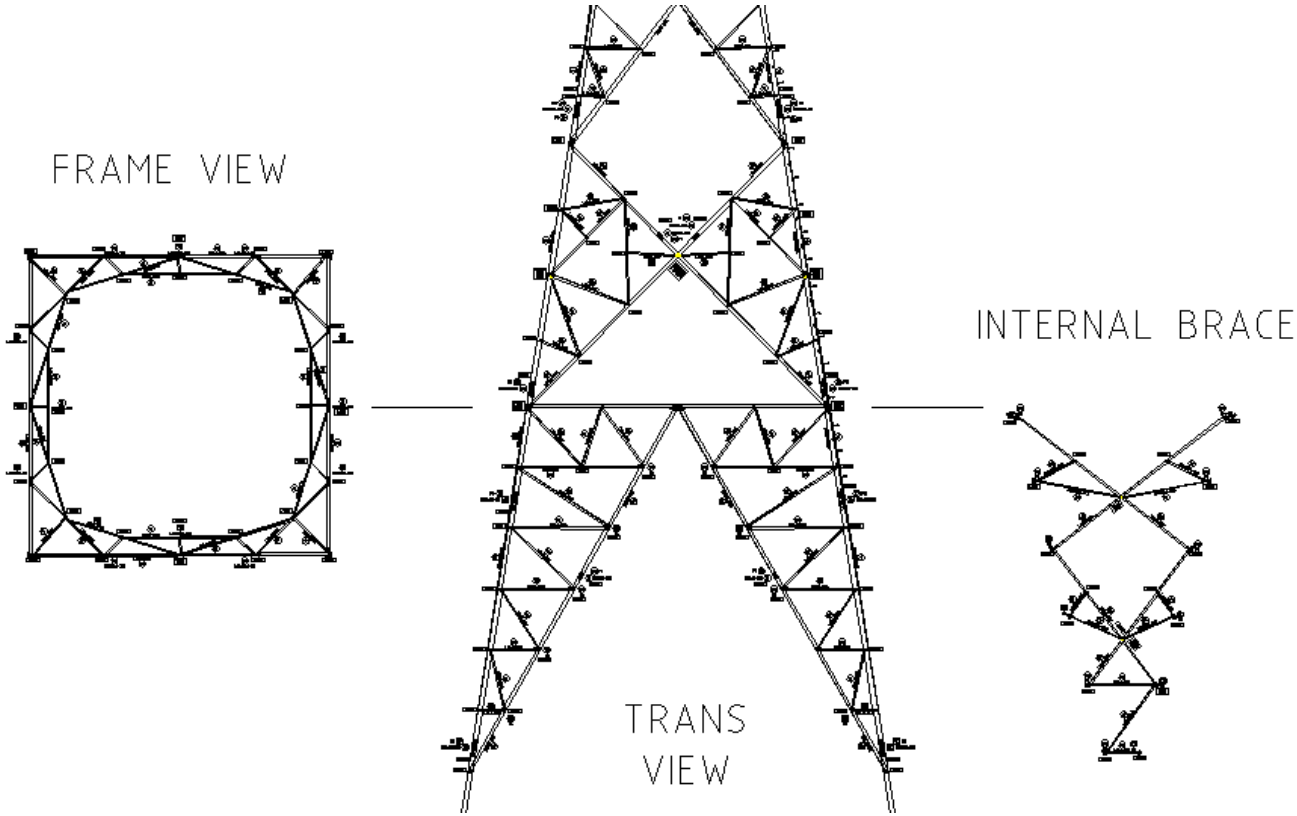
TowerSmart

Tower Detailing Tips



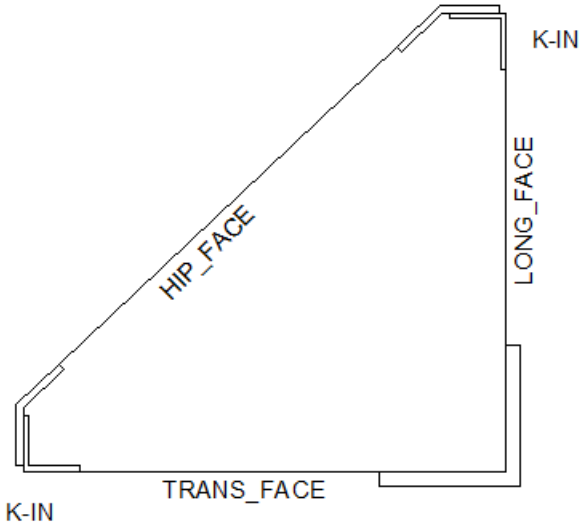
Series 3

gad TECHNOLOGIES
Software Developers

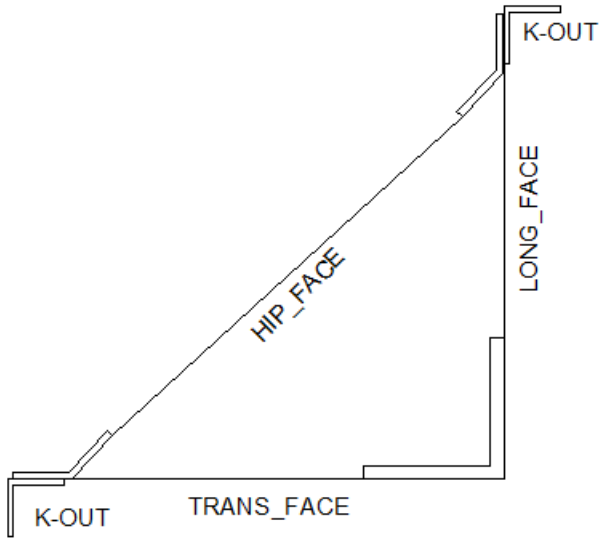
Tower Detailing Tips

During the 1970's, the company I began my career with decided to try a better way of detailing internal bracings (also known as hip bracing). The traditional method was to connect the hip bracing to the B-flange of K-members, what was proposed by my boss at the time (Lino Pozzobon) was to connect the hips to the A-flange.

Below is a cross sectional plan view of a corner leg showing the two methods.



