# ANALYZER

## User Guide

### (Version 3.2 – June 2021)

# Analyzer Software

**User Guide** – **Version 3.2**

# Contents :

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### System Requirements

- Windows 8.1 or newer version
- Processor: 1 GHz or faster 32-bit or 64-bit
- 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- DirectX 9 graphics device with WDDM 1.0 or higher driver
- Screen Resolution 1280 x 1020 or more
- High Speed Internet Connection

# 1. <u>Installation</u>

After requesting the software, our team will get back to you promptly. You will receive a similar email inviting you to download and install the program:
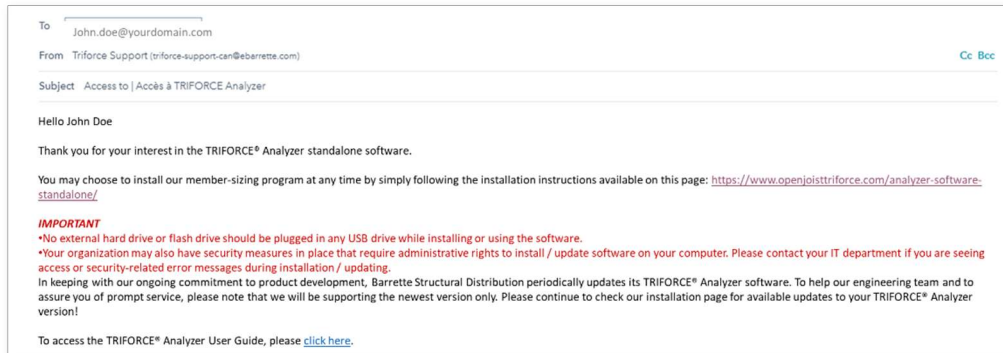


Use the specified hyperlink to access the download page and follow the instructions for the installation.
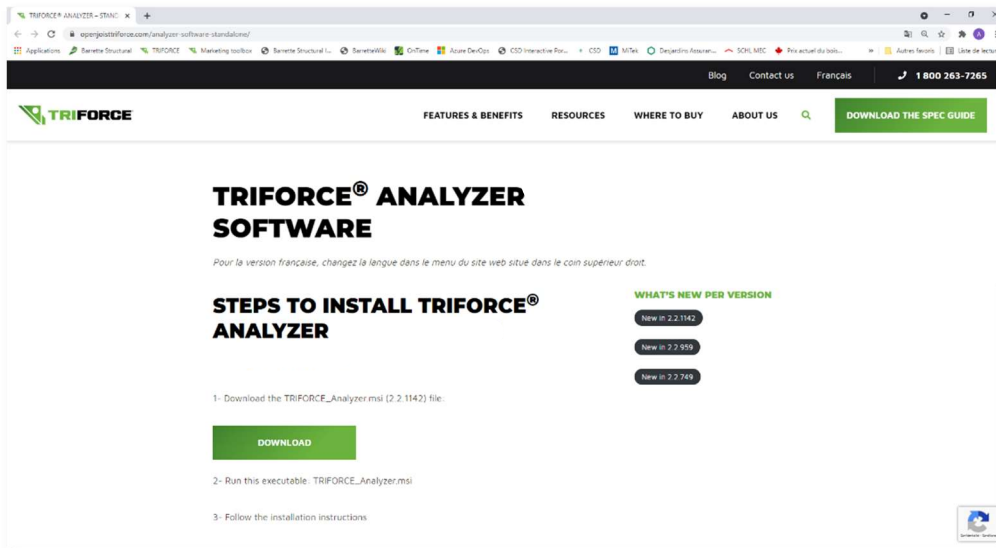


If you have installation issues, please do not hesitate to contact us. We will be glad to assist you.

**Email:**     CAN : triforce-support-can@ebarrette.com

         USA : triforce-support-usa@ebarrette.com

**Toll Free:**   1-800-263-7265

Note that our offices are open Monday to Friday, from 8 a.m. to 5 p.m. (EDT)

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## 2.   Start Analyzer

During the Installation of Analyzer, a "TRIFORCE® Analyzer" icon will be installed.

Launch the application by clicking the **TRIFORCE® Analyzer** icon.

When first launching the Analyzer software, you will need to configure your defaults in the "Preference" section. Please refer to Section 4 for more information.

## 3.   File

In the **File** Tab, you will be able to:
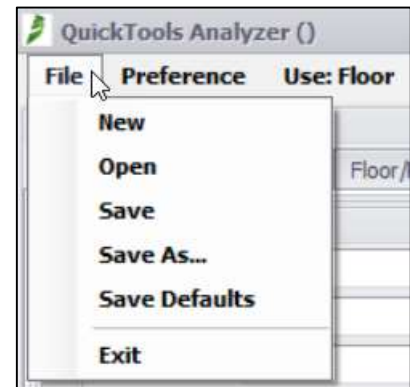
**New:** Creates a new joist design

**Open:** Open an existing design

**Save:** Allows you to save a joist design

**Save As:** Allows you to save the design under a different name.

**Save Defaults:** Save the last design configurations as defaults setting.

**Exit:** To Exit Analyzer.
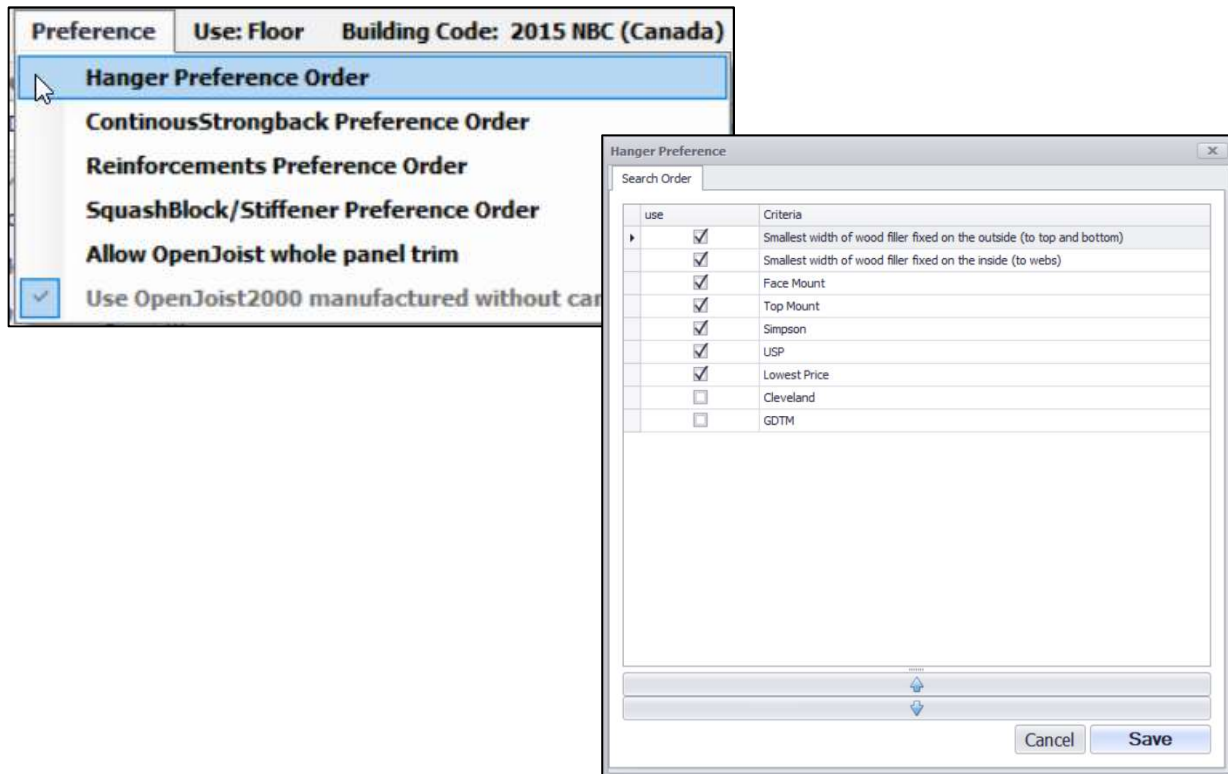
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# 4. <u>Preference</u>

In the **Preference** Tab, you will be able to select and give priority to different materials in order to analyse your joist as per your personalized settings.
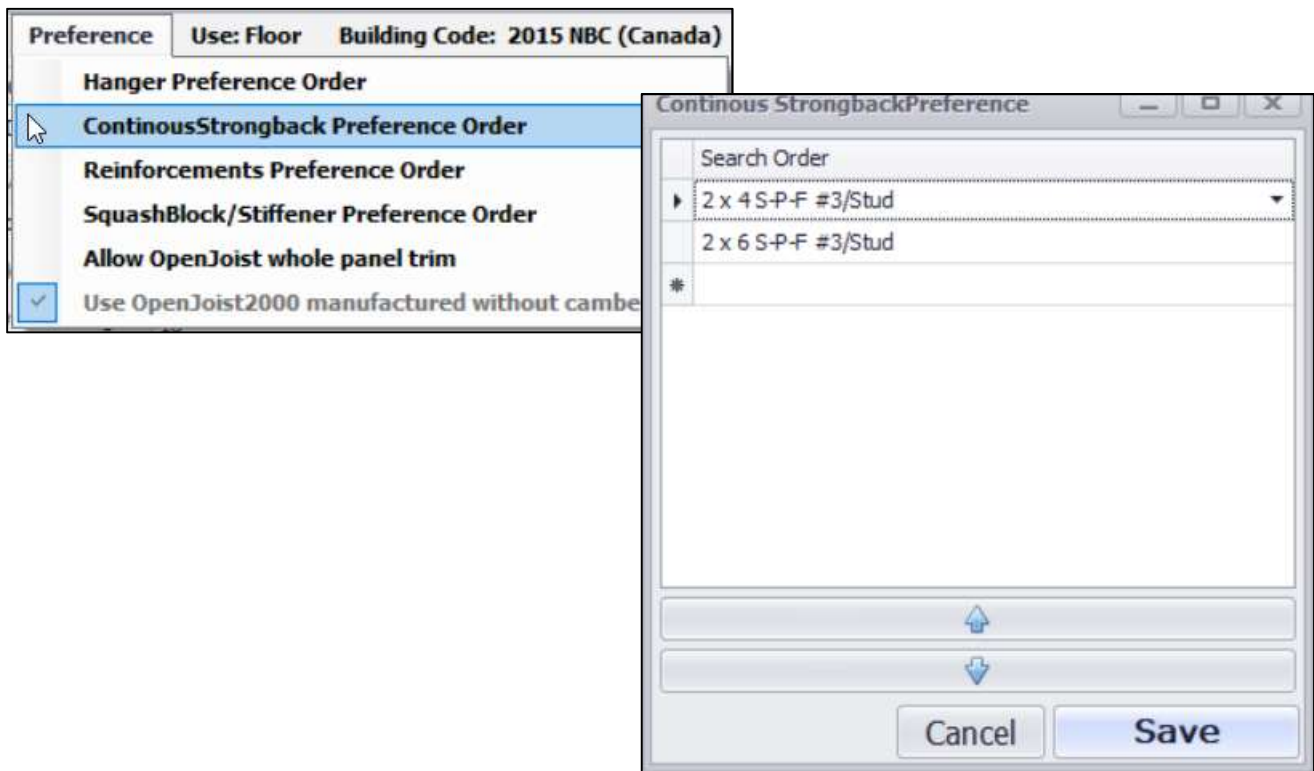
For Hanger, Continuous Strongback, Reinforcement and Squash Block/Stiffener, you can click on the empty box in order to add any other material that will then be available in the Database (see page 12).

You can select any row and move it up and down using the arrows appearing at the bottom of the dialog box. Don't forget to click on "save" before closing any dialog box!

