



Construction Métallique

03- Stabilités



ISA BTP
ÉCOLE D'INGÉNIEURS

Philippe MARON

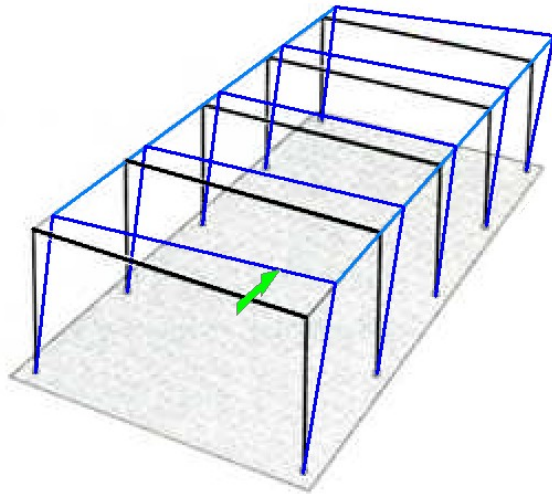
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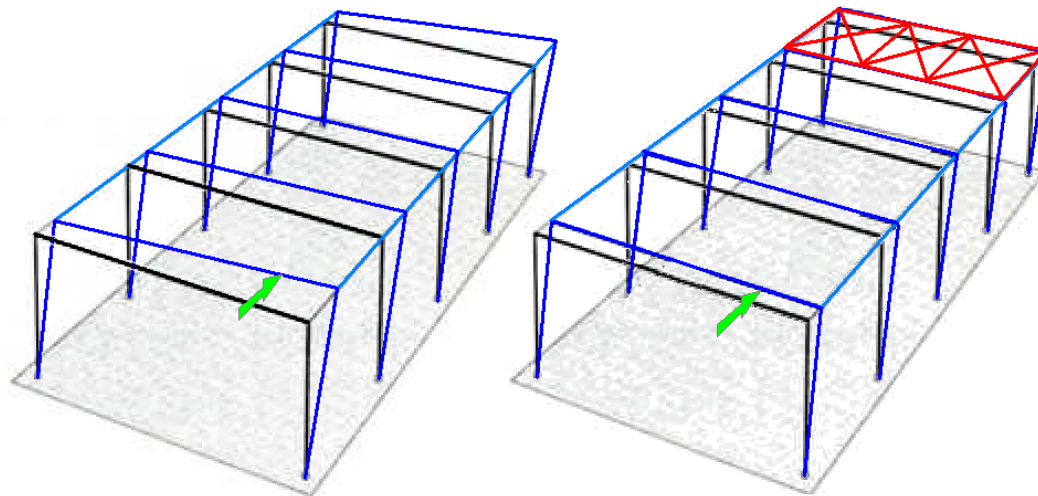
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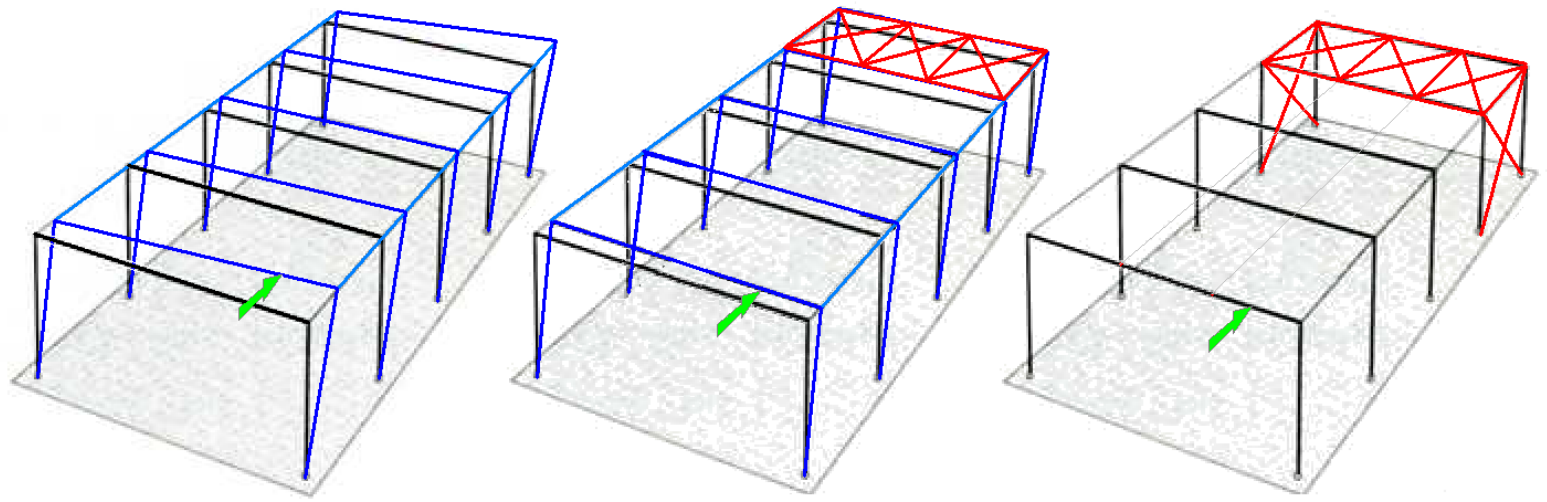
23 mars 2020

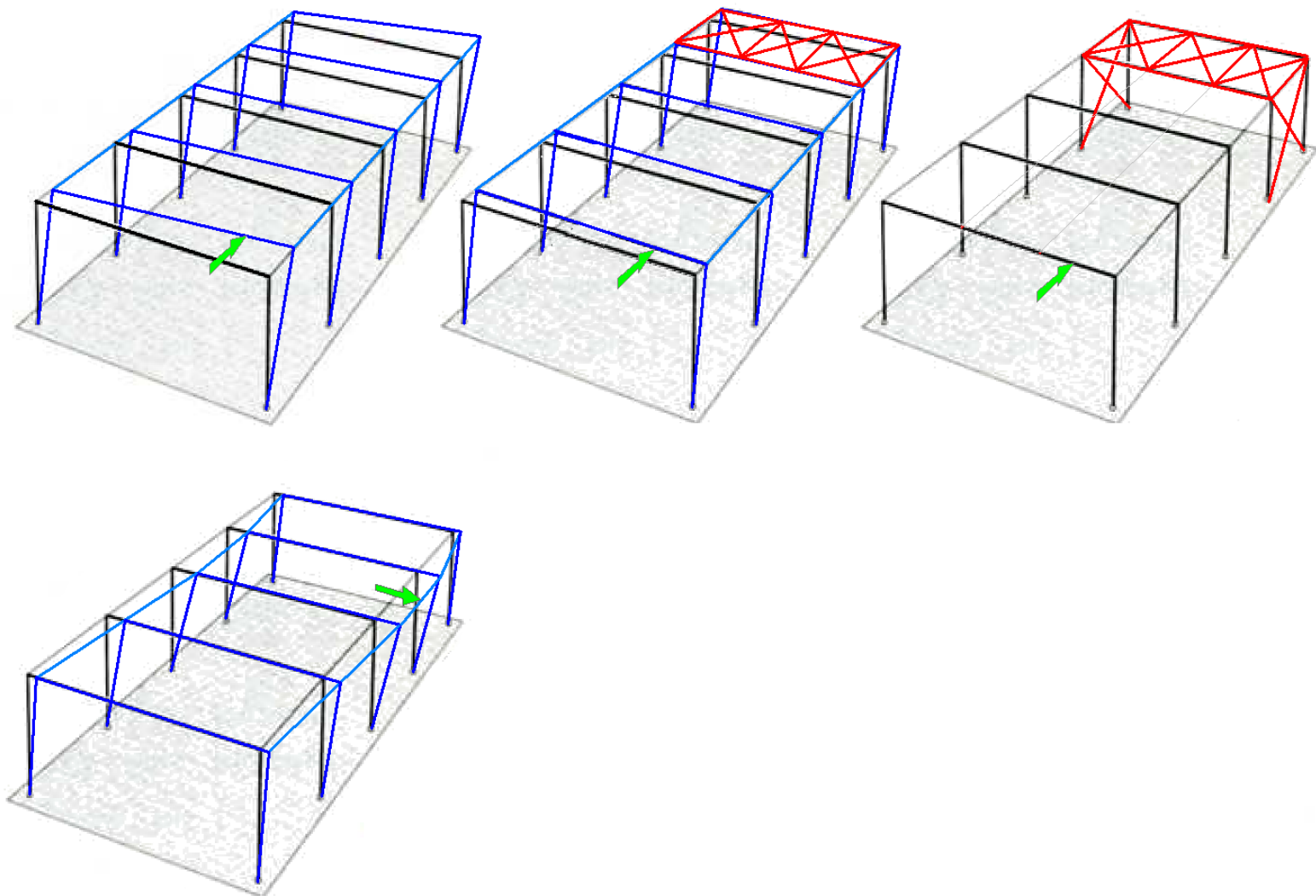
- **A l'issue de ce chapitre, l'étudiant doit être capable à partir du dossier d'un nouveau bâtiment du même type :**
 - d'analyser le fonctionnement de la structure sous des efforts verticaux ou horizontaux.
 - de déterminer le cheminement des efforts depuis la surface recevant les efforts, jusqu'aux fondations.
 - de calculer les efforts extérieurs subis par chaque élément participant à la stabilité de la structure, et d'en déduire les types de sollicitations subies par cet élément.

