to adjust the percentage (%) under PAGE SETUP.

NOTE: The 1-Line printout may produce additional blank pages.

CREATING PDF FILES

If you wish to create PDF files of printouts, you will need to have Adobe Acrobat.

If you have Adobe Acrobat, a Save As Adobe PDF command appears under the FILE menu.



USING THE PANEL TEMPLATES

There are 24 panel templates P1 through P24. Do not change the name of these files. Each file links to the MSWBD file and forwards all the load calculations. The panel files also read information from the MSWBD files. It is best to have the MSWBD file open when working with the panel files.

USING THE TABS

The template has twelve (10) tabs.



The first four tabs are for the Panel and the second four tabs are for the Subpanel.

Each tab has a special purpose:

Panel Tabs

Input - This sheet is used to enter information.

Schedule - This sheet is used to review and print the panel schedule.

Calcs - This sheet is used to review and print load calculations.

Directory - This sheet is used to review and print the circuit directory.

Subpanel Tabs

S-Input - This sheet is used to enter information.

S-Schedule - This sheet is used to review and print the panel schedule.

S-Calcs - This sheet is used to review and print load calculations.

S-Directory - This sheet is used to review and print the circuit directory.

Misc Tabs

Copy/Paste - This sheet explains the Paste Values command for Excel.

CAD - This sheet explains how to use the Copy Picture command and paste into a CAD program.

GENERAL ENTRIES

Some cells in the template files are protected. You may only enter information into certain cells. If you are using a color monitor, these cells are yellow or lime green.

1-Line 2026 (Version 26.0A) - Copyright Durand & Associates Warning DO NOT use copy/paste commands with Panel

PANEL	P1	AFC CALCULATION METHOD	AUTO
FED FROM	MAIN SWITCHBOARD		
# OF CIRCUITS	84		
HI VOLTAGE	208	AFC AT THIS PANEL	14,361
LOW VOLTAGE	120	FEEDER	
PHASE	3Y	NUMBER OF CONDUITS	1
		FEEDER CONDUIT	1 1/4"
NEUTRAL SIZE	FULL	WIRE SIZE L1	#3
		WIRE SIZE L2	#3
GND WIRE Y/N	Y	WIRE SIZE L3	#3
WIRE TYPE	THHN	WIRE SIZE NEUTRAL	#3
WIRE CU/AL?	CU	WIRE SIZE GROUND	#8
WIRE TEMP C	75	SUB PANEL PHASE	NONE
WIRE LENGTH	25'		
CONDUIT TYPE	EMT		
MINIMUM AMPS	100		
# KITCHEN LOAD:	0		
% FACTOR	0		
MAIN BKR / FUSE	N		
BREAKER SIZE	NONE		

Yellow Cells

Lime Green Cells

Each unprotected yellow cell requires a user entry. If an invalid entry is made, a RED error message will appear to the left of the entry or an error message will appear in a pop up box.

When you select a cell a hint box will appear.

You may also use the pulldown menu.

GENERAL ENTRIES (continued)

Below is a list of valid entries for the general information section of the panel schedule.

PANEL	P1	Enter the panel name such as LPA. If entry is too long it may be cut off when printed. (As a general rule 22 characters are allowed.)
# OF CIRCUITS	30	Enter number of circuits. (Even number from 6 to 84) or use the pulldown menu.
PHASE	3Y	Enter phase. Note: You may put a 1-Phase panel on a 3-Phase source.
HI-LEG SIZE	AUTO	Select Auto or Full. (3-Phase Delta Only)
NEUTRAL SIZE	AUTO	Select Auto or Full Most of the time you will select Full and the neutral conductor will be sized the same as the line conductor. If you select auto you must identify each line to neutral circuit with a (N) on the panel schedule.
MIN NET AMPS	60	You may enter zero and the program will calculate the proper wire size. You may also enter a minimum value and the program will use the minimum value. If the minimum value is less than the neutral load, the program will size the neutral to handle the neutral load. The program will size the neutral to carry at least 34 percent of the line conductors per NEC requirements.
GND WIRE Y/N	Y	Enter Y or N. If you enter Y, an equipment ground conductor will be added to the feeder conduit(s).
WIRE TYPE	THHN	Select the wire type.
WIRE CU/AL?	CU	Enter CU or AL.
WIRE TEMP	75	Enter the wire insulation temperature.