## 4.1 Hanger Preference Order:

| Preference | Use: Floor | Building Code: 2015 NBC (Canada) |
|---|---|---|
| **Hanger Preference Order** | | |
| **ContinousStrongback Preference Order** | | |
| **Reinforcements Preference Order** | | |
| **SquashBlock/Stiffener Preference Order** | | |
| **Allow OpenJoist whole panel trim** | | |
| ✓ Use OpenJoist2000 manufactured without car | | |

**Hanger Preference**

Search Order

| use | Criteria |
|---|---|
| ✓ | Smallest width of wood filler fixed on the outside (to top and bottom) |
| ✓ | Smallest width of wood filler fixed on the inside (to webs) |
| ✓ | Face Mount |
| ✓ | Top Mount |
| ✓ | Simpson |
| ✓ | USP |
| ✓ | Lowest Price |
| ☐ | Cleveland |
| ☐ | GDTM |

Cancel  Save

## 4.2 Continuous Strongback Preference Order:



You can select the size and grade for strongbacks and set the preference search order. Those strongbacks are used for the Canadian Vibration Criteria analysis and are not required in the US.

Even if they are made mandatory by the Canadian Building Codes and remain optional in the US, strongbacks can be added when working under the ICC code mode by simply checking "**Perform Canadian vibration check**" under Floor / Roof Composition:

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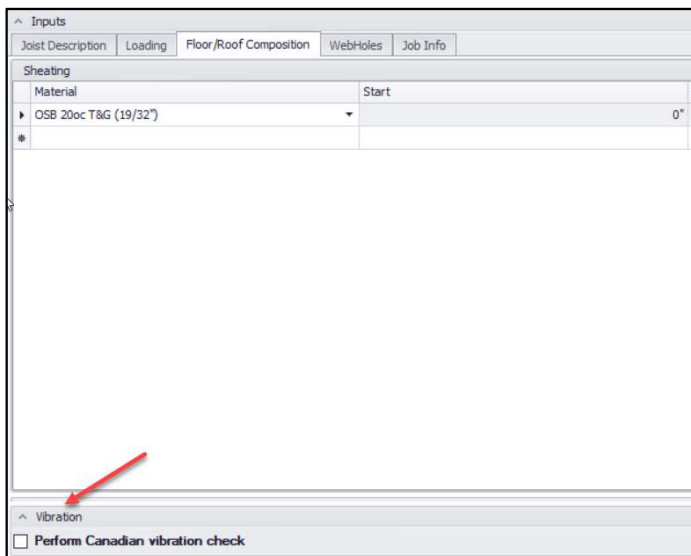
## 4.3 Reinforcements Preference Order:
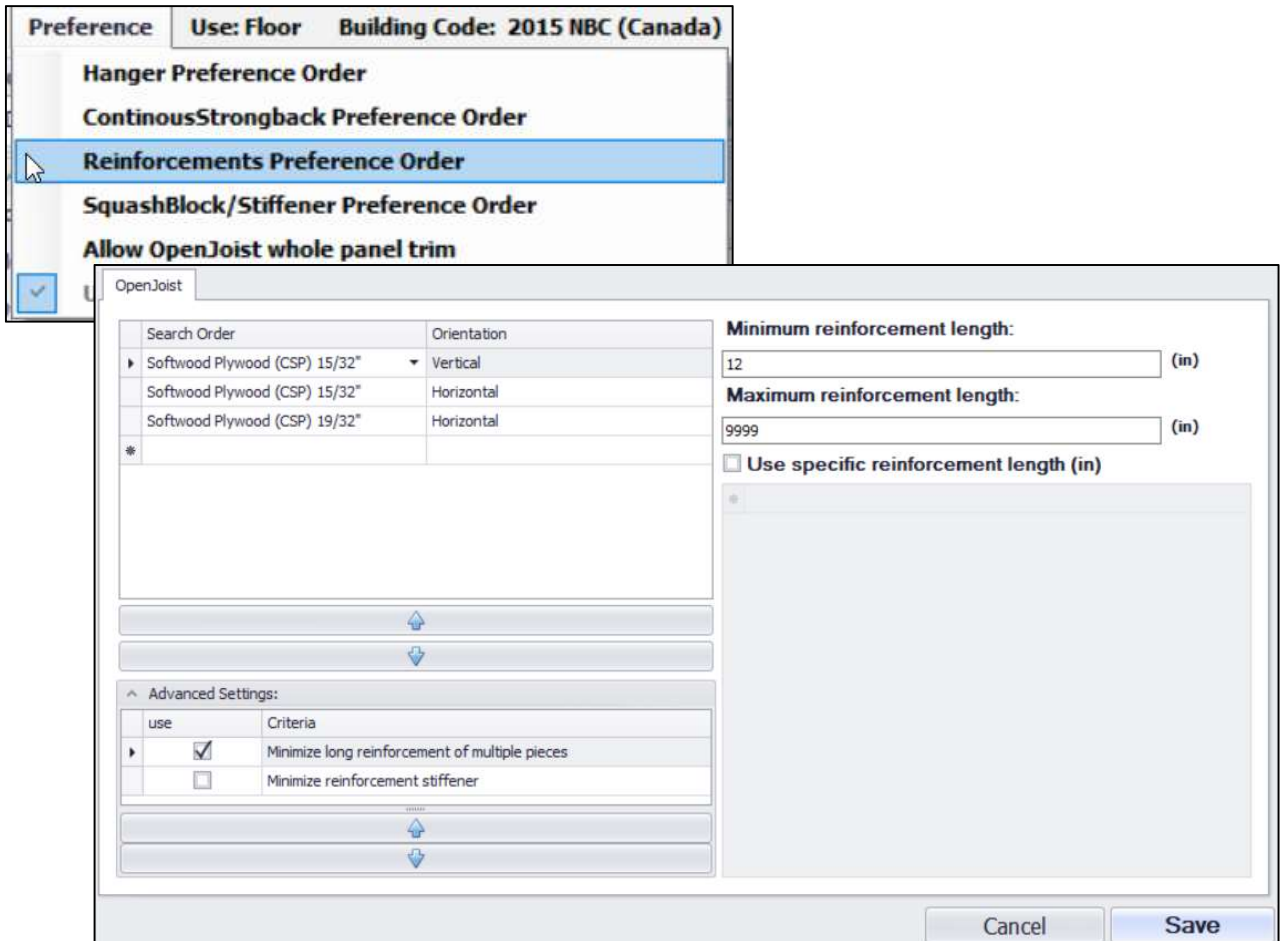


You can select different materials such as OSB/Plywood, thickness and even select its orientation: vertical or horizontal.

Hint: Vertical material is stronger than horizontal material but would need a joint cover if the request length is more than 48''.

These reinforments will be used for reinforced girders, cantilevered joists, etc.

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### 4.4 SquashBlocks/Stiffeners Preference Order:
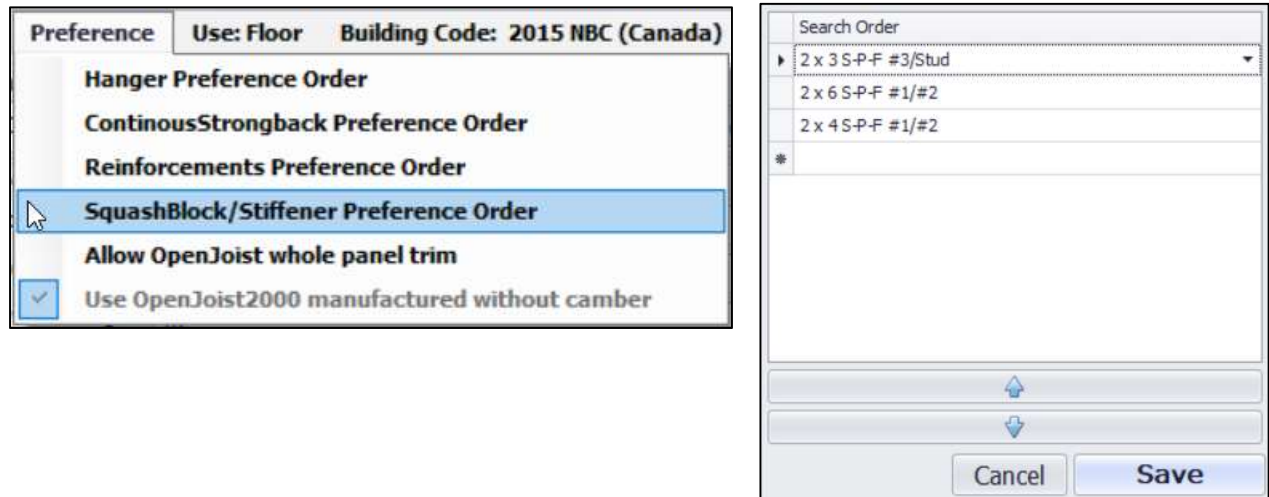


Those squash blocks or web stiffeners are used for reinforcement under a concentrated load on top or at bearings. Once again, you can select different sizes and grades.

### 4.5 Allow OpenJoist whole panel trim:

The TRIFORCE® open joists are manufactured every 2 feet. Every now and then, we have customers having the joist cut more than 24". By selecting "Allow OpenJoist whole panel trim", you have access to analyze the joist when cut more than the recommended 24".
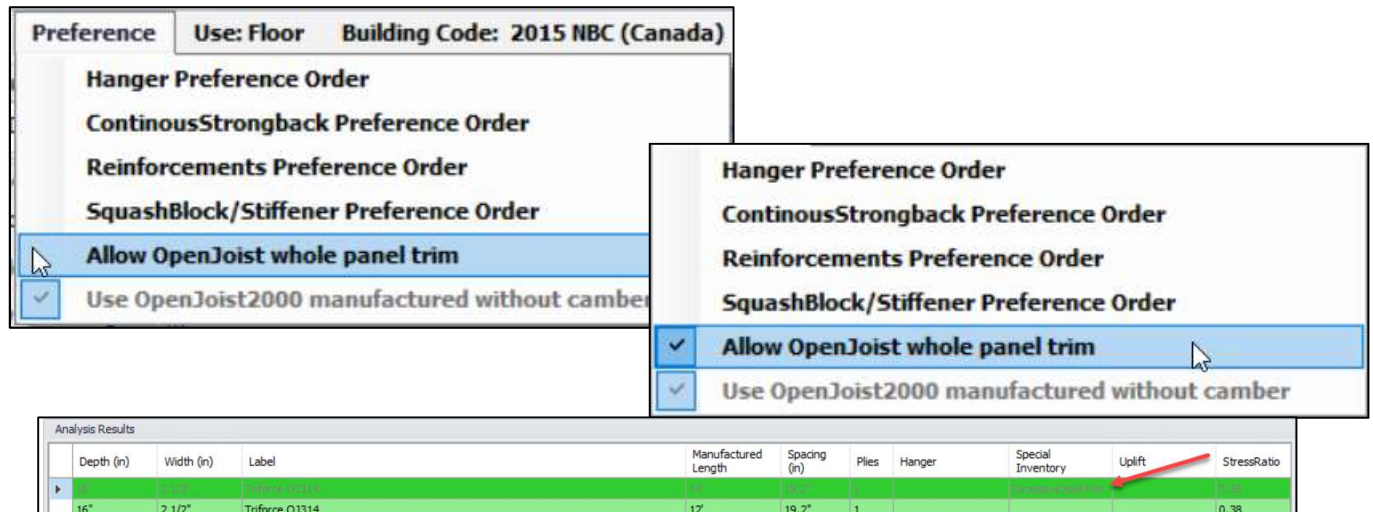


### 4.6 Use OpenJoist2000™ manufactured without camber:
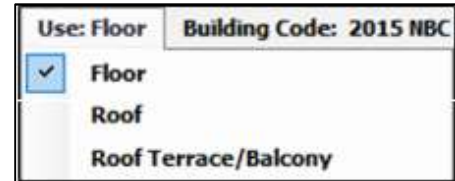
This feature is for licensees manufacturing Open Joist 2000™ products only.

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## 5.  Use

When designing a joist, you need to select the usage of that joist:

- Floor
- Floor Limited Accessibility
- Roof
- Roof Terrace/Balcony

| Use: Floor | Building Code: 2015 NBC |
|---|---|
| ✓ Floor | |
| Roof | |
| Roof Terrace/Balcony | |

Depending on the usage selected, the values used for the analysis could be different due to local building code used.