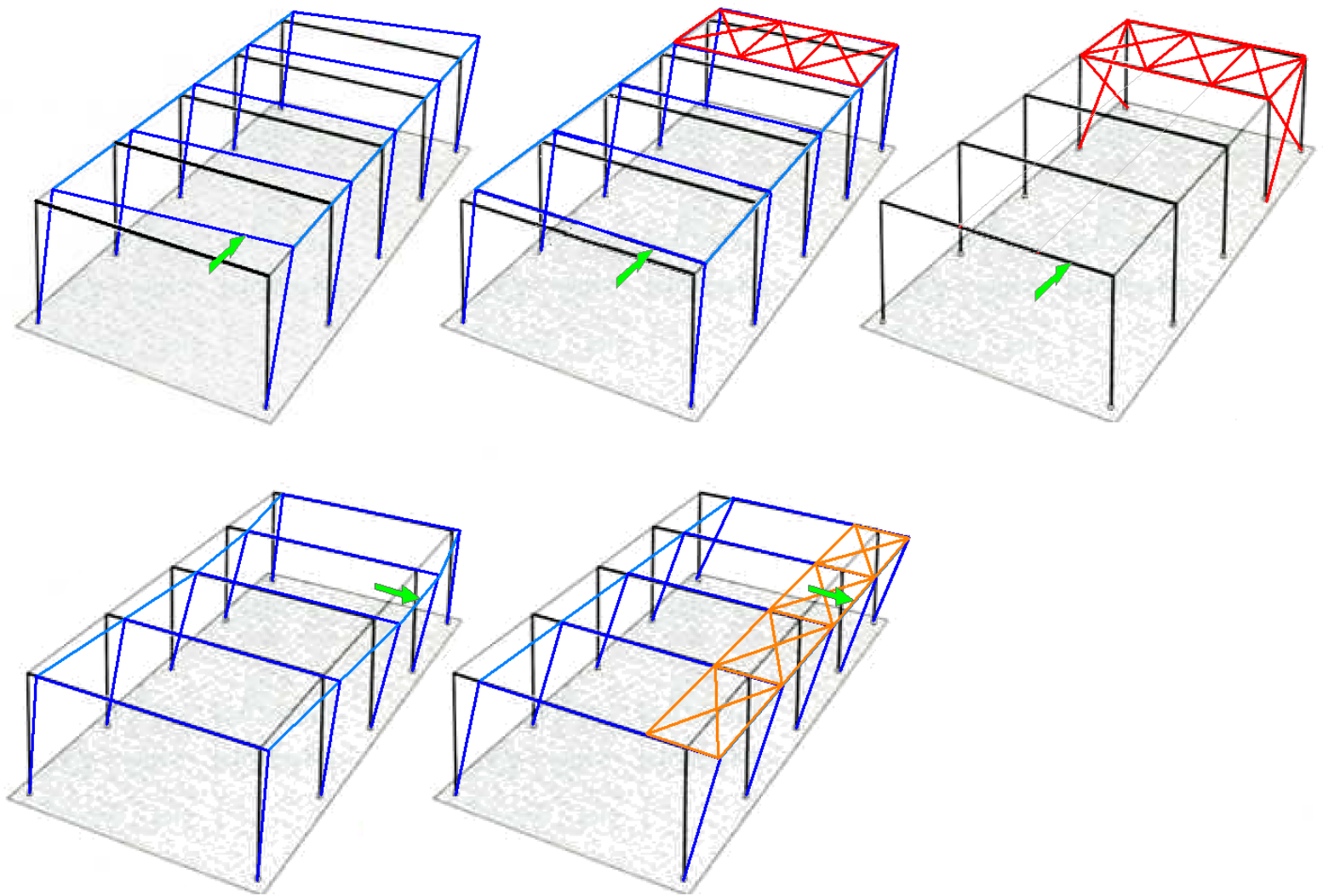
- **Limitation des déformations**

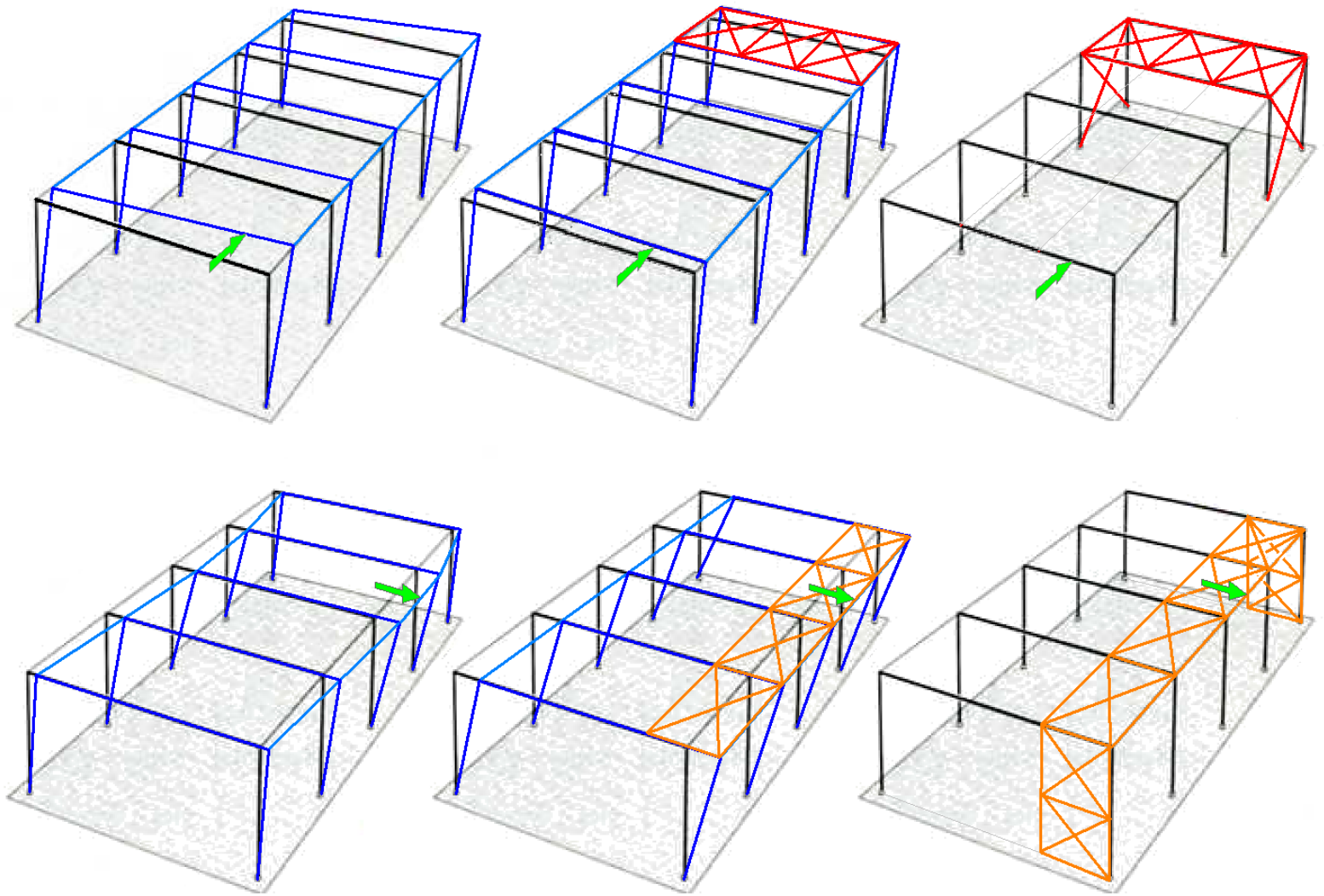












- **Statique des structures**

- Structures isostatiques et hyperstatiques sont stables

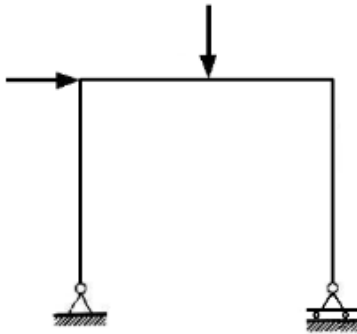


Fig.5.4 : Portique rigide isostatique

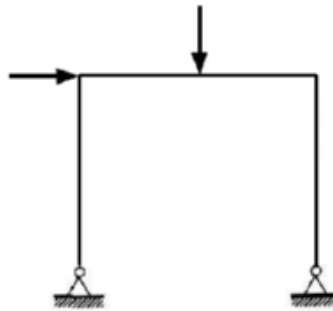


Fig.5.5 : Portique rigide hyperstatique de degré 1

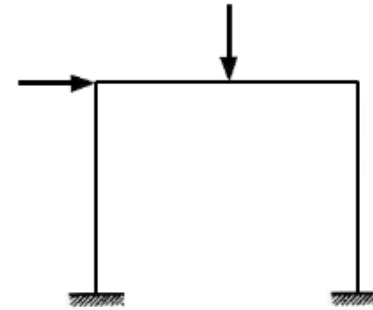


Fig.5.6 : Portique rigide hyperstatique de degré 3

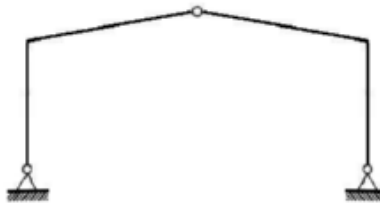


Fig.5.7 : Portique articulé isostatique



Fig.5.8 : Portique articulé hyperstatique de degré 2