GENERAL ENTRIES (continued)

WIRE LENGTH	20	Enter wire length.
CONDUIT TYPE	EMT	Select conduit type.
MINIMUM AMPS	100	Enter minimum amps. If the load exceeds the minimum amps, the program will automatically size the wire for Code requirements.
MINIMUM AMPS (L2)	100	Enter minimum amps for hi-leg (L2). If the load exceeds the minimum amps, the program will automatically size the wire per Code.
KITCHEN LOADS	5	Enter the number of kitchen loads.
% FACTOR	20	Enter percentage factor. Example: If you enter 20, the program will provide 20% spare capacity for future loads. You may also use this factor to adjust for voltage drop.
% FACTOR (L2)	20	Enter percentage factor for hi-leg (L2). Example: If you enter 20, the program will provide 20% spare capacity for future loads. You may also use this factor to adjust for voltage drop.
MAIN BKR / FUSE	Y	Enter Y or N. If you enter Y, the program will size the main breaker. If this is a 3-phase delta panel with a reduced size hi-leg (L2), the program will size overcurrent protection using fuses.
SUB PANEL BKR	3-PHASE	Select choice from pulldown menu. If you want a subpanel fed from this panel, select 1-Phase or 3-Phase.
BREAKER POSITION	1, 3, 5	If you have a subpanel, select the breaker position from the pulldown menu.

GENERAL ENTRIES (continued)

DATE 9-5-25	
ABC ELECTRIC COMPANY	
FOR SERVICE CALL (555) 650-3255	

You may enter any information in the green cells and it will appear on the panel schedule.

DISPLAY ONLY

Also, in the general information section there are a group of cells displaying wire and conduit size information. These cells only display information when no errors are present in the template.

AFC CALCULATION METHOD	AUTO
AFC AT THIS PANEL	14,361
FEEDER	
NUMBER OF CONDUITS	1
FEEDER CONDUIT	1 1/4"
WIRE SIZE L1	#3
WIRE SIZE L2	#3
WIRE SIZE L3	#3
WIRE SIZE NEUTRAL	#3
WIRE SIZE GROUND	#8

CIRCUIT ENTRIES

Once you have completed the general entries, you may begin making the circuit entries. Each circuit entry consists of the following:

BREAKER

1	20A-1P	LIGHTING			G	1,800	L1
3	20A-1P	LIGHTING			G	1,800	L2
5	20A-1P	LIGHTING			G	1,800	L3

Enter breaker type.

CIRCUIT DESCRIPTION

1	20A-1P	LIGHTING			G	1,800	L1
3	20A-1P	LIGHTING			G	1,800	L2
5	20A-1P	LIGHTING			G	1,800	L3

Enter circuit description.

CIRCUIT ENTRIES (continued)

3-PHASE DELTA CIRCUITS

If you are entering 1-phase (line to neutral loads) on a 3-phase delta panel, do not put them in the orange cells.

1	20A-1P	LIGHTING			C	1,800	L1
3					C		L2
5	20A-1P	LIGHTING			C	1,800	L3

Hi-Leg (L2)

No 1-phase (line to neutral) loads.

LOAD IDENTIFIERS

H (HARMONIC LOAD)

On 3-phase wye panels, loads subject to harmonic currents (such as electronic ballast and computer equipment) must be identified by placing an "H" in the harmonic identifier column.

#	BKR	CIRCUIT DESCRIPTION	H	I	VA	
1	20A-1P	LIGHTING	H	C	1,800	L1
3	20A-1P	LIGHTING	H	C	1,800	L2
5	20A-1P	LIGHTING	H	C	1,800	L3

Enter "H" or a space (Space Bar)

HOW THE PROGRAM CALCULATES HARMONIC LOADS.

When the harmonic load is 50% or more of the load (on 3-phase wye panels), the, NEC requires the neutral conductor to be considered a current carrying conductor.

Therefore, the feeder conduit has four (4) current carrying conductors and the conductor ampacity must be derated to 80%. The program does this automatically.

LOAD IDENTIFIERS (continued)

NEUTRAL LOADS

If you have selected MINIMUM for neutral sizing, the program will calculate the neutral load and size the neutral separate from the line conductors. This is known as reduced neutral sizing.

For this to work properly you need to identify each line to neutral load in the panel.