## 6.  Building Code

Up-to-date Canadian and US codes are available:
Hint: When changing your code selection,
your data aren't retained.
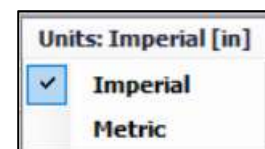
| |
|---|
| 2005 NBC (Canada) |
| 2010 NBC (Canada) |
| 2015 NBC (Canada) |
| 2012 OBC 2010 NBC (Ontario, Canada) |
| 2012 OBC 2015 NBC (Ontario, Canada) |
| ICC 2012-IBC/IRC (USA) |
| ICC 2015-IBC/IRC (USA) |
| ✓ ICC 2018-IBC/IRC (USA) |

## 7.  Units

Imperial or Metric units are available for your designs:
Hint: When changing your unit selection, your data will be retained.

| Units: Imperial [in] |
|---|
| ✓ Imperial |
| Metric |

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## 8.  Inventory & Inventory Threshold

### 8.1 Inventory:

The default inventory is set to "All Available" TRIFORCE® open joists SKU Manufactured by Barrette Structural Distribution.

### 8.2 Inventory Threshold:

You can sort your inventories by using those 4 different categories in the Database (see page 12):

- Not Available
- Authorization Required
- Occasional
- Available

## 9.  Language

French and English are available:
Hint: When changing language, your data aren't retained and the software will exit and restart.
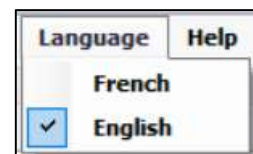
## 10.  Analyze

If you select "Analyze" or press down on F5 on your keyboard, all data input will be analyzed.

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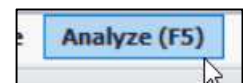
## 11. Help



### 11.1 Signal Error:

If an error occurs or you find one, please send us an email to the following address:
analyzer-support@ebarrette.com
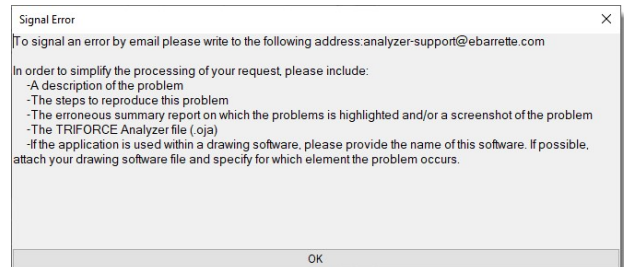


### 11.2 Install New Web Authentication Certificate:

This new version now allows the automatic Web Authentication certificate renewal. The program will automatically and regularly check with our license server. To achieve this, your computer needs to be connected to the Internet.

In rare occasion, or if your computer was disconnected from the Internet for a long period of time, you may have to manually prompt the automatic renewal of your Authentication Certificate by clicking on "install New Authentication Certificates" in the Help Menu.



You will be prompt to enter the email submitted when requesting access to the software.
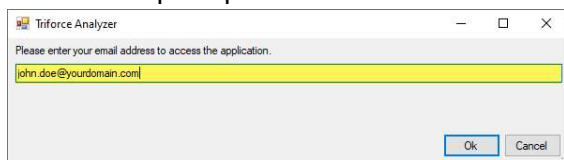
## 12. Database:

In the Database, you will be able to setup the Inventory Threshold category selected (see page 10):
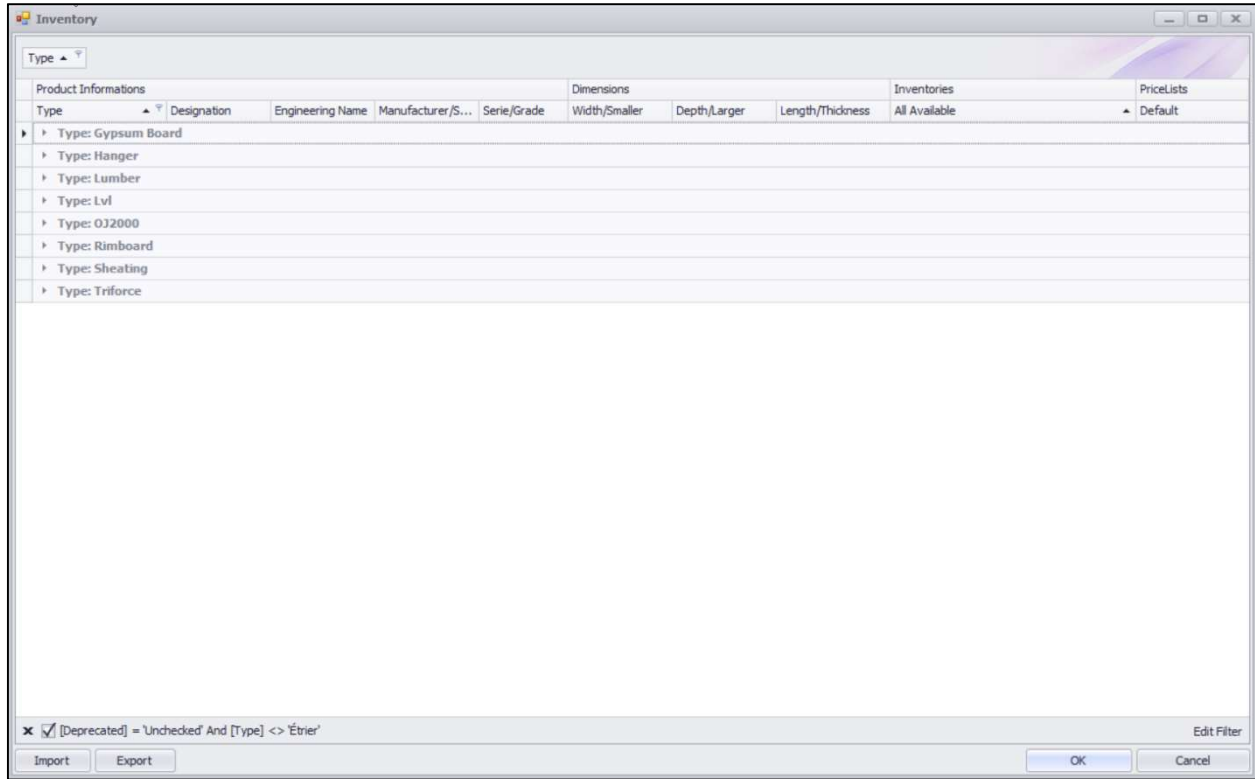


In each type of material, you will be able to change the product inventories default and price.
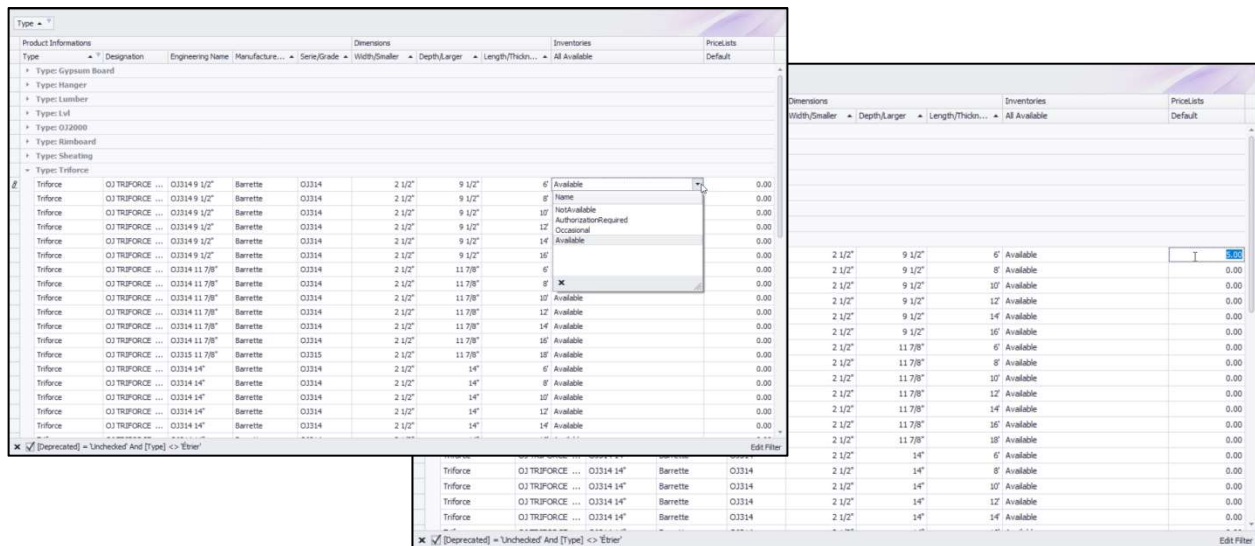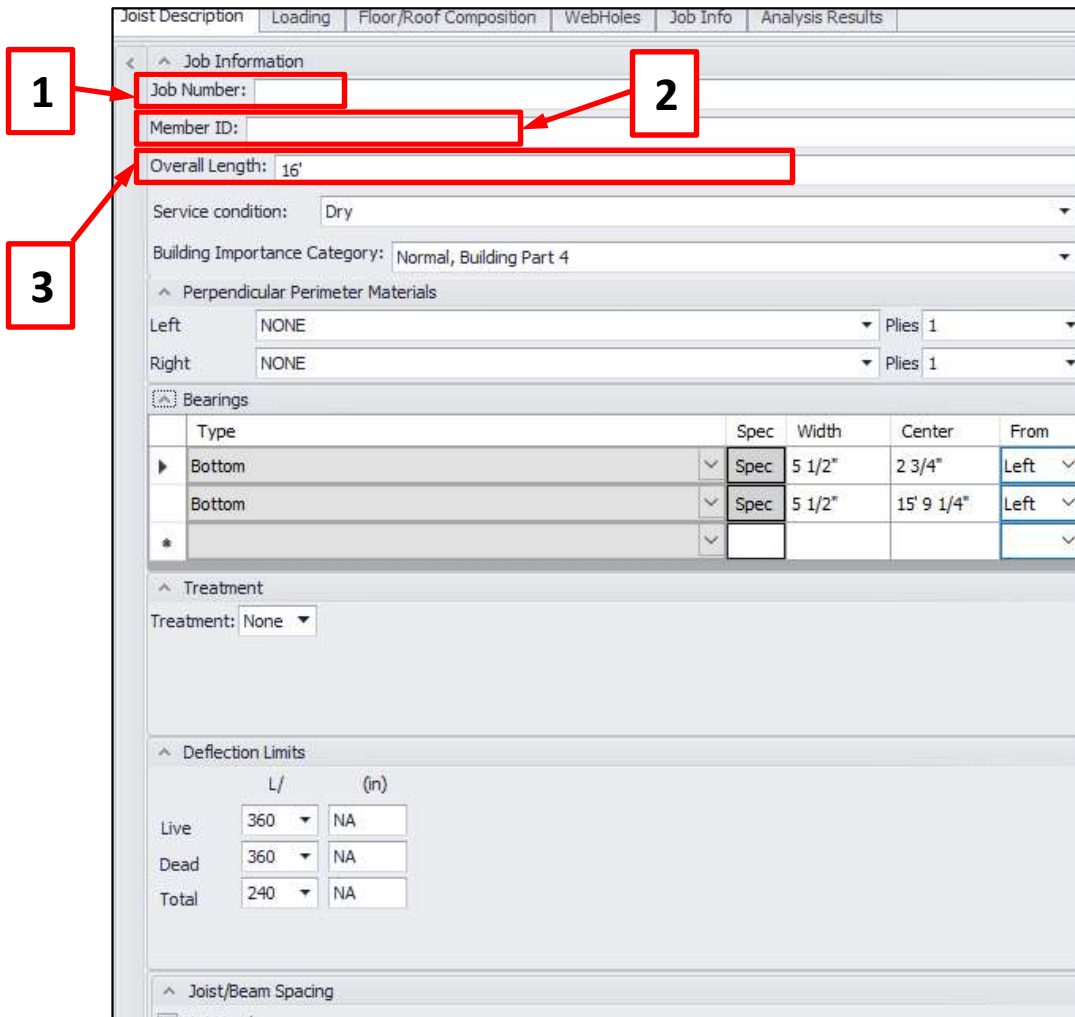


It allows you to sort material per price or per product availability.