HIPS ON B-FLANGE OF K-MEMBER

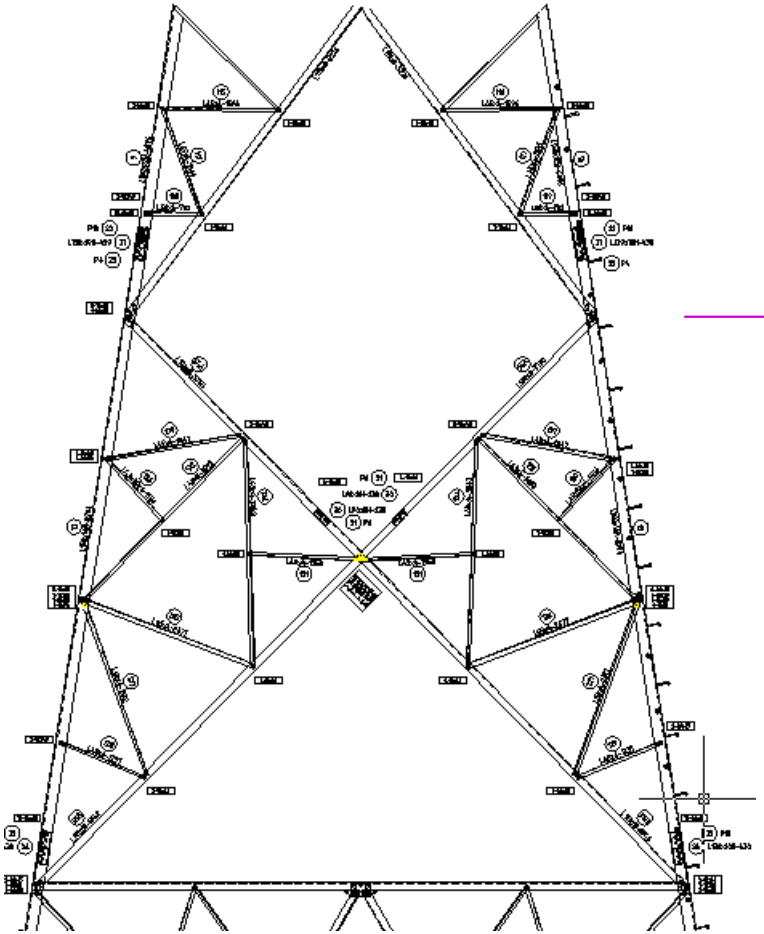


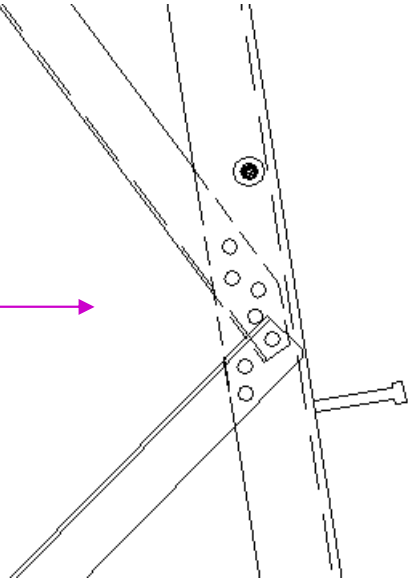
HIPS ON A-FLANGE OF K-MEMBER

The main issue with connecting to the B-flange was that the main K members needed to be IN-IN (B-flanges facing towards centre of tower) to allow better detailing.

Tower Detailing Tips