#	BKR	CIRCUIT DESCRIPTION	N	H	I	
1	20A-1P	LIGHTING	N	H	C	1,600
3	20A-1P	LIGHTING	N	H	C	1,600
5	20A-1P	LIGHTING	N	H	C	1,600

Enter "N" or a space (Space Bar),

HOW THE PROGRAM CALCULATES NEUTRAL CONDUCTOR SIZE

In the minimum sizing mode the largest line to neutral load is the ampacity used. The neutral conductor is sized on that load or 34% of line conductor ampacity per Code requirements.

CIRCUIT LOAD IDENTIFIERS

There are several ways to identify loads. Listed below are the options.

- G - General Load
- D - Receptacle Load (Diversity)
- C - Continuous Load
- K - Kitchen Load
- M - Motor Load

#	BKR	CIRCUIT DESCRIPTION	N	H	I	
1	20A-1P	LIGHTING	N	H	C	1,600
3	20A-1P	LIGHTING	N	H	C	1,600
5	20A-1P	LIGHTING	N	H	C	1,600

Enter (G, D, C, K, or M)

ENTERING CIRCUIT LOADS

LINE TO NEUTRAL LOADS (1-Pole Breaker)

#	BKR	CIRCUIT DESCRIPTION	N	H	I	VA	
1	20A-1P	LIGHTING	N	H	C	1,800	L1
3					G		L2
5					G		L3

Enter the VA (Volts X Amps) into the cell.

LINE TO LINE LOADS (2-Pole Breaker)

Enter one half of the VA in each cell.

#	BKR	CIRCUIT DESCRIPTION	N	H	I	VA	
1	50A-2P	AC UNIT			M	6,000	L1
3	X X X	X X X			M	6,000	L2
5					G		L3

Example: (50 Amps X 240 Volts) = 12,000 VA
(12,000 VA ÷ 2) = 6,000 VA in each cell

LINE TO LINE LOADS (3-Pole Breaker)

Enter one third of the VA in each cell.

#	BKR	CIRCUIT DESCRIPTION	N	H	I	VA	
1	X X X	X X X			M	4,803	L1
3	50A-2P	AC UNIT			M	4,803	L2
5	X X X	X X X			M	4,803	L3

Example: (40 Amps X 208 Volts X 1.732) = 14,410 VA
(14,410 VA ÷ 3) = 4,803 VA in each cell

SUBPANEL GENERAL ENTRIES

FED FROM

SP1
TRANSFORMER (3-PHASE)
P1
TRANSFORMER (1-PHASE)
TRANSFORMER (3-PHASE)

Select Choice

KVA

AUTO
AUTO
25
30
37.5
45
50
60
75

If you select a transformer, you can select the KVA rating or select AUTO and the program will size the transformer automatically.

VD ADJUSTMENT

% FACTOR	0	
VOTAGE DROP ADJUSTMENT	10	0
MAIN BKR / FUSE	Y	

If you are using a transformer, a voltage drop adjustment appears. Use this rather than % Factor to adjust for voltage drop.

XMFR % Z RATING

AFC AT THIS PANEL	2,629
TRANSFORMER % Z RATING	2.5%
AFC AT TRANSFORMER PRIMARY	9,536
SECONDARY FEEDER FROM TRANSFORMER	

If you are using a transformer, a transformer % Z rating appears. Enter the % Z rating of the transformer.

PRINTOUTS

Each panel schedule template is designed to print out four (4) sheets for the panel and four (4) sheets for the subpanel.

- Panel Schedule
- Load Calculation
- Directory
- Error Checking Report

Using the mouse, click on the tab to display the sheet you wish to print. When the sheet is displayed, use the FILE/PRINT command.

NO COPY/PASTE

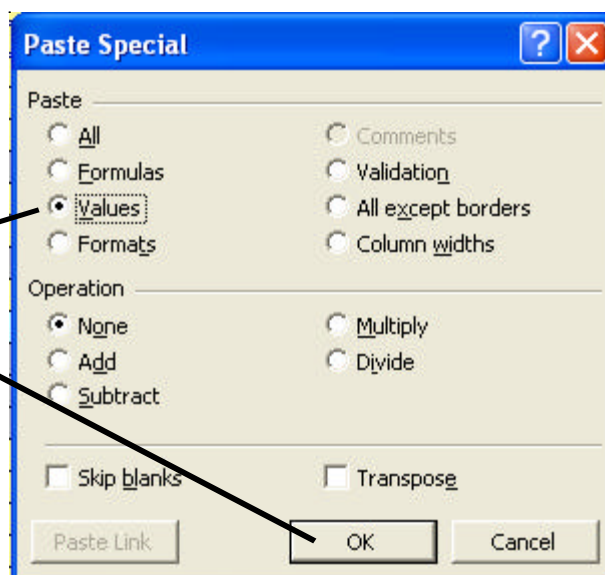
Do not use the COPY and PASTE commands on this template as they can corrupt the file.