Fig.5.9 : Portique tri-articulé isostatique

- Structures hypostatiques sont instables
- On peut rendre stable une structure hypostatique en ajoutant une(des) réaction(s) d'appui(s) apportée(s) par un(des) contreventement(s) => Stabilité statique

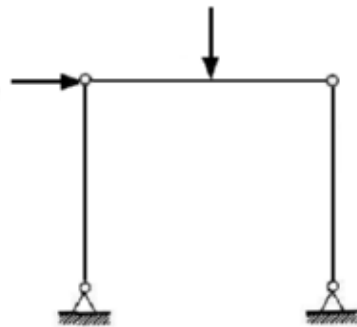


Fig.5.10 : Portique articulé hypostatique instable

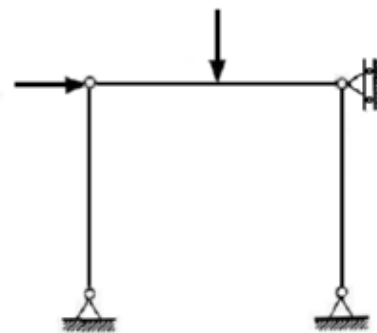
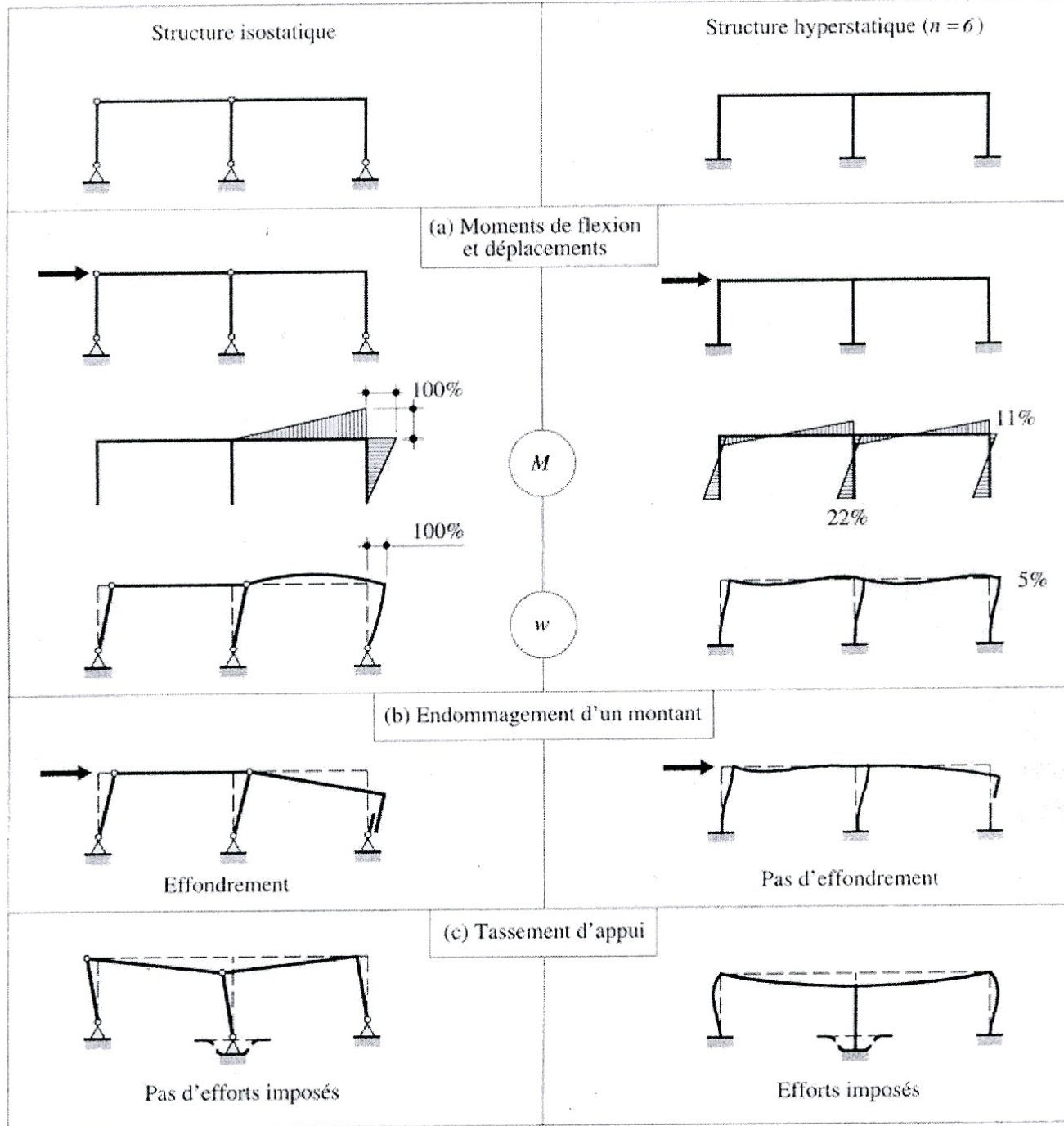


Fig.5.11 : Portique articulé isostatique. La stabilité est assurée par un contreventement

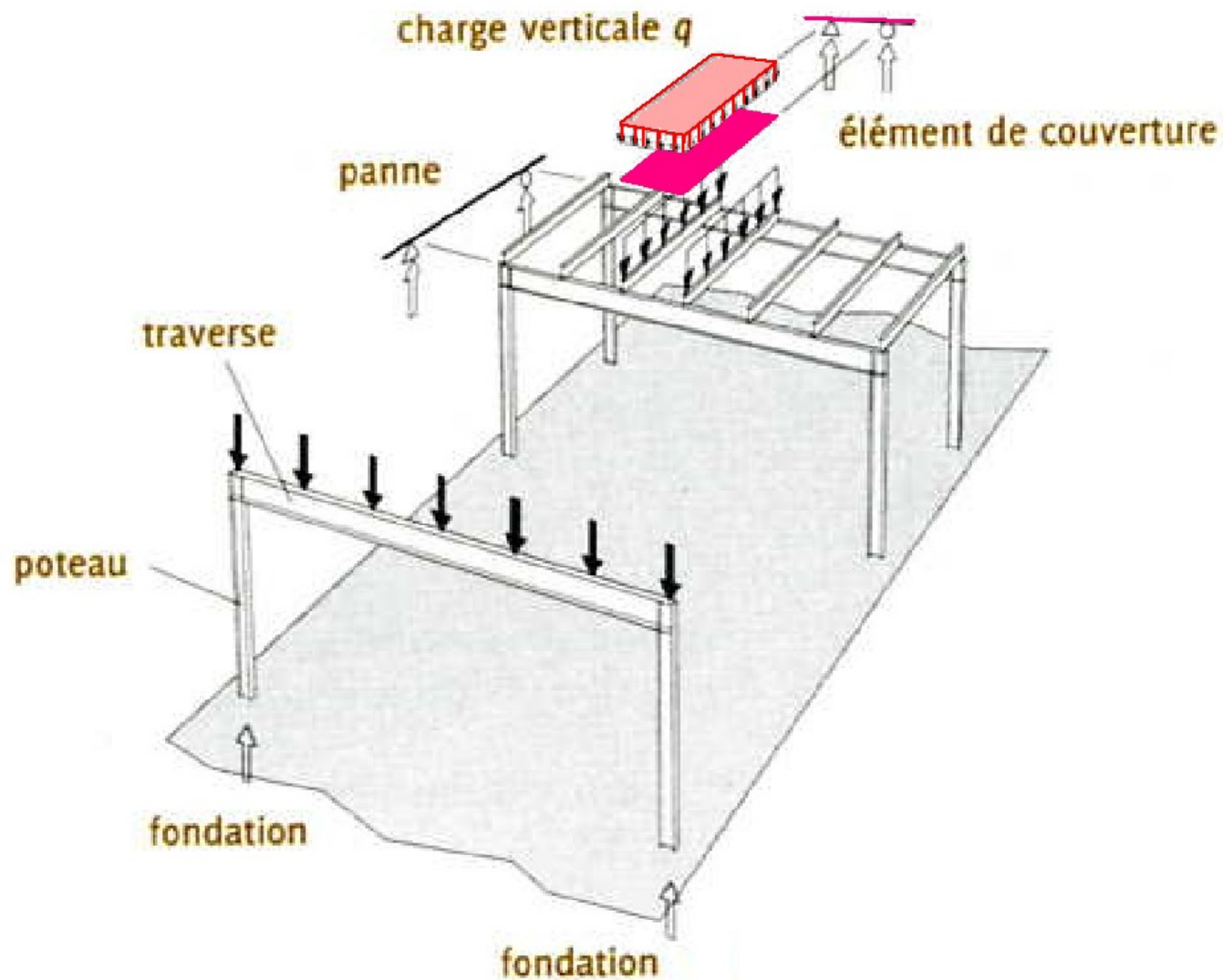
- **L'hyperstaticité d'une structure =>**