Having the B-flange of K-members always pointing ‘IN’ was not the best solution, this caused non-optimised detailing with K-up / K-down combinations at corner nodes.

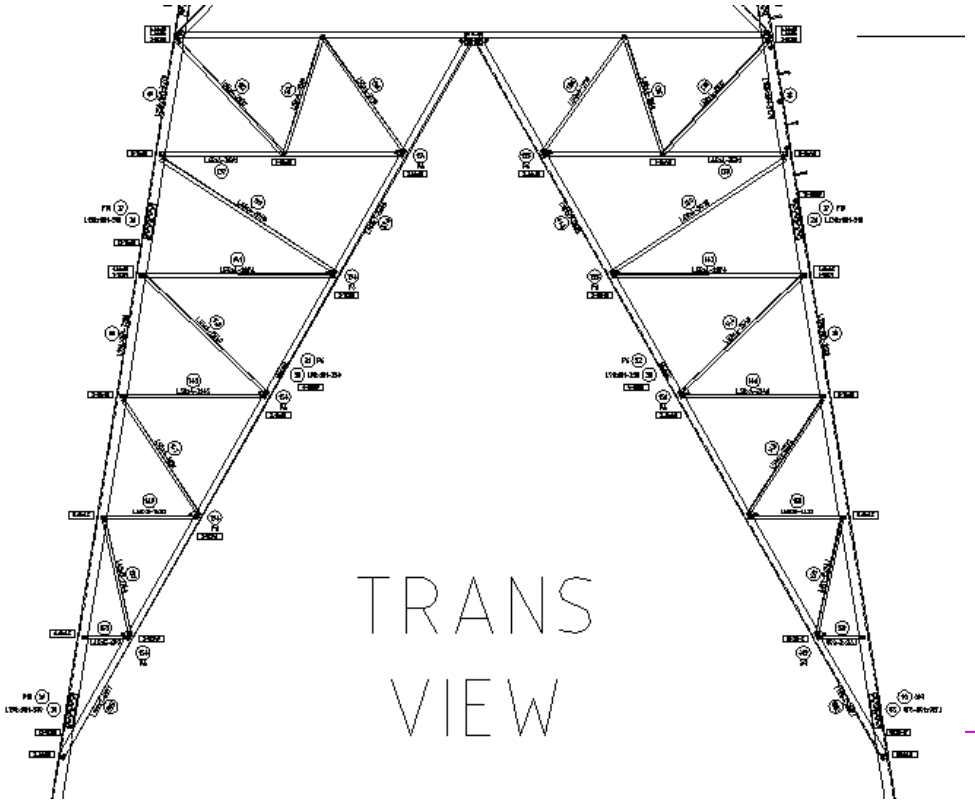




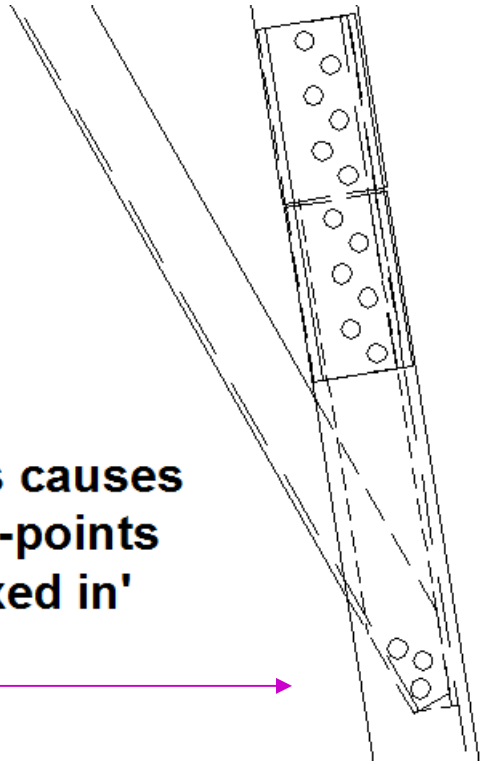
K-in and K-out combinations at corners allow for better detailing, that is, less chance of gusset plates since common bolts can be used.