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## 13.  Inputs:

### 13.1 Job Description:

1- **Job Number:** project reference name
2- **Member ID:** joist/girder identification
3- **Overall Length:** total length of the joist including the perimeter/rim board material
   Use FFIISS (feet, inch, sixteenth inch) format.
   For example; 13' 5-3/16" would be entered as 130503



### 13.2  Service Condition:

Normal condition is DRY

Could be WET only for Lumber or Glulam material (not available yet) as per application and local code.

## 13.3 Building Importance Category:
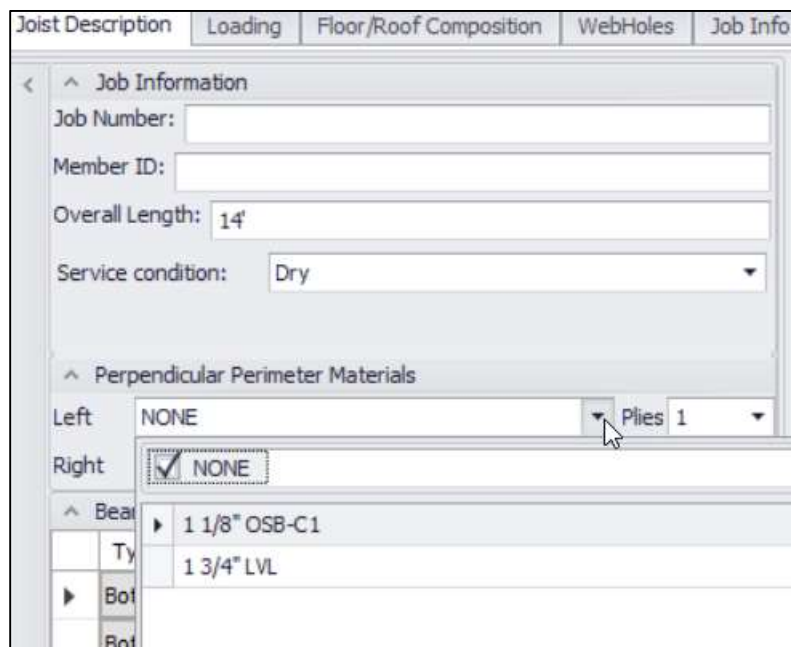
For NBC in Canada only (application as per code) not available for ICC code (USA):



## 13.4 Perpendicular Perimeter Materials:

You can select NONE, 1 1/8" OSB or 1 ¾" LVL



You can select 2 plies for the OSB only.

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### 13.5 Bearings:

You must specify the width of the bearing. This width includes the perpendicular perimeter material:
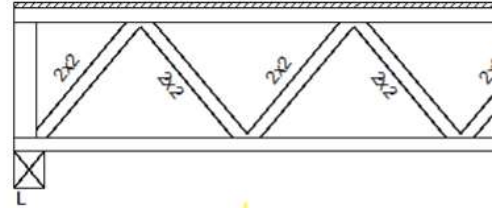


Bottom bearing could be a dropped beam, a bearing wall or a foundation with a sill plate.
You can create a cantilevered joist by moving the centre of the bearing:
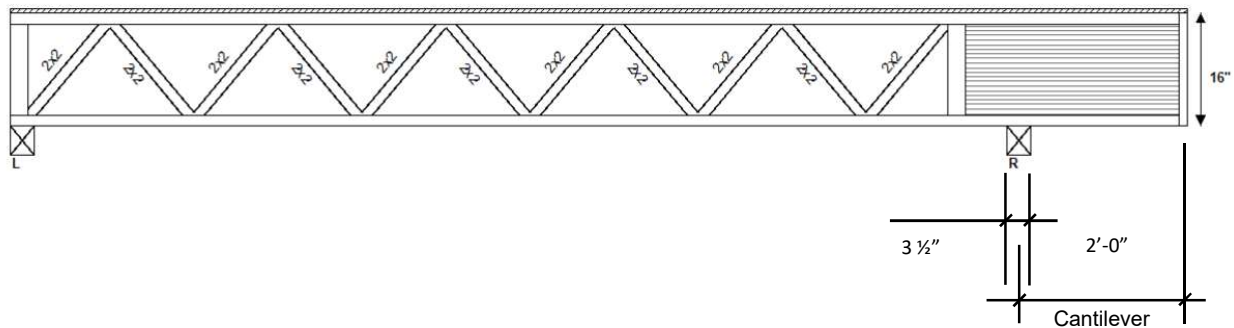




You can also create a third bearing by adding one:

Hint: since it's an open web joist, TRIFORCE® joist will need reinforcement.
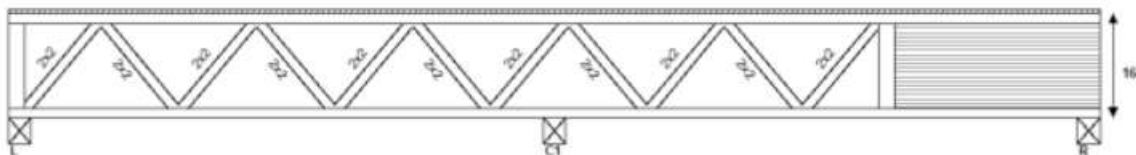
Hangers are also available for bearings. You would need to select hanger details or let it be sorted by your previous setting input as preference (see page 5). The supporting beam will need to be selected.





Simpson IUS2.56/16
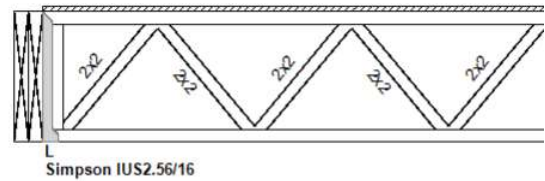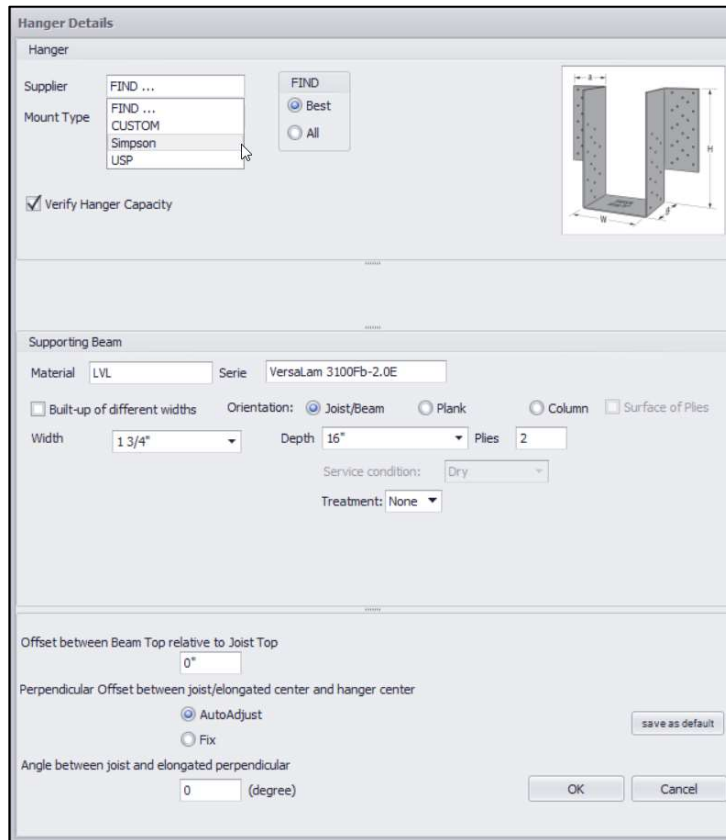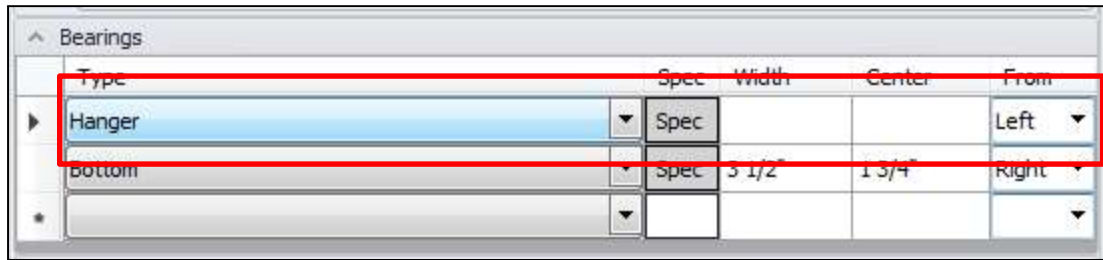
## 13.6 Treatment:
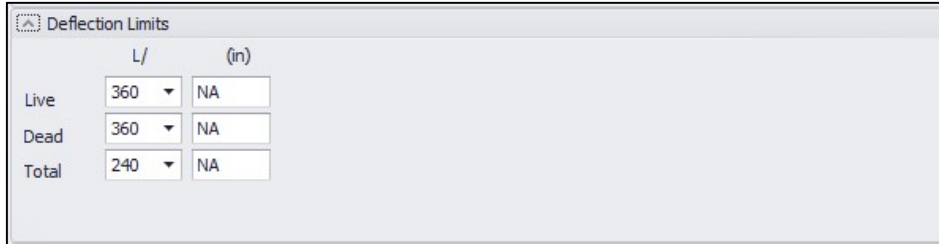
This section does not use for TRIFORCE® products. Leave "None" as the default option.
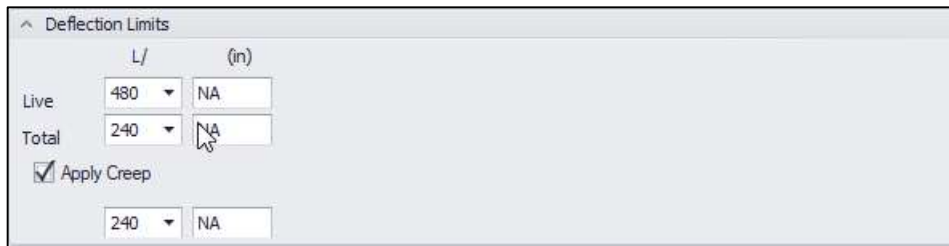
### 13.7 Deflection Limits:

Select or write the deflection needed as per Architect and/or Engineer requirement under live, dead and total. If you are using the ICC codes, you will have access to check "Apply Creep" (see local code for requirements).
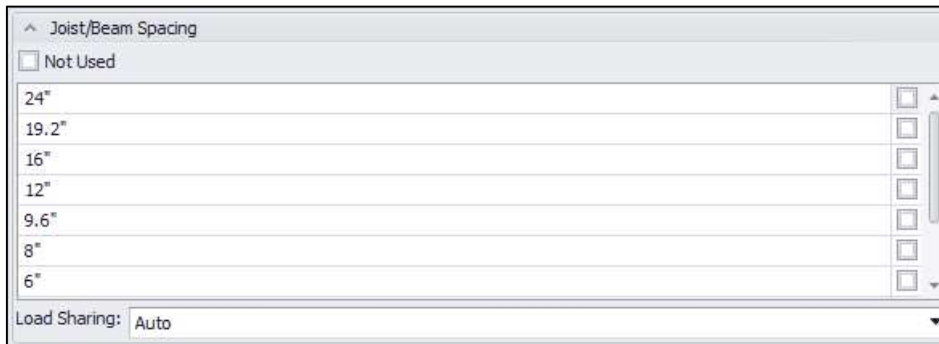




### 13.8 Joist/Beam Spacing:

Select or write the spacing needed as per Architect and/or Engineer requirement.
Load sharing is defined at "Auto" by default and use the load sharing factor applicable to the material if authorise by the standard. There is no load sharing factor authorised for TRIFORCE® Joist or others manufactured Joists.