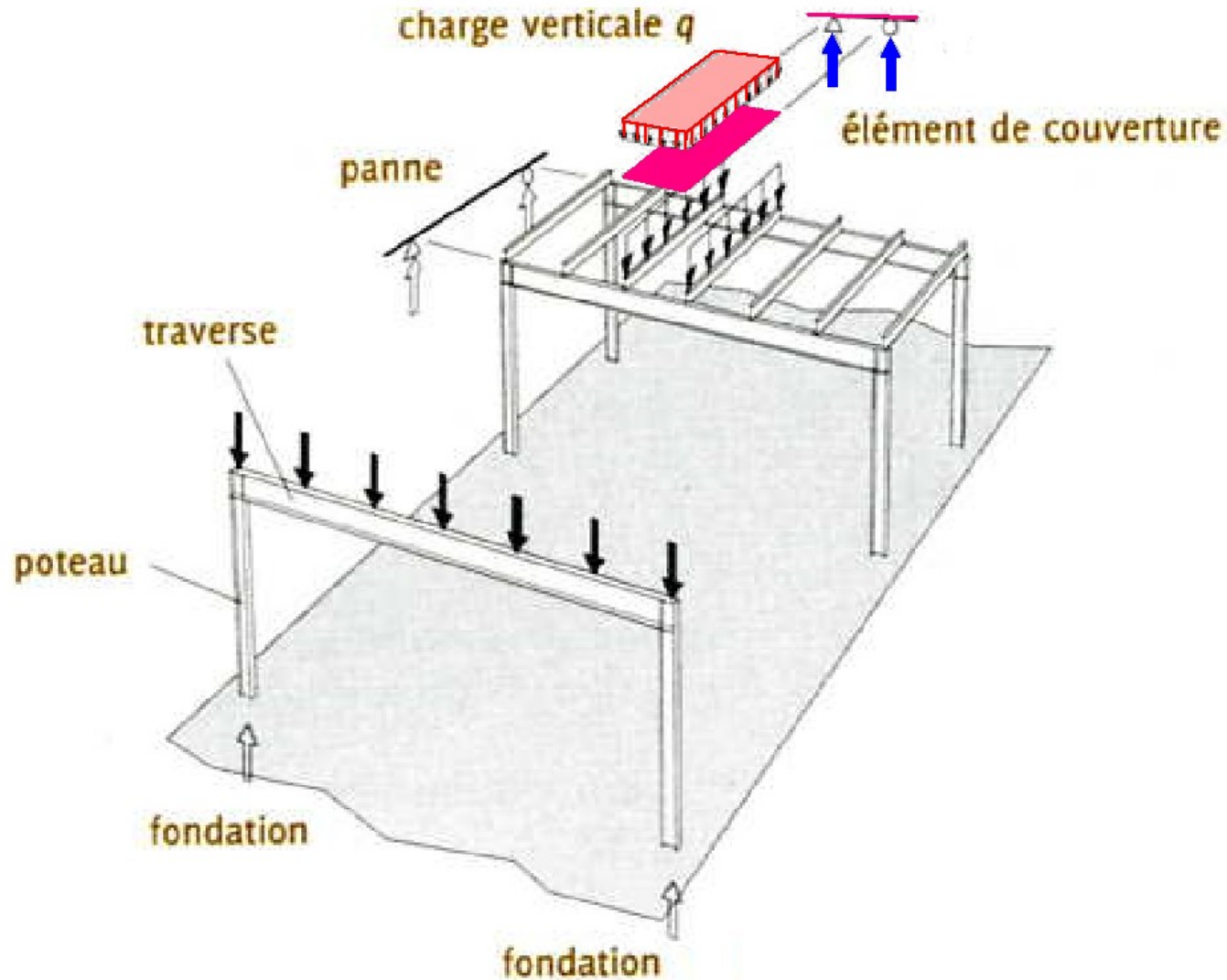
- **bonne répartition des moments fléchissant**
 - ♦ **valeurs extrêmes < celles en structure isostatique**
 - ♦ **=> déplacements plus petits.**
- **bonne redistribution des efforts en cas d'endommagement d'une partie de la structure.**
- **grande sensibilité**
 - ♦ **aux déplacements des appuis,**
 - ♦ **tassements différentiels,**
 - ♦ **variations de température,**
 - ♦ **=> Les structures isostatiques sont peu sensibles à ces phénomènes.**