Tower Detailing Tips

Another issue of K-members being IN / IN was the ‘boxed in’ affect, especially on long K-panels such as tall legs …

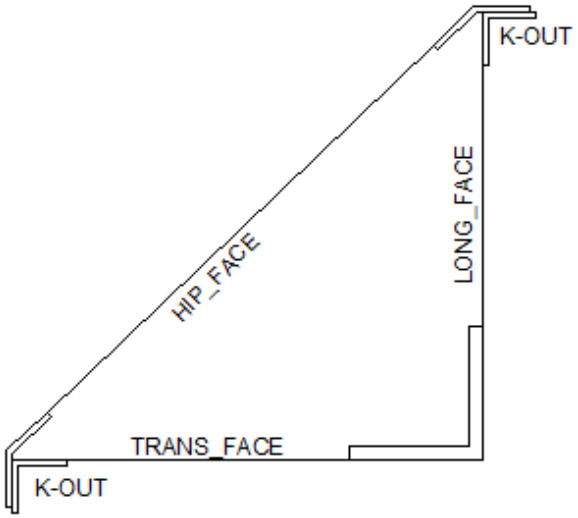


Long legs causes bolts at K-points to be 'boxed in'



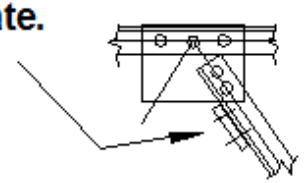
Tower Detailing Tips

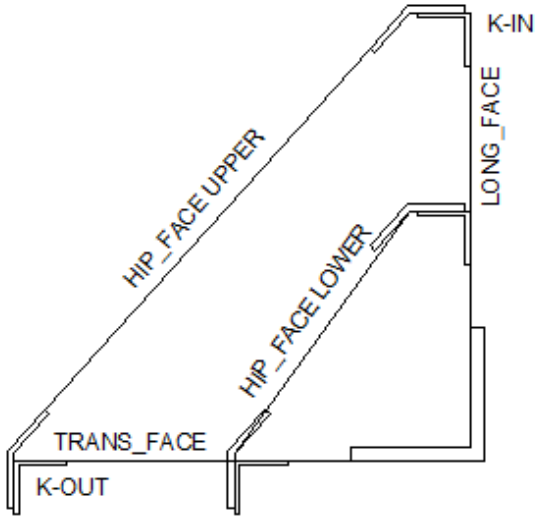
At times the K-member IN / IN rule was disregarded to offer better detailing on the corner nodes, but this just created problems in other areas …



K-OUT / K-OUT

This case causes a lot of clashing between panel webs and hip plates (and bolts). Also, hip brace on centre plate not allowed unless cleat is used or hip plate is placed to clear centre plate.





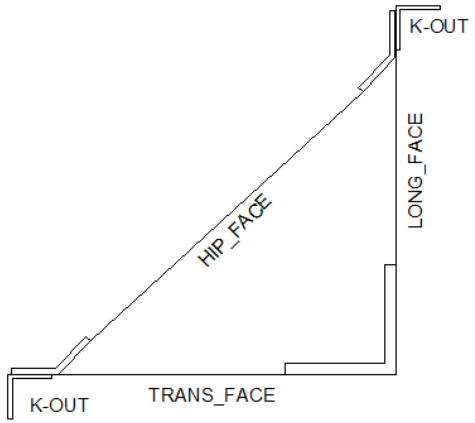
K-OUT / K-IN

This case causes a warped plane, the webs on 1st sub-panel of hip brace are not same plane as other sub-panel webs. The warping is BFL over length of K-member, that is, the shorter the leg, or bigger the B-flange, the bigger the warp.