When designing a girder, you must check "not used," so it won't add tributary loading as per spacing.
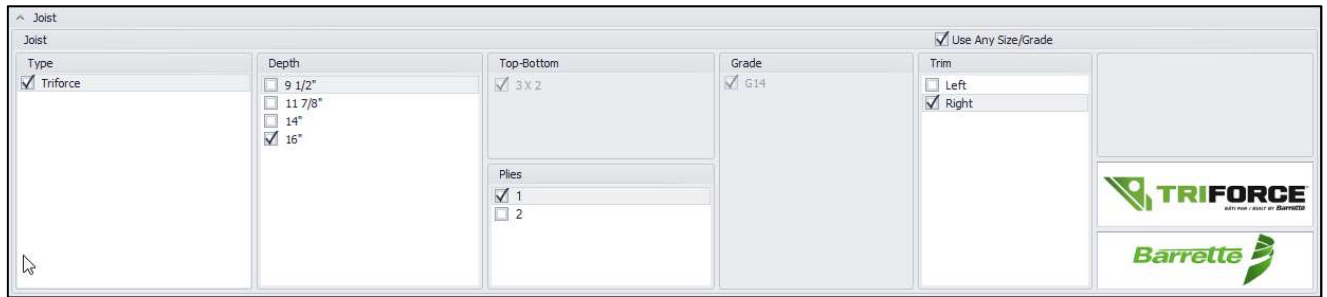
### 13.9 Type:

TRIFORCE® is the only choice available, except for Open Joist 2000 licensees.



### 13.10 Depth:

Select depth required

### 13.11 Top-Bottom:

Available to select other sizes if "Use Any Size/Grade" is unchecked (not recommend)

### 13.12 Plies:

Select plies required

### 13.13 Grade:

Available to select other sizes if "Use Any Size/Grade" is unchecked (not recommend)

### 13.14 Use Any Size/Grade:

To have other sizes and wood grade (not recommend)

### 13.15 Trim:

Select the side you want the OSB panel (ex. Right)

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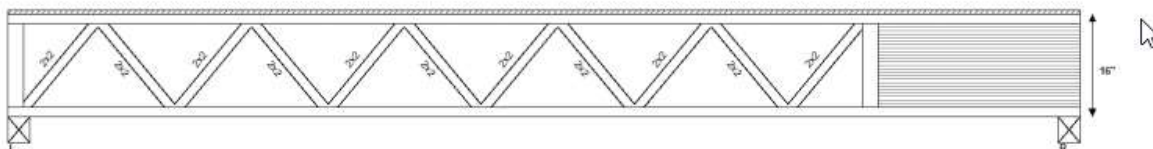
## 14.  Viewer:
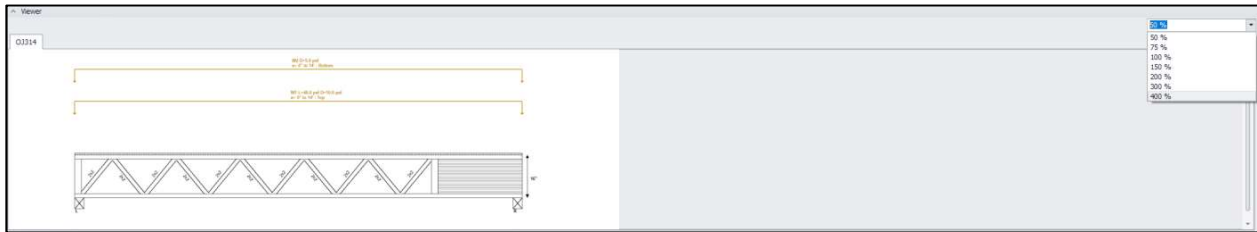


On the left side, you will see all loadings and the length and depth of the joist to be analyzed:
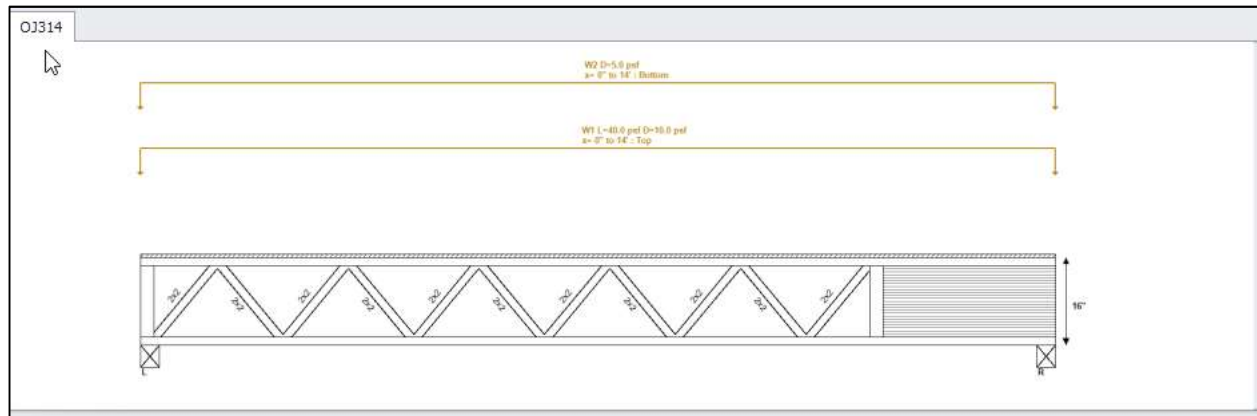


On the right side, you have access to the percentage value you want the joist to appear (50% by default):
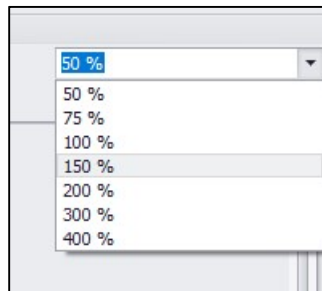
## 15. Loading:
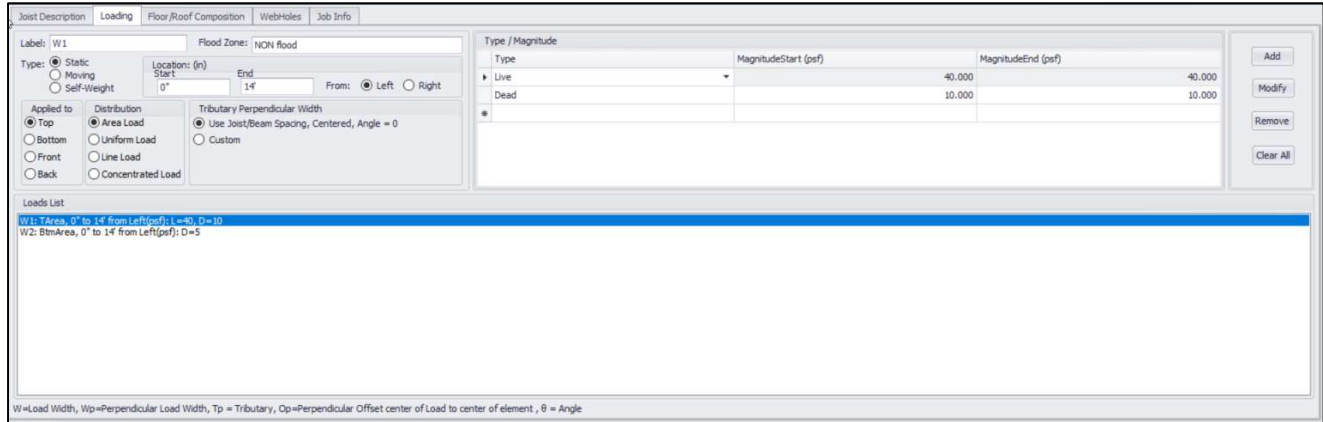


### 15.1 Label:

Label for load inputs will be displayed in the loads list

### 15.2 Flood Zone:

Available for USA ICC code only. Applied as per code if required

1- NON flood (by default)
2- V flood
3- COASTAL A flood
4- OTHER flood

### 15.3 Type:

1- **Static:** load type as per application (see local code)
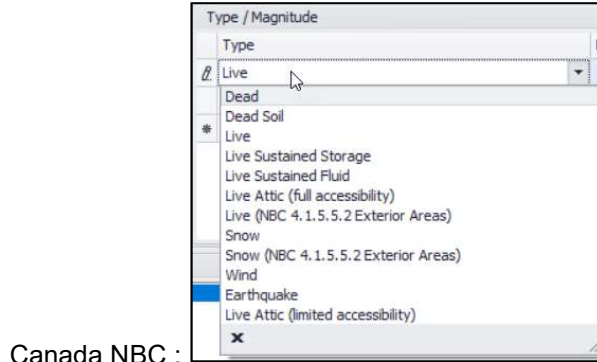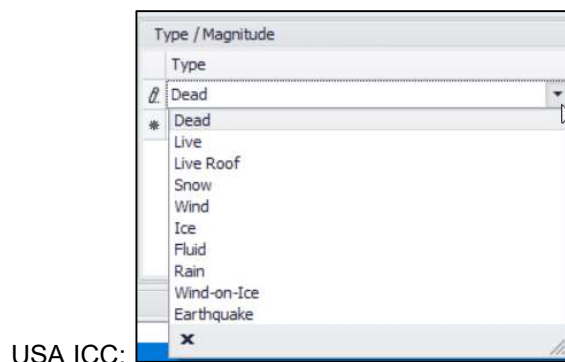


USA ICC:



Canada NBC :

2- **Moving Load:** load type as per application (see local code)

USA ICC:



Canada NBC:



3- **Self-Weight:** self-weight adjustment if needed (not recommend to change it)



## 15.4  Applied to:

1- Top
2- Bottom
3- Front
4- Back



Hint: all beams attached to the side of a girder needs to be applied front or back even if using top mount hangers. See appendix A for maximum load protection.

## 16.  Distribution:

1- Area Load
2- Uniform Load
3- Line Load
4- Concentrated Load



### 16.1 AREA LOAD (PSF):





Area load is applied per "psf" (Standard floor loadings)

For area load, you can select "use Joist/Beam spacing, centered, Angle = 0" or "custom." The first option calculates the area load as per preselected spacing. The second one gives you the option on changing the spacing for a custom tributary perpendicular width like 14" for example.

### 16.2 UNIFORM LOAD (PLF):



Uniform load is applied per "plf" (Wall parallel to joist transferring loads)

### 16.3 LINE LOAD (PLF):



Line load is applied per "plf" (perpendicular or angle bearing wall transferring loads)

For line load, you can select "use Joist/Beam Width, centered, Angle = 0" or "custom." The first option calculates the line load to be the same width as per the joist spacing. The second one gives you the option on changing the spacing for a custom tributary perpendicular width, like 14" for example.

### 16.4 CONCENTRATED LOAD (LBS):



Concentrated load is applied per "Lbs" (top, Bottom, front or back)

For concentrated load, you can select "use Joist/Beam Width, centered, Angle = 0" or "custom" for the top and bottom only. The first option calculates the concentrated load to be the same width as per the joist width. As for custom, you can select the total width of the concentrated load applied to the top or bottom; if it's not centred select the offset from the centre line and select the angle of that it would be installed if not installed at 90 degrees.