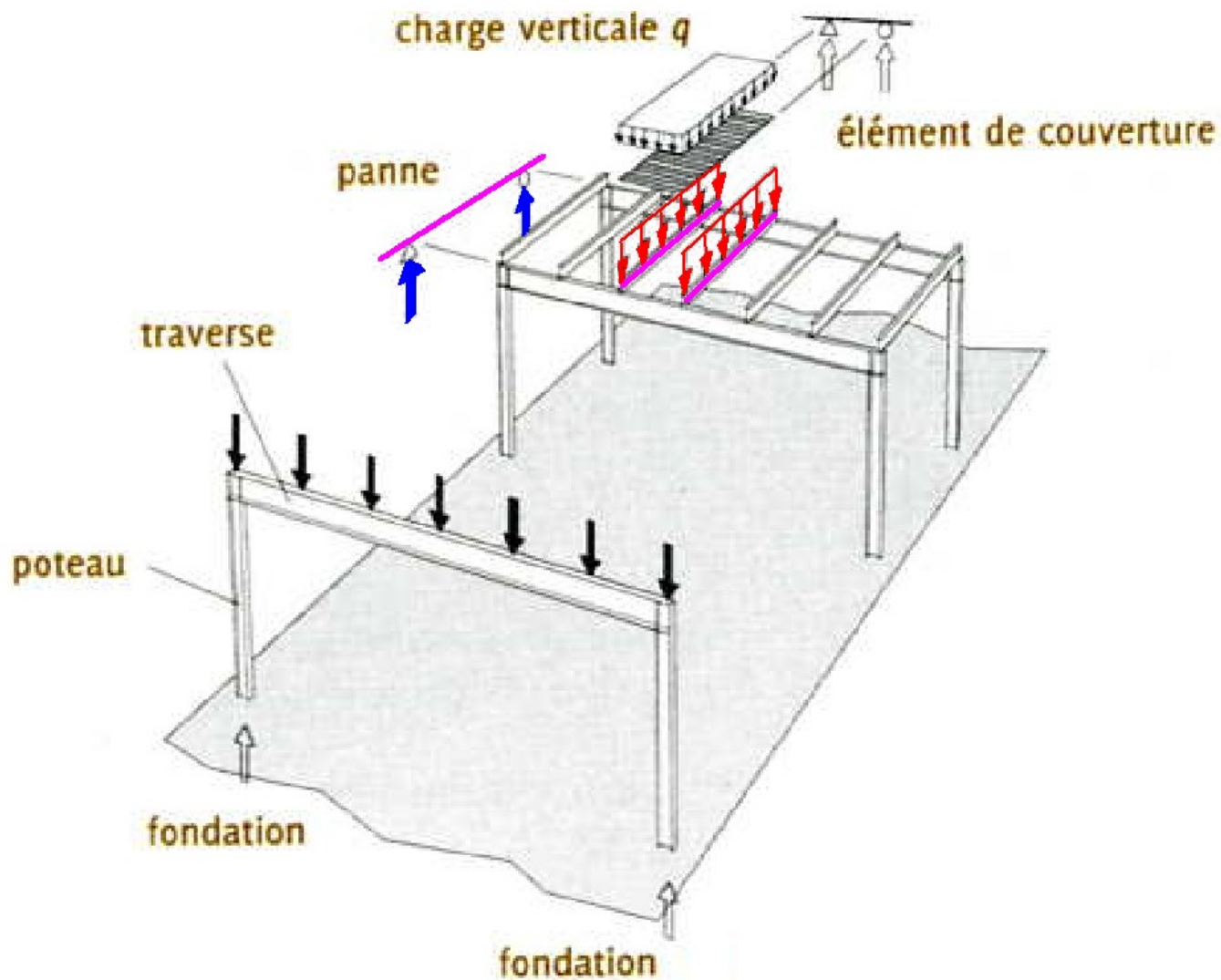


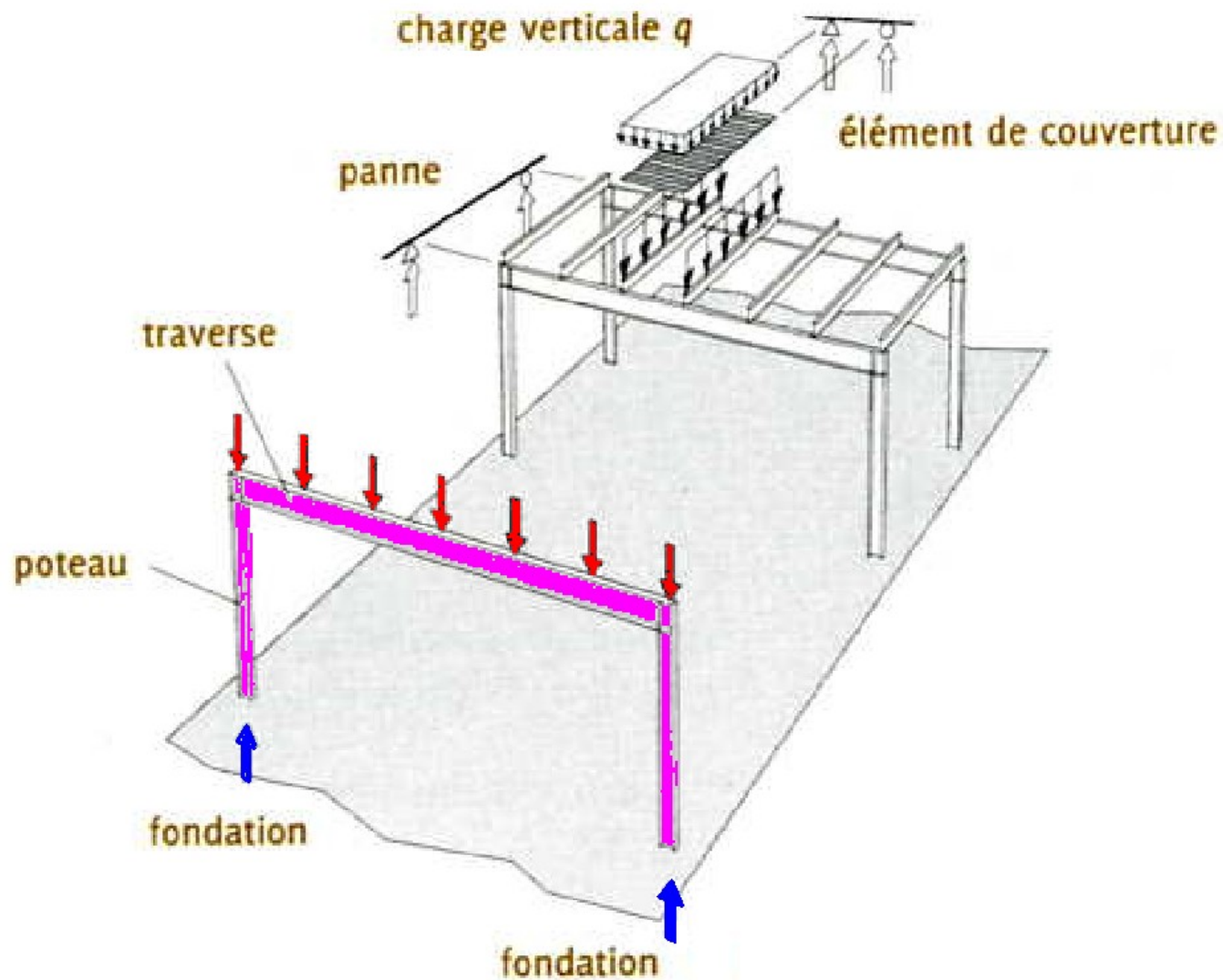
- **Stabilité statique :**

- Cheminement des efforts verticaux (neige, poids propre, vent, ...)