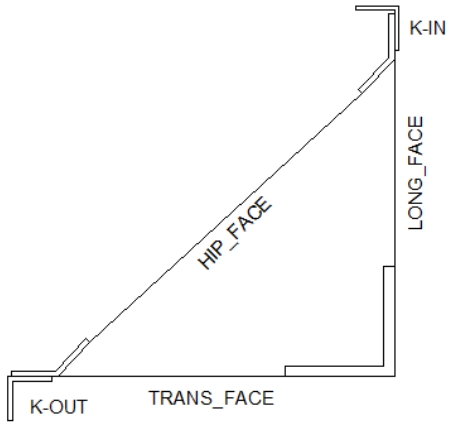
Tower Detailing Tips

When the A-flange hip connection method was first introduced, many preliminary tests were carried out and it was determined that the A-flange method was superior and contained less eccentricities than B-flange connections.

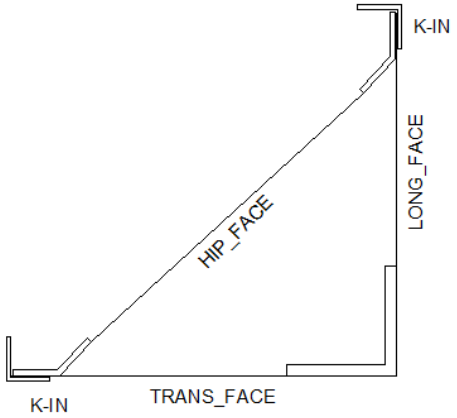
The main benefit of A-flange connection is that it does not rely on the orientation of K-members, the plane of the hip face stays the same. It also reduces the total number of bolts required.



HIPS ON A-FLANGE OF K-MEMBER K-OUT / K-OUT



HIPS ON A-FLANGE OF K-MEMBER K-OUT / K-IN

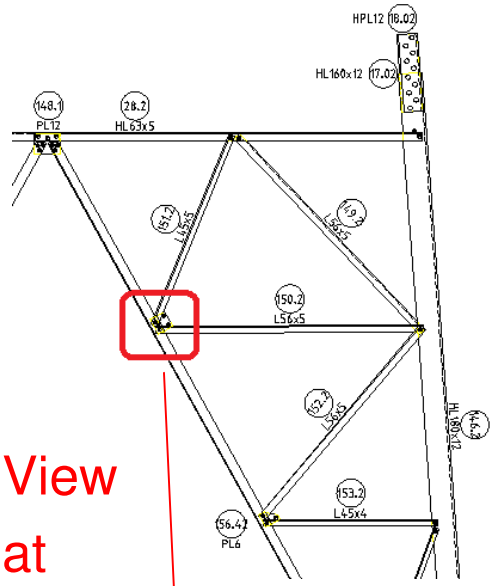


HIPS ON A-FLANGE OF K-MEMBER K-IN / K-IN

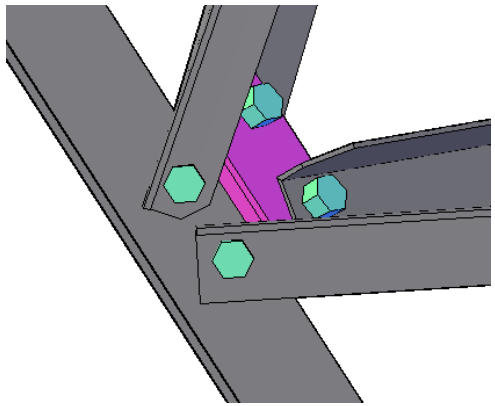
Since then nearly all transmission line and radio towers were detailed and successfully tested using the A-flange method. It is a proven detailing connection which has been locally and internationally adopted.