## 17. Loads list and Viewer:
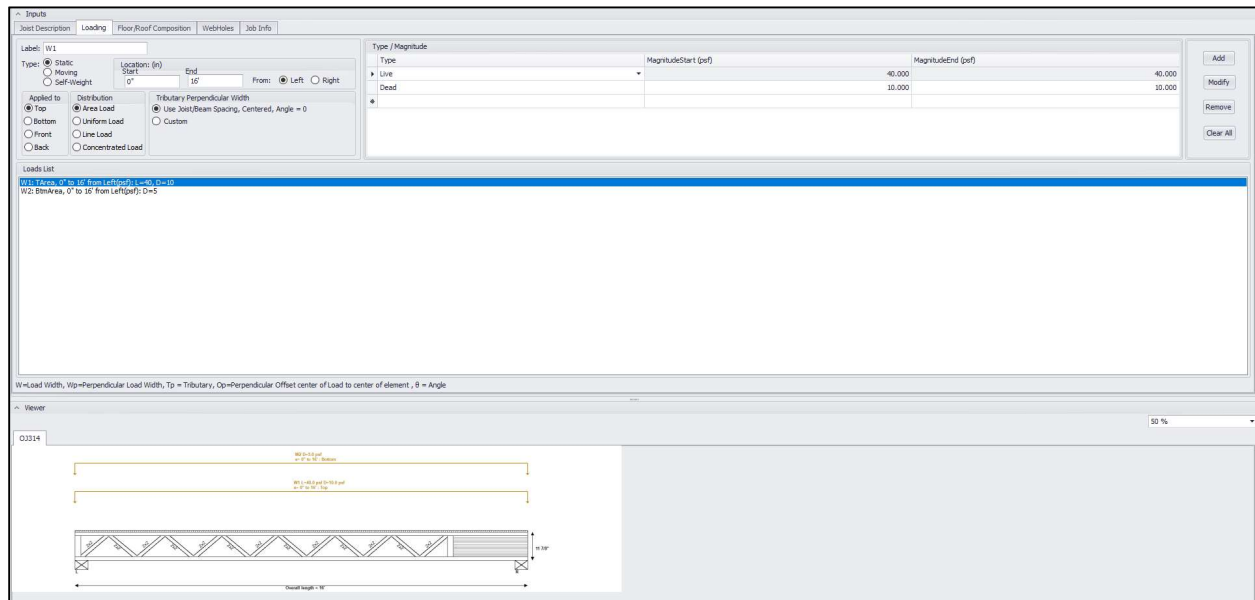


You can see all the loads input in the "loads list" and in the "viewer".

## 18. Floor/Roof Composition:

1- Sheathing
2- Ceiling
3- Gypsum Board
4- Vibration

### 18.1 SHEATHING:
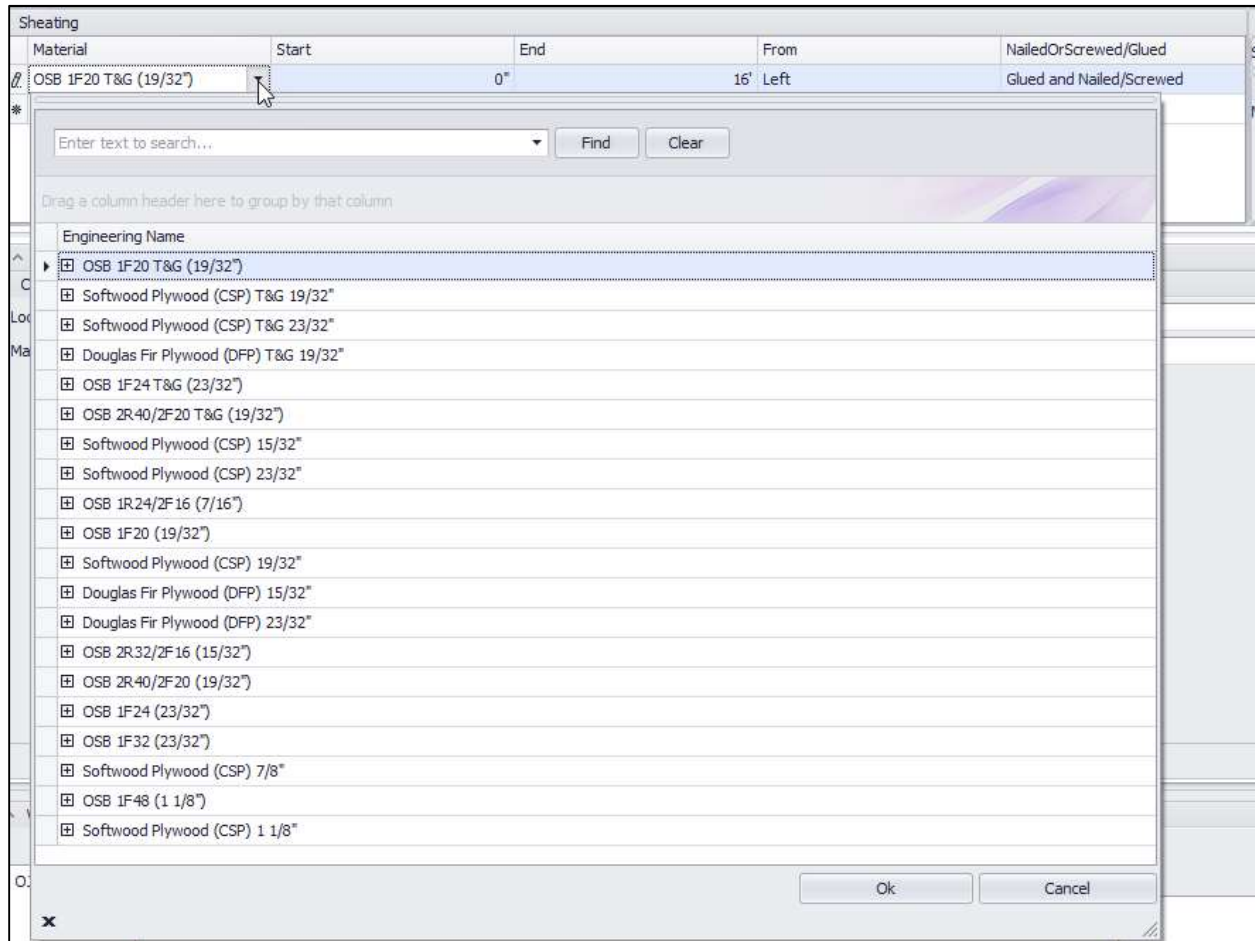


Material: select the one you need (for more material, see Database)

Start/End/From: select from where you want your sheeting to start and to end. Ex.: You could have an attic without having the sheathing all the way because of the rafters crossing the joist at bearing.

Nailed OR Screwed/Glued: you can select rather *glued and nailed/screwed* or *nailed/screwed*:
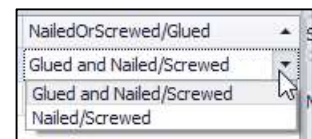
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### 18.2 CEILING
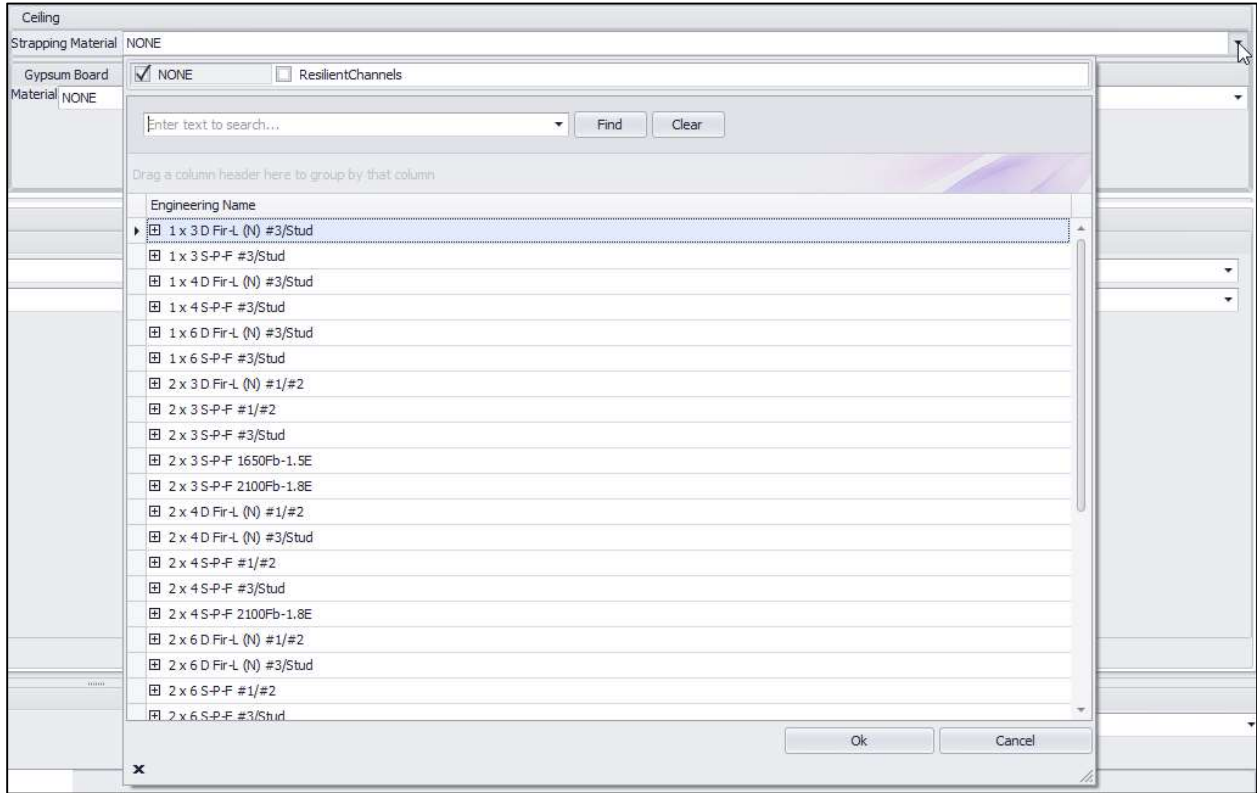


For the ceiling (or bottom chord strapping), select the one you need (for more material, see database). When selected, you will need to specify the on-center spacing for those:
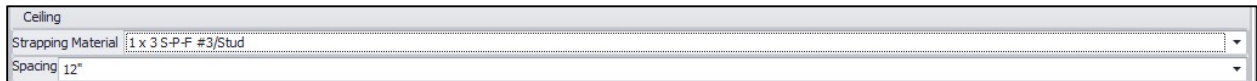


The same if you select Resilient Channels:
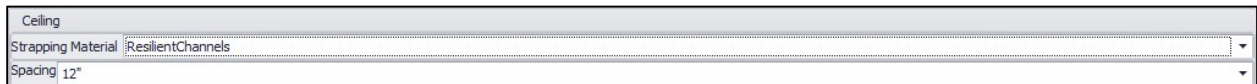


And finally "NONE":
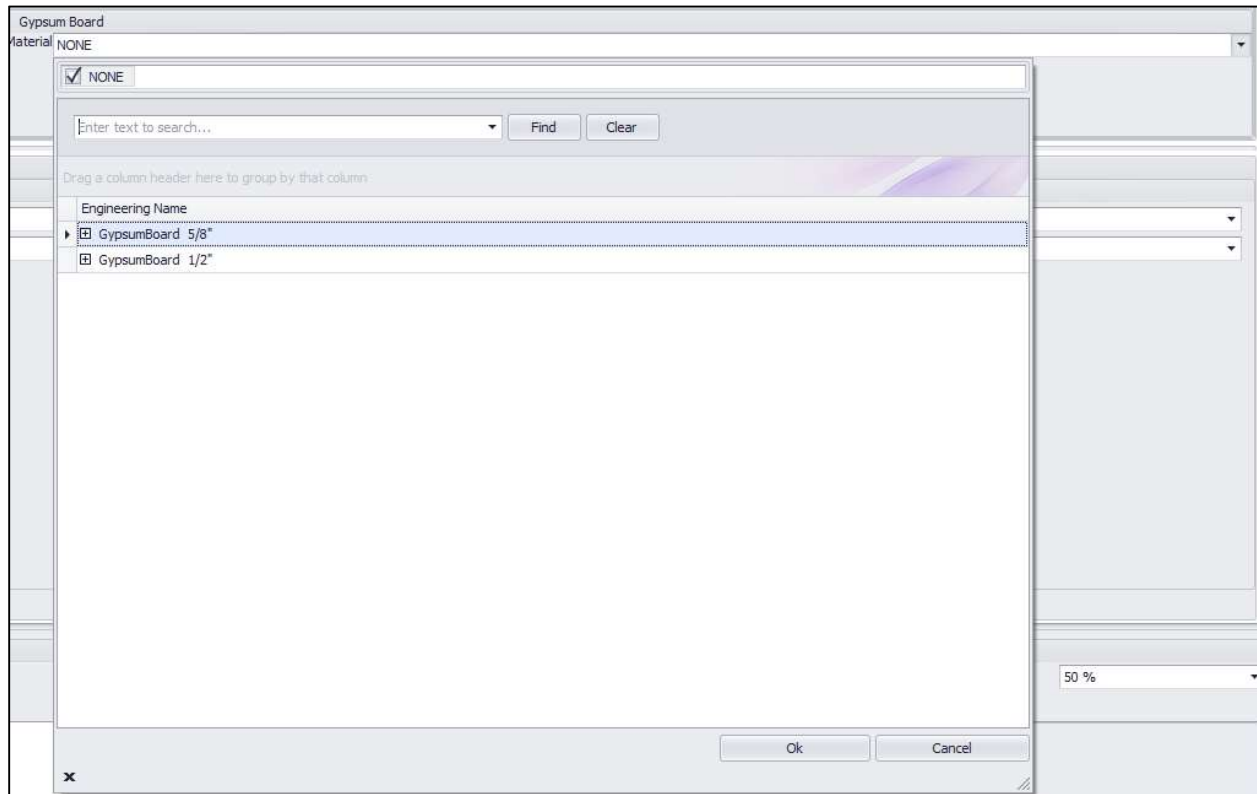
### 18.3 GYPSUM BOARD