Each cell in this template has been formatted with error checking and performance codes. When you copy a cell and use the paste command, these formats and performance codes are pasted to the new location.

PASTE SPECIAL (Values Only)

To avoid corrupting the file use the COPY and the EDIT/PASTE SPECIAL command selecting VALUES from the paste special menu.

Click on "Values"
and click OK.

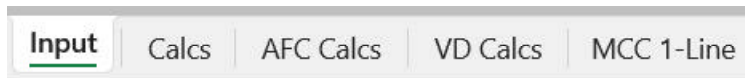


USING THE MOTOR CONTROL CENTER TEMPLATES

There are 4 MCC templates MCC-1 through MCC-4. Do not change the name of these files. Each file links to the MSWBD file and forwards all the load calculations. The MCC files also read information from the MSWBD files. It is best to have the MSWBD file open when working with the MCC files.

USING THE TABS

The template has five (5) tabs.



Each tab has a special purpose:

MCC Tabs

Input - This sheet is used to enter information.

Calcs - This sheet is used to review and print load calculations.

AFC Calcs - This sheet is used to review and print the fault current calculations.

VD Calcs - This sheet is used to review and print the voltage drop calculations.

MCC 1-Line - This sheet is used to review and print the MCC 1-Line.

GENERAL INFORMATION

General Information	
MCC NAME	MCC3
FED FROM	MSWBD
# OF CIRCUITS	3
CODE YEAR	2026
VOLTAGE	208
PHASE	3Y
HERTZ	60
AVAILABLE FAULT CURRENT	38,500
MINIMUM AMPS	0
GROUND WIRE	YES
WIRE TYPE	RHW
WIRE CU/AL?	CU
WIRE TEMP C	75
WIRE LENGTH	50'
CONDUIT TYPE	EMT
% FACTOR	10%
MAIN DISCONNECT	BREAKER
BREAKER SIZE	60

- **MCC Name** (Enter the name of the MCC)
- **Fed From** (Enter the power source for the MCC)
- **# Of Circuits** (Enter the number of circuits 1-20)
- **Phase** (Select the phase from the pulldown menu)
 - 1 = 1-Phase
 - 3D = 3-Phase Delta
 - 3Y = 3-Phase Wye
- **Minimum Amps** (Enter the minimum amps)

The minimum amps is the smallest size allowed for the service. If the load exceeds the minimum amps, the program will automatically size the service to the correct size.
- **Ground Wire** (Select YES or NO)
- **Wire Type** (Select wire type)
- **Wire CU/AL** (Select CU or AL)
- **Wire Temp C** (Select 60, 75, or 90)
- **Wire Length** (Enter the length of the wire)
- **Conduit Type** (Select conduit type)
- **% Factor** (Enter percent factor)

This factor is used two ways. If you enter 20%, the ampacity of the MCC and conductors will be increased 20%. You can also use this factor to correct for voltage drop.
- **Main Disconnect** (Select BREAKER, FUSED SWITCH, or NON-FUSED SWITCH)

MOTOR INFORMATION

	MOTOR DESCRIPTION	PHASE	HP	OVERCURRENT PROTECTION	OVERCURRENT % OF FLA
1	MOTOR #1	3Y	1	BREAKER	175%
2	MOTOR #2	3Y	5	BREAKER	175%
3	MOTOR #3	3Y	5	BREAKER	175%
4	MOTOR #4	3Y	5	BREAKER	175%

Enter motor
description.

Select
Phase.

Select
Motor HP.

Select
Overcurrent
Protection.

Select % of
FLA for
Overcurrent
Protection.

CONDUIT LENGTH	CONDUIT TYPE	WIRE TYPE	WIRE CU/AL	GROUND WIRE	WIRE TEMP	DISCONNECT AT MOTOR
10'	RIGID	THHN	CU	YES	75	YES
20'	RIGID	THHN	CU	YES	75	YES
30'	RIGID	THHN	CU	YES	75	YES
40'	EMT	THHN	CU	YES	75	YES

Enter
Conduit
Length.

Select
Conduit
Type.

Select
Wire
Type.

Select
CU or AL.

Select
YES or NO.

Select
Wire
Temp.

Select
YES or NO.

END OF USER'S GUIDE