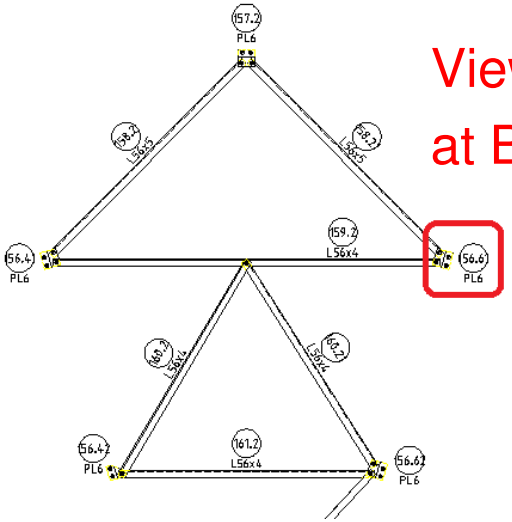
Tower Detailing Tips

Below is a detailed example of hip plate connection to A-flange of K-member …

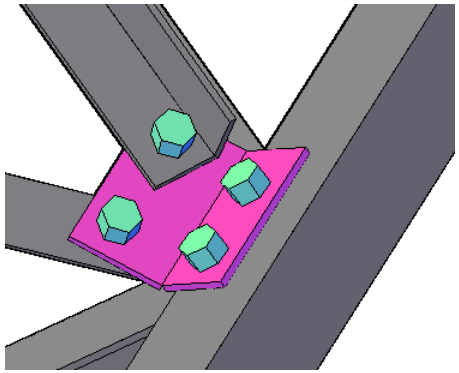


View at Front

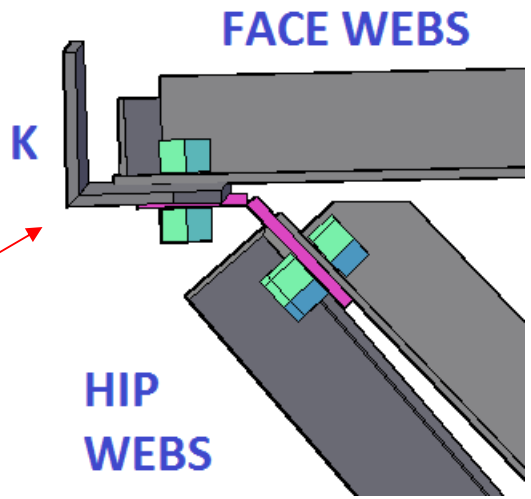




View at Back

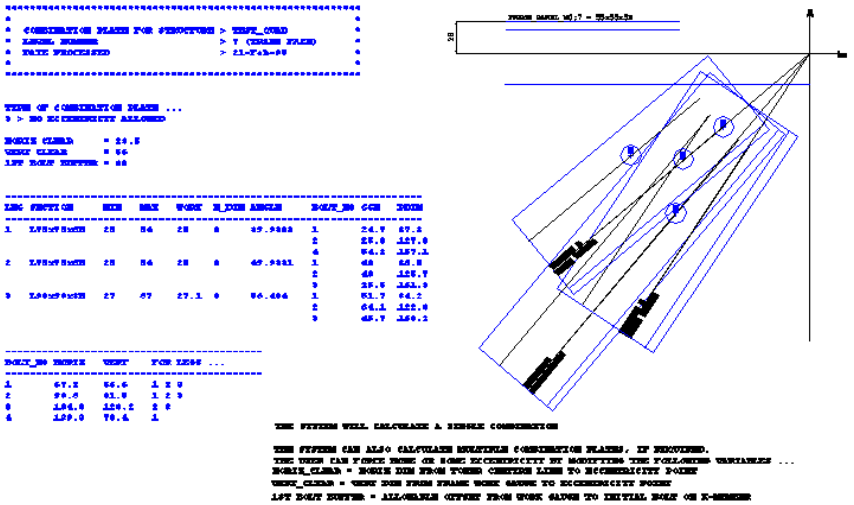


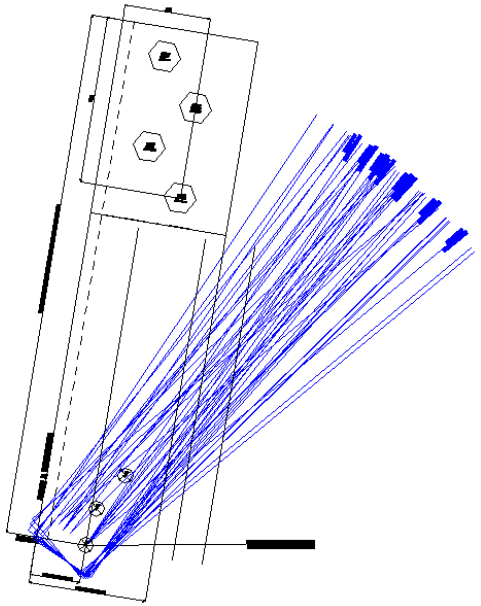
View Looking thru K-member



Tower Detailing Tips

In the next presentation (Tower Detailing Tips - Series 4) we look at how to achieve common centre plate and common stub for tower legs.





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