For Gypsum board, you have 3 options:

- Gypsum board 1/2"
- Gypsum board 5/8"
- And NONE

### 18.4 VIBRATION (FOR CANADIAN CODE)
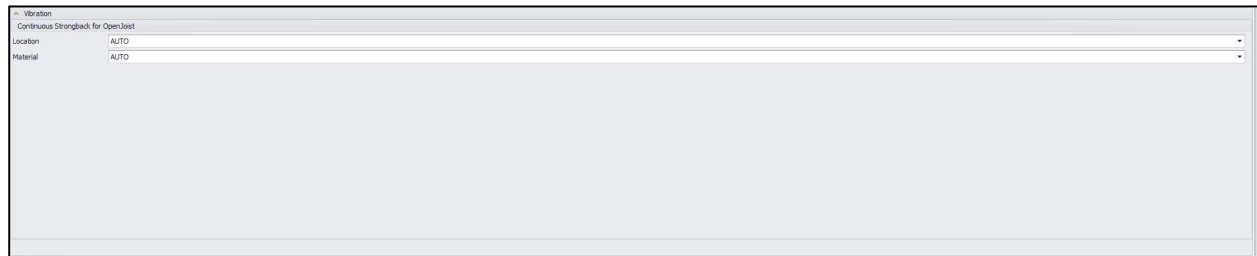


These settings are for strongbacks to be analyzed in the Canadian Vibration Criteria.

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BUILT BY *Barrette*

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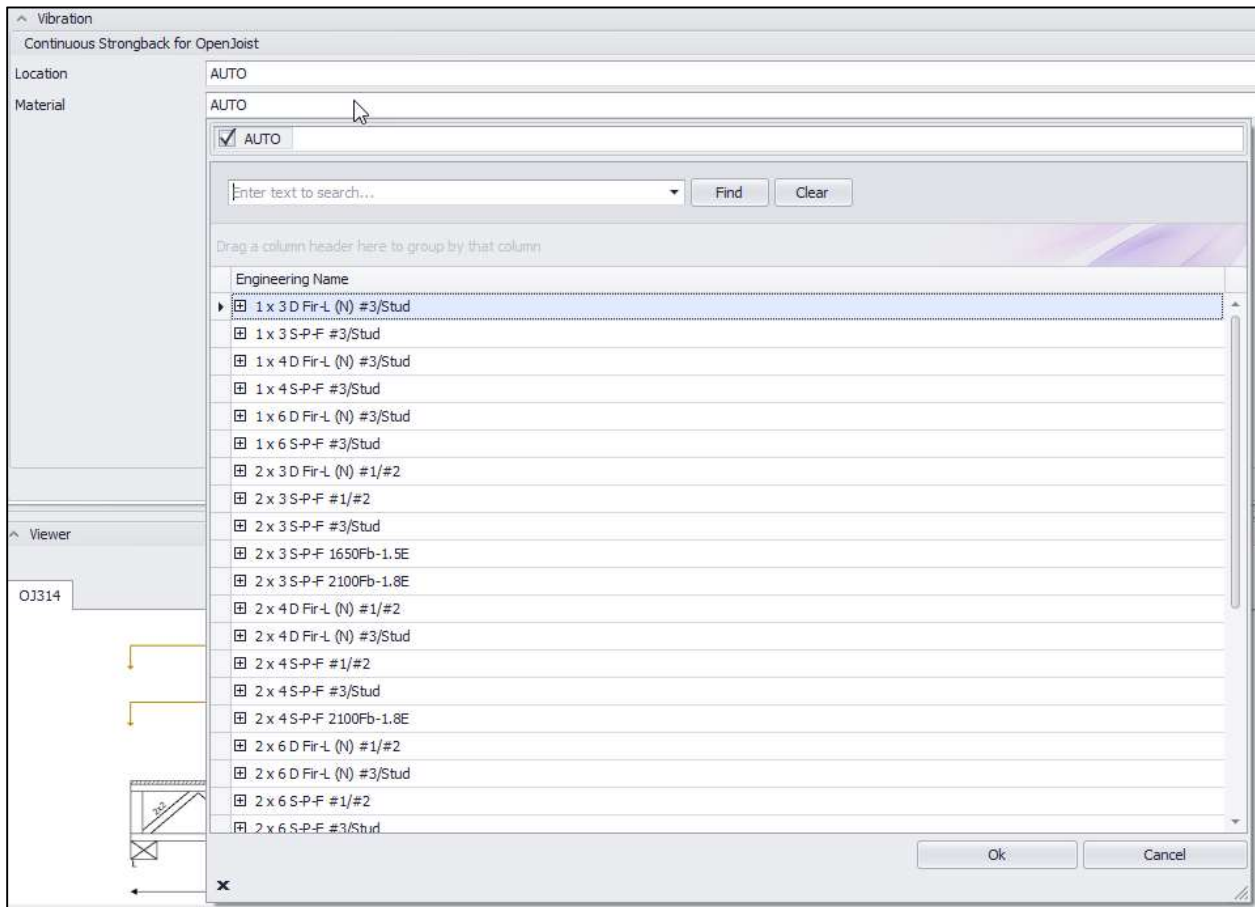




For the location, you have 5 options:

- Auto
- None
- 1
- 2
- Custom

At "Auto," Analyzer will install minimum requirements needed. For "None," it will analyze your design without any strongback. For "1" and "2," it will analyze as per the number selected. If you don't select any *material*, it will analyze with the minimal material available in the inventory.

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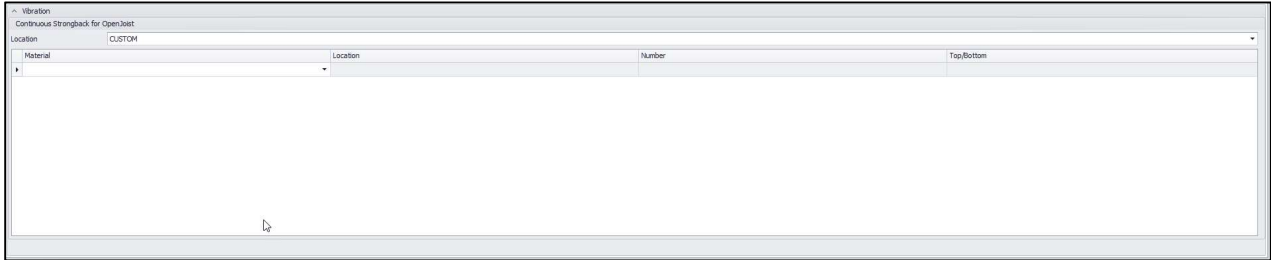


For the "Custom" selection, you will be able to change location, number of strongbacks and if applied to the Top or Bottom of the joist.

Hint: Always try as much as possible to install those strongbacks to the bottom chord for a better result. One 2x6 has better performance than two 2x4.

If you are using the ICC Code, you can select "Perform Canadian vibration check":
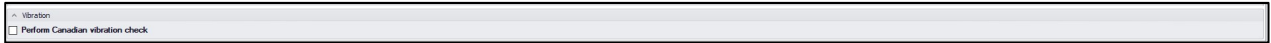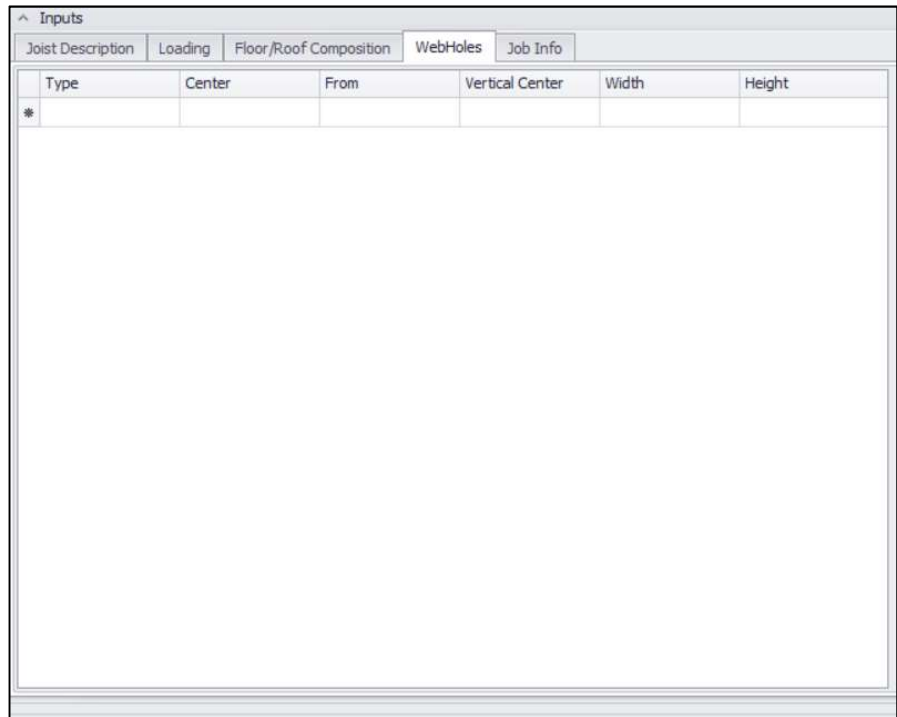


If you do so, you'll have access to the same settings as the "Canadian Code":

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## 19.  Web Holes:

1- Type
2- Center
3- Vertical center
4- Width
5- Height



You can analyze the joist with different holes sizes in the OSB part.



You have access to both circular and rectangular holes. In each case, you will need to input the:

- Centre of the hole (from the end), and precise from which end;
- Vertical center of the hole and the width (diameter of a circular hole or the horizontal width in the case of a Rectangular hole).

For a rectangular hole, you will need to input the height of the hole (vertical).

### 19.1 Circular hole:



### 19.2 Rectangular hole:

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# 20.  Job Info:



All input will be transferred to the summary report. If you "add" a "Manufacturer or Distributor" or a "Customers," it will be added to Analyzer's database and will be available through the "drop-down menu."

You will always be able to change the values of a "Manufacturer or Distributor" or a "Customers" by selecting "Modify."

You will be able to delete any of those contacts from the database by selecting the name, then clicking on "Remove."

