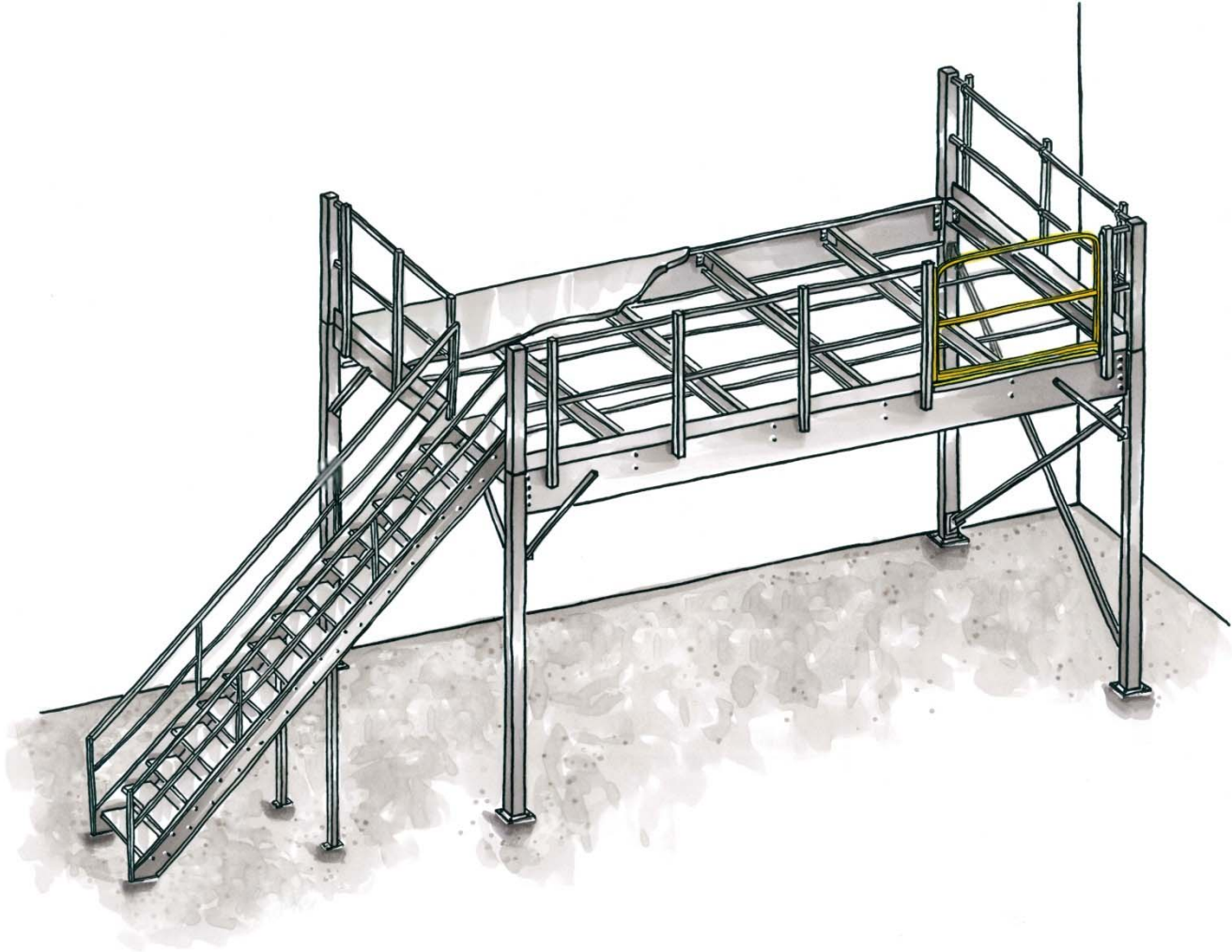


# REFERENCE GUIDE

Patent Pending

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V.2014.1



<b>Product</b>	Mezzanine
<b>Sub-product</b>	Braces

- Cogan structural steel mezzanines always include one of the following types of brace designs: knee-bracing, x-bracing, or structural knee-bracing.

- Braces are designed to transfer the horizontal loads to the base. The effectiveness of the braces is increased as the unbraced height is decreased.