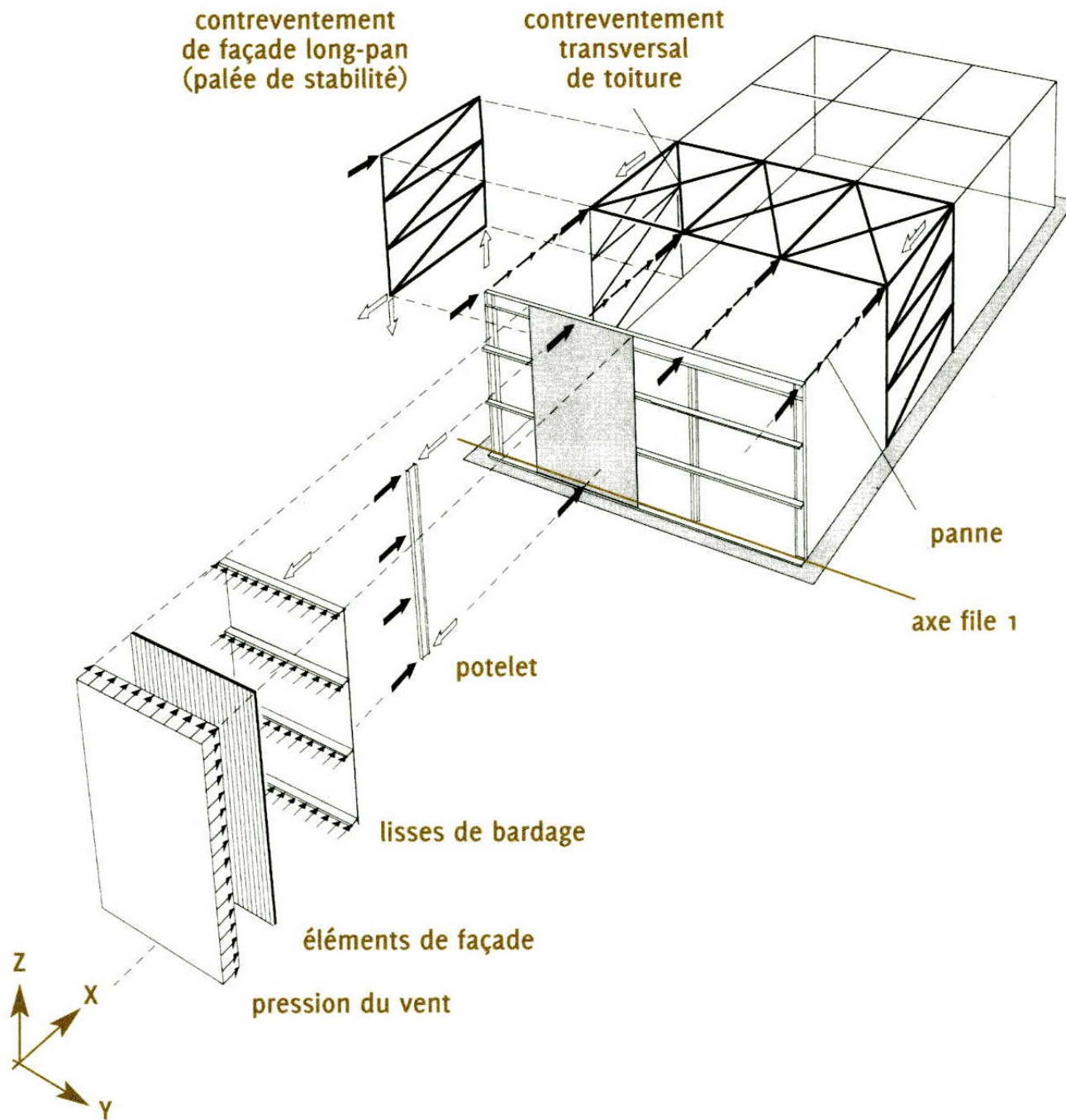


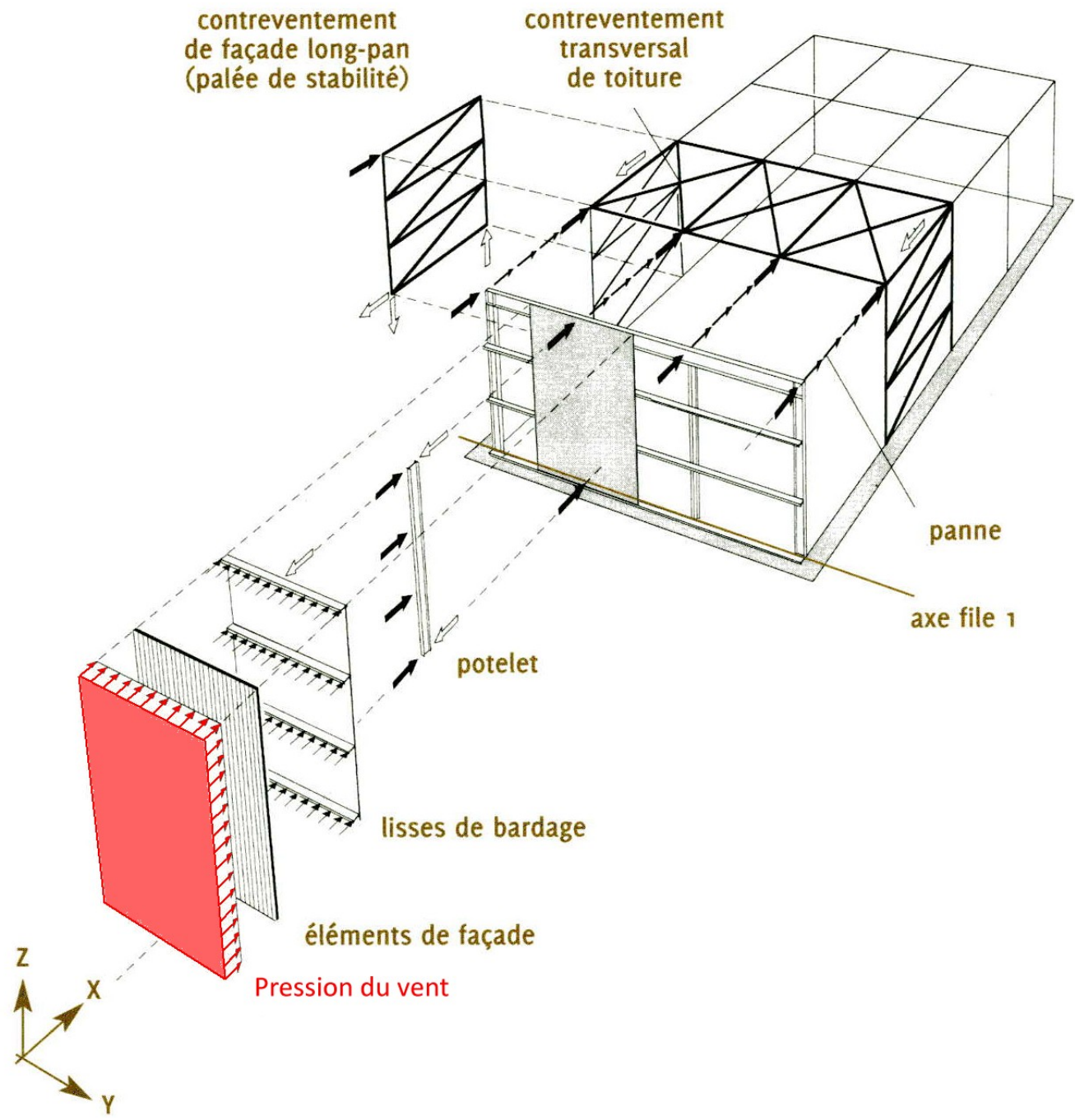


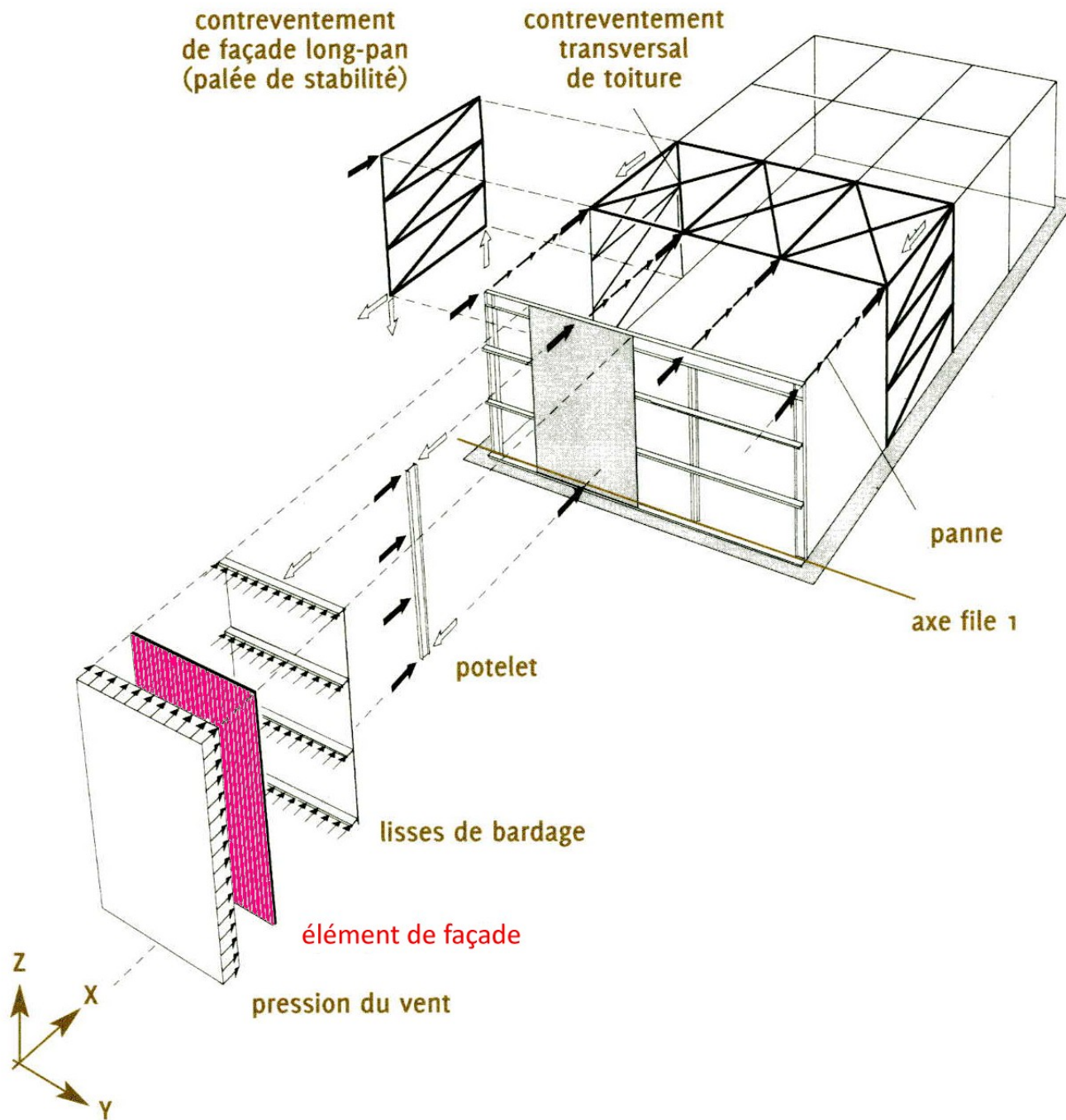


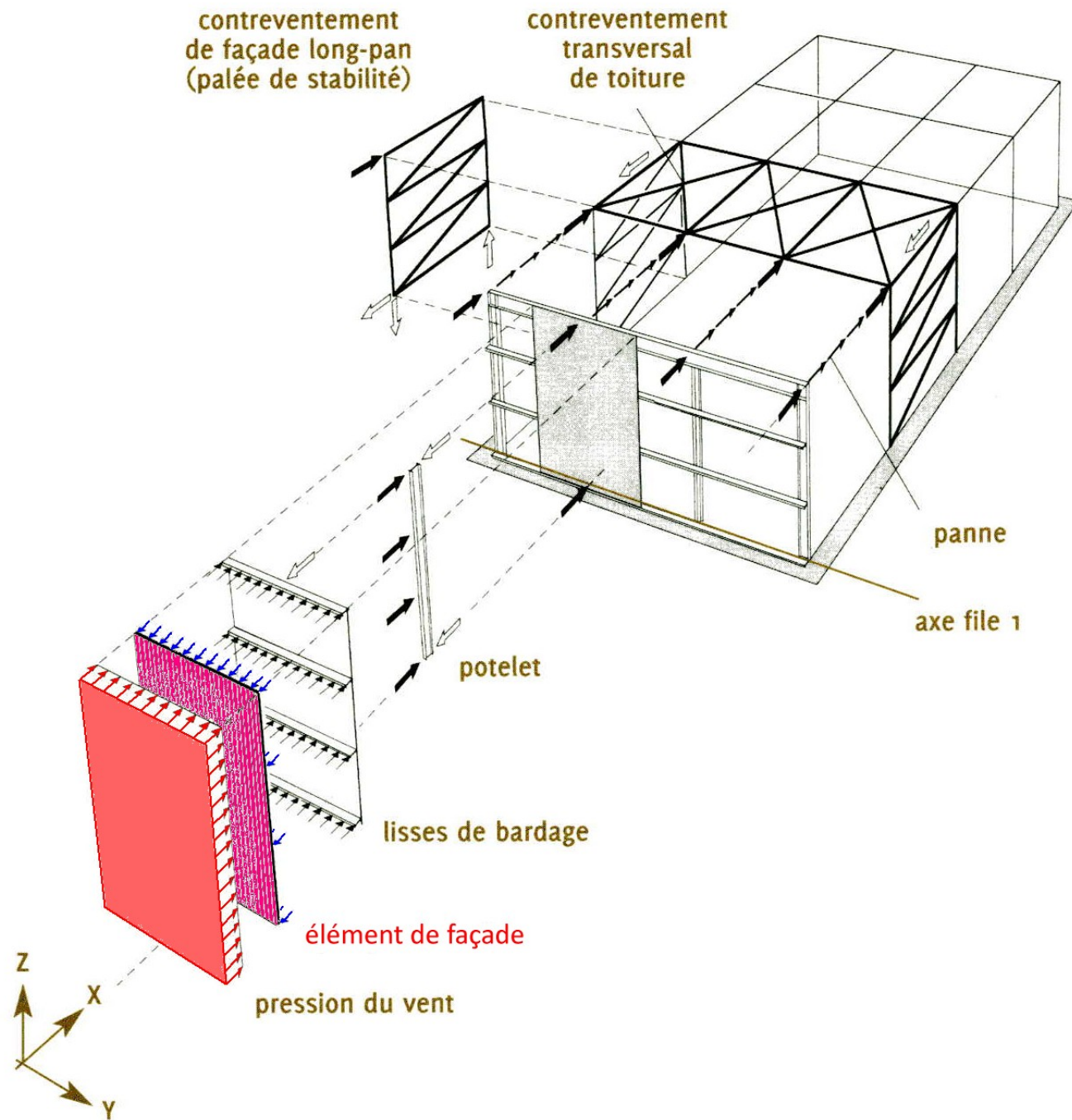