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## 21.  Summary Report:

After analyzing the joist (see page 10), you will see this menu on the right.
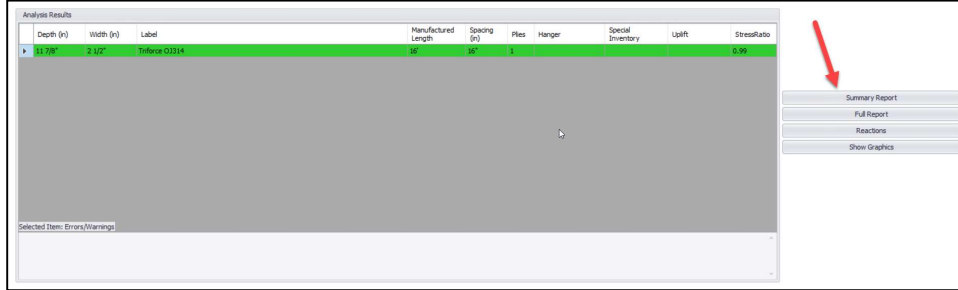


If you select the "Summary Report," a new window will open. This is the typical design sheet required by engineers, architects and city inspectors. You will have access to export this report in a PDF format. We recommend to send this sheet in PDF for any seal request.



Analyzed values in the grey zones need to be 1.00 or less (required minimum performance). In other words, the closer the score is to 0, the better the performance.

### BEARING ANALYSIS

| Label | Real Bearing Center, Width, Perp.Width (in) | $K_B$ | Min Calc. Bearing Center, Width (in) | $K_B$ | Normal $R_F$ (lb) | $R_RK_D$ (lb) | $K_D$ | $R_F$ / $(R_RK_D)$ | Critical LC-Part | Uplift $R_F$ (lb) | $K_D$ | Critical LC-Part |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | 2.75", 5.5", 999999" | 1.00 | NA, NA | NA | 840 | 3286 | 1.00 | 0.26 | 2-1 | NA | NA | NA |
| R | 189.25", 5.5", 999999" | 1.00 | NA, NA | NA | 840 | 2057 | 1.00 | 0.41 | 2-1 | NA | NA | NA |

### SHEAR ANALYSIS

| Axis | Max At (in) | $V_F$ (lb) | $V_RK_D$ (lb) | $K_D$ | $V_F$ / $(V_RK_D)$ | Critical LC - Part | | |
|---|---|---|---|---|---|---|---|---|
| Z | 189.25" | 816 | 2057 | 1.00 | 0.40 | 2-1 | | |

### BENDING ANALYSIS

| Axis | At (in) | $M_F$ (lb.ft) | $K_L$ | $M_RK_D$ (lb.ft) | $K_D$ | $M_F$ / $(M_RK_D)$ | Critical LC - Part |
|---|---|---|---|---|---|---|---|
| Z | 95.75" | 3170 | 1.00 | 4648 | 1.00 | 0.68 | 2-1 |

### DEFLECTION

| Axis | | | Critical | | | | Calculated | | | | Criteria | | Calc. Crt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOAD CASE | | Part | $\Delta$ (in) | Camber (in) | $\Delta$ - Camb (in) | | $\Delta$ (in) | | | |
| Z | $\Delta_L$ | Span L-R | LCL1 : L | | 1 | 0.254" | NA | NA | L/735 | 0.518" | L/360 | 0.49 |
| Z | $\Delta_D$ | Span L-R | LCD1 : D | | 0 | 0.095" | NA | NA | L/1960 | 0.518" | L/360 | 0.18 |
| Z | $\Delta_T$ | Span L-R | LCT1 : D+L | | 1 | 0.349" | NA | NA | L/534 | 0.777" | L/240 | 0.45 |
| Z | $\Delta$ bare Joist | Span L-R | LCL1 : L | | 1 | 0.288" | NA | NA | L/648 | 0.518" | L/360 | 0.56 |

### FLOOR'S PERFORMANCE

Subfloor: OSB 1F20 T&G (19/32") Glued and Nailed/Screwed, Continuous Strongback: None, Strapping: None, GypsymBoard NONE.  Span L-R = 15' 6", Lv= 15' 7".

| | | |
|---|---|---|
| Vibration controlled span Ratio : | Span L-R / Lv | 1.00 |
| Floor's Performance Ratio : | $\Delta$ Span L-R / $\Delta$ Lv | 0.99 |

## 22. Full Report:

If you select the "Full Report," a new window will open. This is the Full analysis report. Could be used by engineers to look deeper into the analysis.



## 23. Reactions:

If you select "Reactions," a new window will open. This window allows you to see the reactions of the joist analyzed at each bearing.

## 24. Show Graphics:

If you select "Show Graphics," a new window will open. This is the Full analysis graphics. Could be used by engineers to look deeper into the analysis.
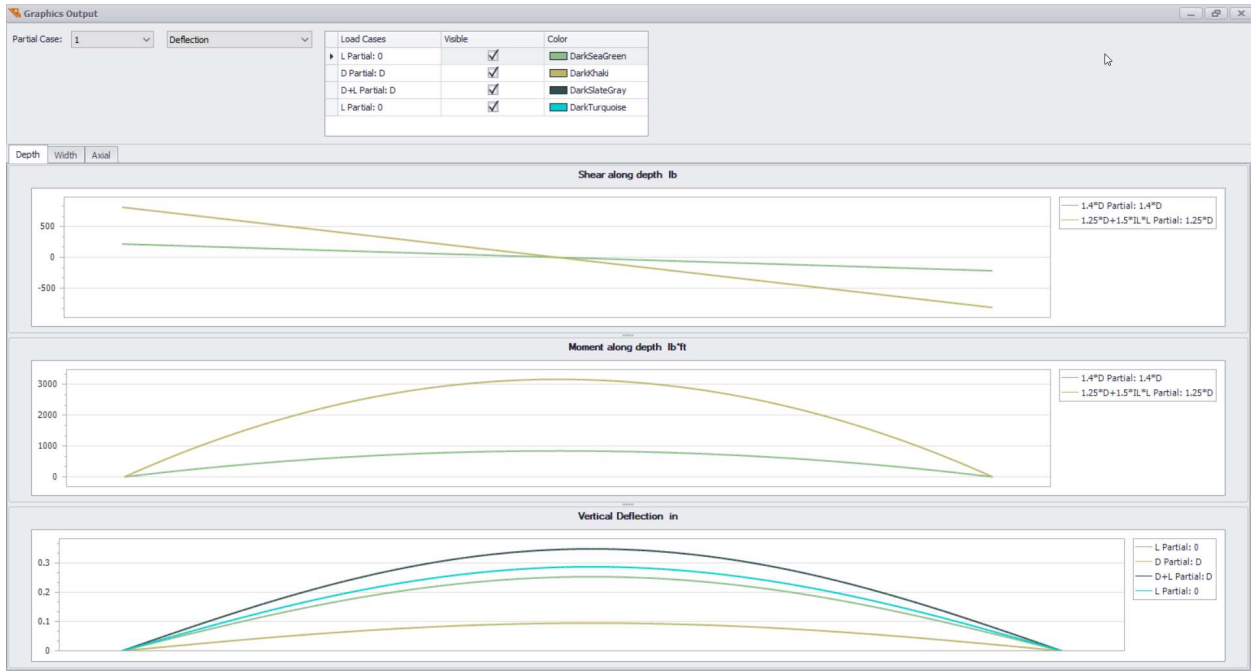


By moving the mouse over the graph, you will see the analysis as per where you are situated over the joist.
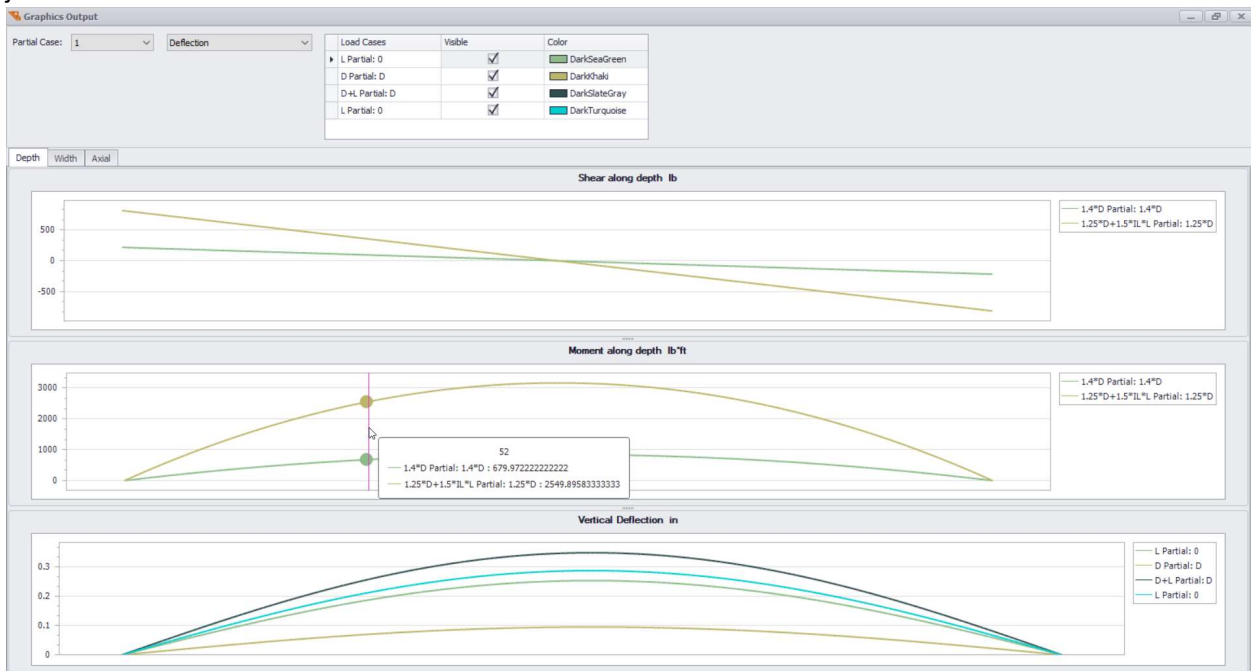
## 25. Appendix:

TRIFORCE® open joist is produced in several depths and lengths to fulfill floor framing needs. Lengths are offered in two foot increments due to their 24" trimmability.

| Depth | Series | Weight (lbs/ft) | Stock Lengths (feet) |
|---|---|---|---|
| 11 7/8 in | OJ314 | 2.8 | 8, 10, 12, 14, 16 |
| | OJ315 | 2.8 | 18 |
| | OJ415 | 3.35 | 20 |
| | OJ418 | 3.35 | 18(S)*, 20(S)*, 22 |

| Depth | Series | Weight (lbs/ft) | Stock Lengths (feet) |
|---|---|---|---|
| 14 in | OJ314 | 2.85 | 8, 10, 12, 14, 16 |
| | OJ315 | 2.85 | 18, 20 |
| | OJ415 | 3.45 | 22 |
| | OJ418 | 3.45 | 20(S)*, 24, 26 |

| Depth | Series | Weight (lbs/ft) | Stock Lengths (feet) |
|---|---|---|---|
| 16 in | OJ314 | 2.95 | 8, 10, 12, 14, 16 |
| | OJ315 | 2.95 | 18, 20 |
| | OJ418 | 3.55 | 20(S)*, 22, 24, 26 |
| | OJ420 | 3.55 | 28, 30 |

**(S)* = Limited Inventory**. Please contact your TRIFORCE representative to determine quantities.

**Hints:**

- Any point load under 160 lb total won't require any reinforcement.
- Maximum concentrated load applicable to the bottom chord is 160 lb.
- Joist will fail if any negative loads are applied to the top chord with over 40 psf of dead load and 20 psf of live load.
- Joist will fail if any positive loads are applied to the bottom chord with over 40 psf of dead load and 20 psf of live load.

**IMPORTANT NOTICE**

In keeping with our ongoing commitment to product development, Barrette Structural Distribution periodically updates its TRIFORCE® Analyzer software. To help our engineering team and to assure prompt service, please continue to check our installation page for available updates to your TRIFORCE® Analyzer software and note that we will be supporting the newest version only.

Your organization may have security measures in place that require administrative rights to install / update software on your computer. Contact your IT department if you are seeing access or security-related error messages during installation / updating.

If you have any questions concerning our TRIFORCE® Analyzer, please do not hesitate to contact us at:

Email:

- USA : triforce-support-usa@ebarrette.com
- CAN : triforce-support-can@ebarrette.com

Toll Free: 1-800-263-7265