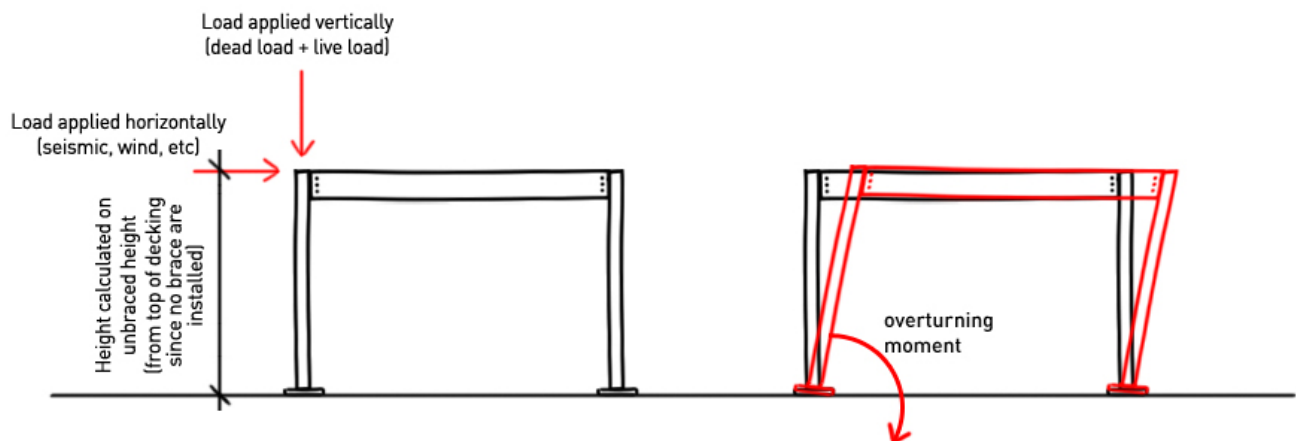
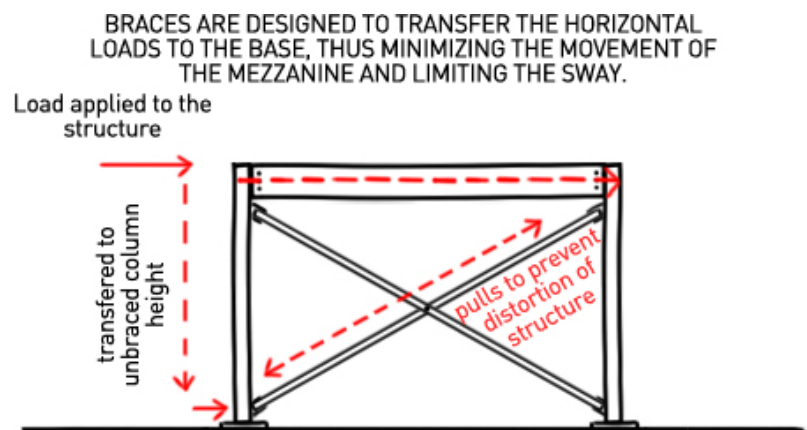
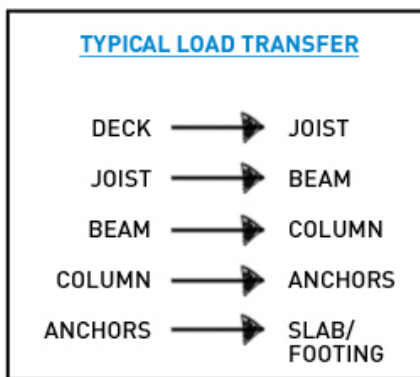
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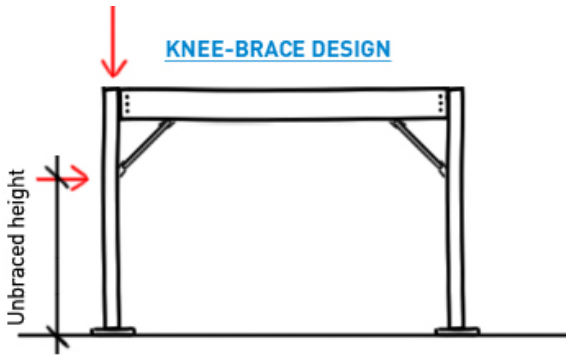
Live loads, dead loads, seismic loads, and climatic loads (for outdoor installations) must be taken into careful consideration when designing a structural mezzanine. These loads make up the vertical and horizontal forces that determine the bracing requirements necessary to develop the structural integrity of a mezzanine.

Vertical loads (i.e. live loads and dead loads) affect every aspect of the mezzanine structure. These are transferred from the decking to the joists, from the joists to the beams, from the beams to the columns, from the columns to the base plates, and from the base plates to the concrete. On their own, vertical loads can exert a tremendous amount of pressure on the mezzanine structure. Horizontal loads (i.e. seismic loads and climatic loads) are the external pressures applied at deck height that can force a mezzanine to move or sway back and forth. Braces are designed to transfer the horizontal loads to the base. The effectiveness of the braces is increased as the unbraced height is decreased.