- **Stabilité statique :**

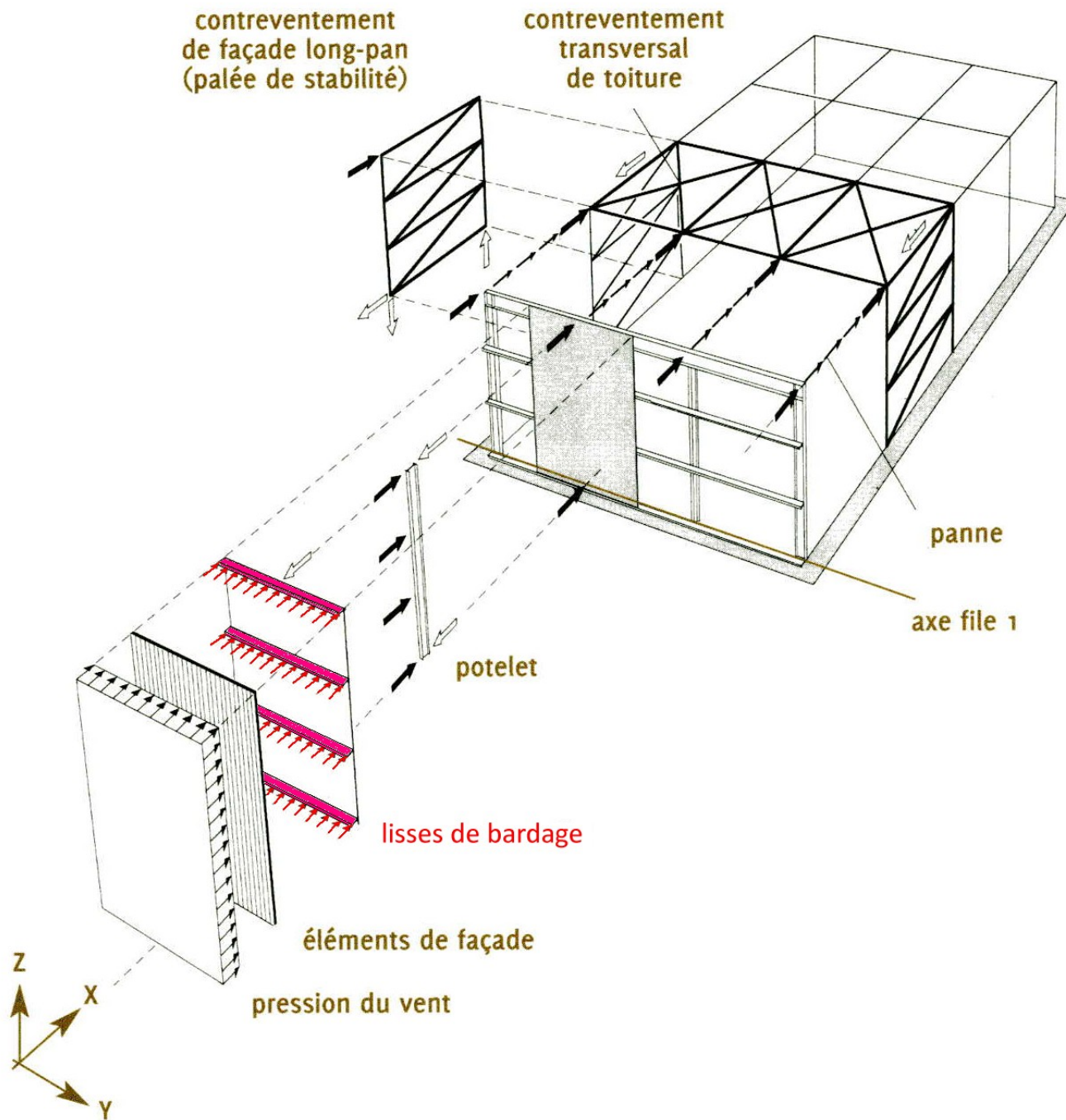
- Cheminement des efforts s'exerçant sur une façade pignon (vent, ...)