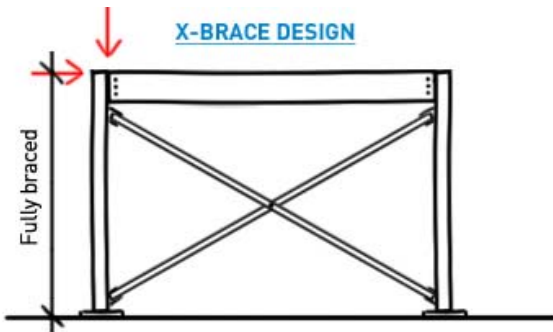
Cogan structural steel mezzanines always include one of the following types of brace designs: knee-bracing, x-bracing, or structural knee-bracing. It is essential to consider the overall budget of your project in order to choose the proper brace design for your mezzanine. The illustrations below highlight the pros and cons of each design.



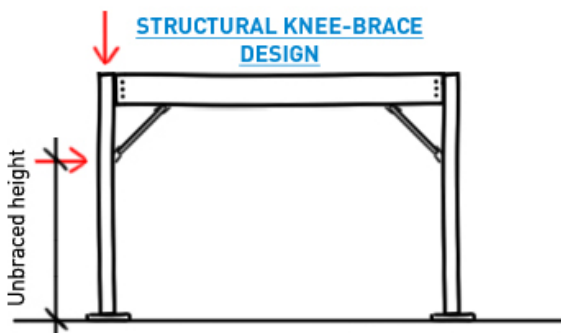
BOTH HORIZONTAL AND VERTICAL LOADS ARE TAKEN INTO CONSIDERATION WHEN DESIGNING A COGAN STRUCTURAL STEEL MEZZANINE. BRACES ARE ENGINEERED TO SUPPORT THE STRUCTURE AGAINST LATERAL (HORIZONTAL) LOADS. IN ADDITION TO SUPPORTING THE STRUCTURE THEY ALSO STABILIZE AND ENSURE CONFORT FOR PEOPLE ON TOP OF THE MEZZANINE AND TO ELIMINATE A CERTAIN SWING MOTION. NOT ALL BRACE DESIGN ARE THE SAME, AND ONLY X-BRACE OR STRUCTURAL KNEE-BRACE DESIGN ARE ACCEPTED IN CERTAIN SEISMIC ZONE.



- Even though standard knee-bracing is usually the least expensive brace design for smaller mezzanine, this system creates large overturning loads at the base which usually requires footings to be poured under each column baseplate. This is an additional expense that interrupts the flow of activity on or around the installation site and that directly affects your final project cost and timeline. Please note that each column is built using more steel, to counter balance part of the overturning loads, resulting in a more expensive overall structure in mid-size or bigger mezzanine.
- Each column connection must be reinforced with a knee-brace (i.e. if 4 beams are connected to one column, then 4 knee-braces are required - one per beam connection).
- Cogan standard knee-braces are not engineered to withstand overturning movement and seismic loads.



- An x-brace design is usually the least expensive brace design for medium to big sized mezzanine. Since overturning loads are eliminated with this brace design, footings are usually not required, eliminating additional charges and interruptions to the flow of activity on or around the installation site.
- X-braces must be installed on minimum of 3 sides of the mezzanine for complete strength and resistance.
- Cogan x-braces are engineered to eliminate overturning movement and to withstand seismic loads in any seismic zone.



- Cogan structural knee-brace design is usually the most expensive brace design for medium to large size mezzanine. With its full clear spans, it allows for fluid circulation underneath the mezzanine with no obstruction. Cogan structural knee-braces are engineered to eliminate overturning loads. As a result, footings are usually not required with this brace design, eliminating additional charges and interruptions to the flow of activity on or around the installation site.
- Cogan structural knee-brace design requires for each column connection to be reinforced with a structural knee-brace (i.e. if 4 beams are connected to one column, then 4 structural knee-braces are required - one per beam connection).
- Cogan structural knee-braces are engineered to eliminate overturning movement and to withstand seismic loads in any seismic zone.

To ensure the safety and longevity of your structure, it is always the sole responsibility of the client/owner to verify the area where the mezzanine is being installed and to provide proper anchor conditions. In situations where concrete depth is inadequate, it may be necessary to pour footings or to otherwise modify the slab. The responsibility of slab verification applies to both knee-brace and x-brace mezzanine designs. If you are looking for more favourable anchoring requirements, Cogan recommends an x-brace design.

Please keep in mind that calculations provided by Cogan are to serve as guidelines only. Cogan Engineers can only determine the number of anchor bolts required per column and the concrete depth necessary to develop the resistance of those anchors. Many variables may affect individual site conditions and therefore negates calculations provided by Cogan Engineers. This is why Cogan cannot guarantee that the structural integrity of your installation site is sufficient to support the proposed anchoring requirements. Please keep in mind that Cogan is not responsible for certifying or analyzing the concrete slab capacity and integrity where the mezzanine columns are to be installed.