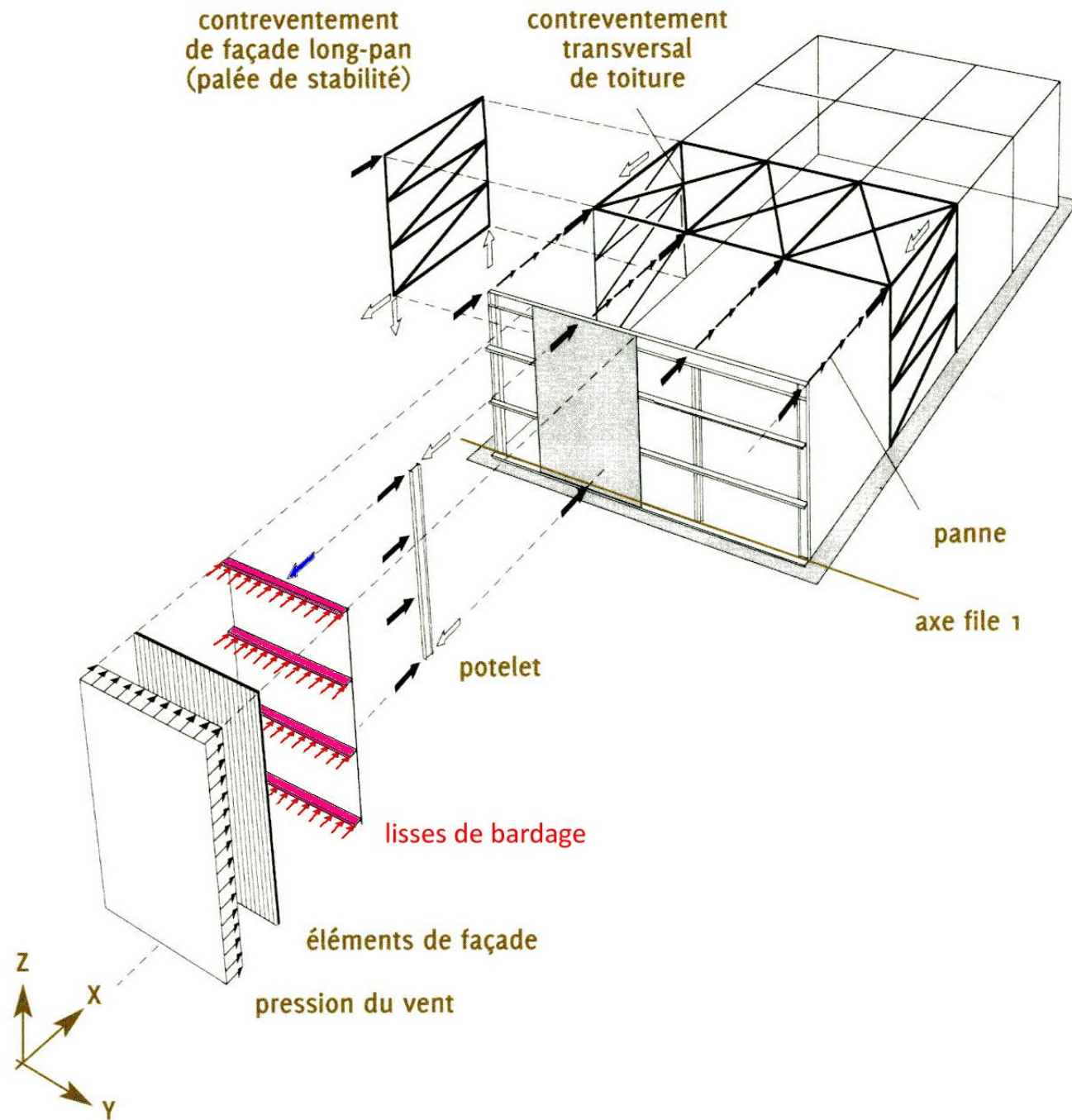


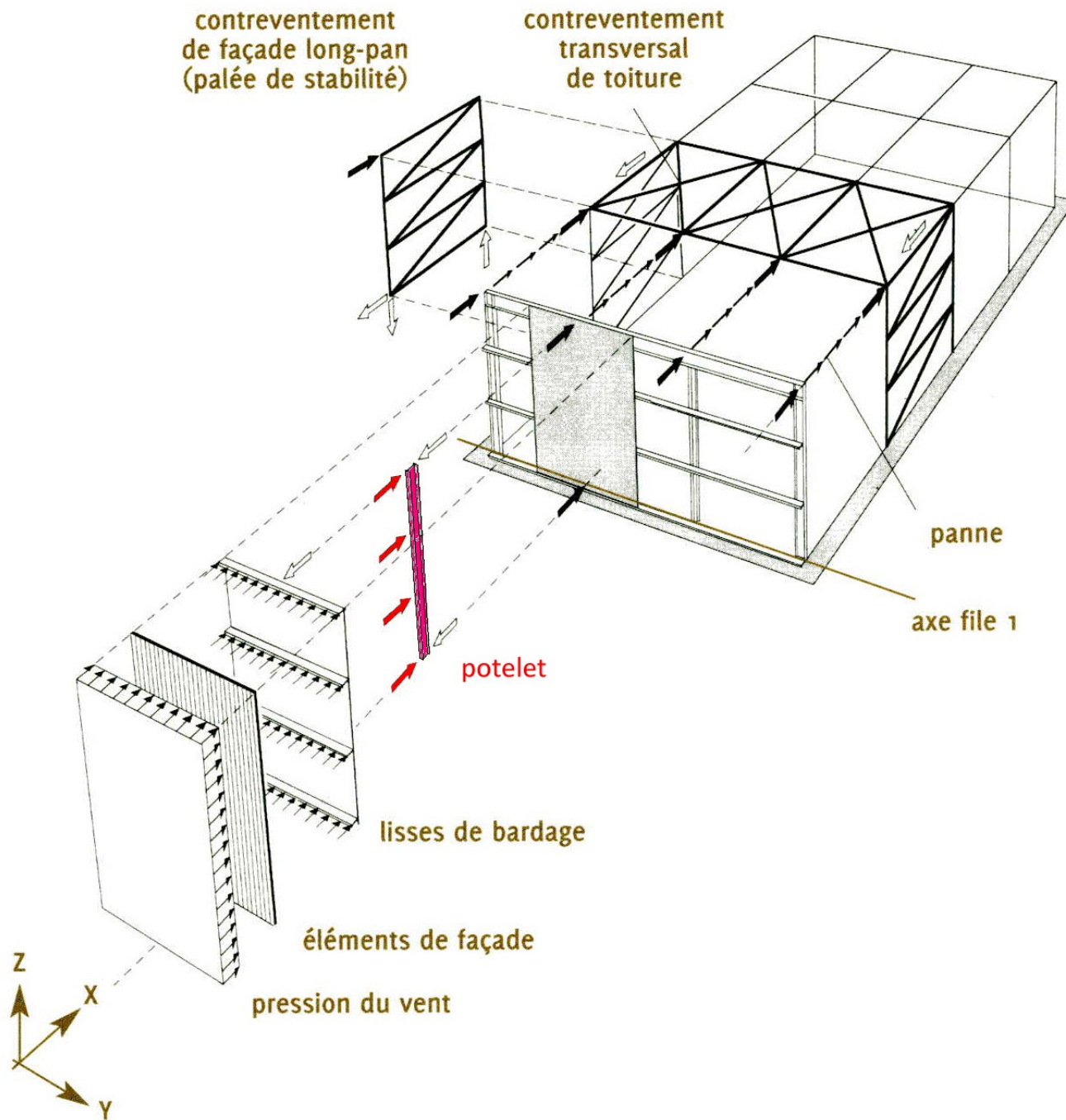


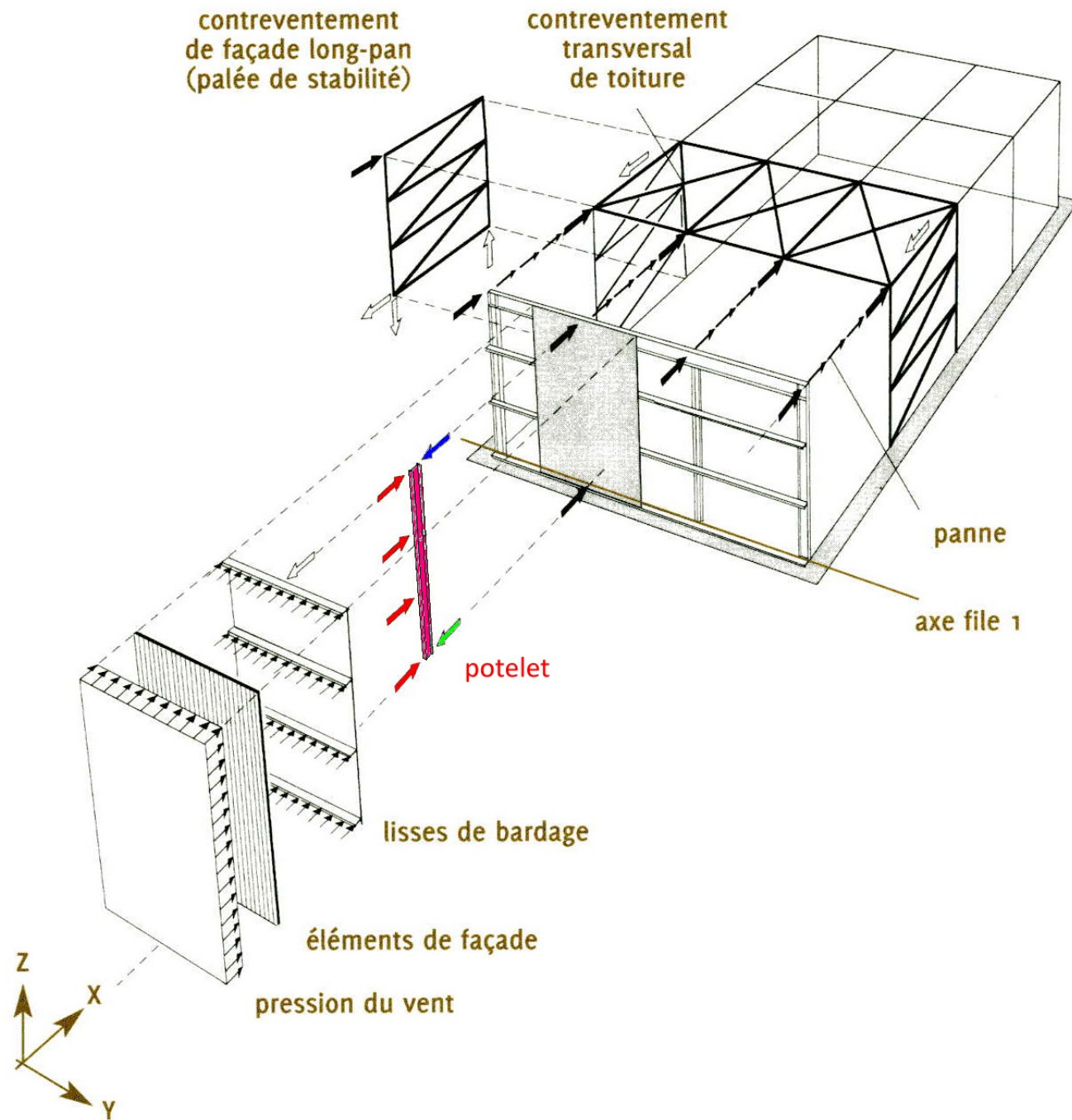


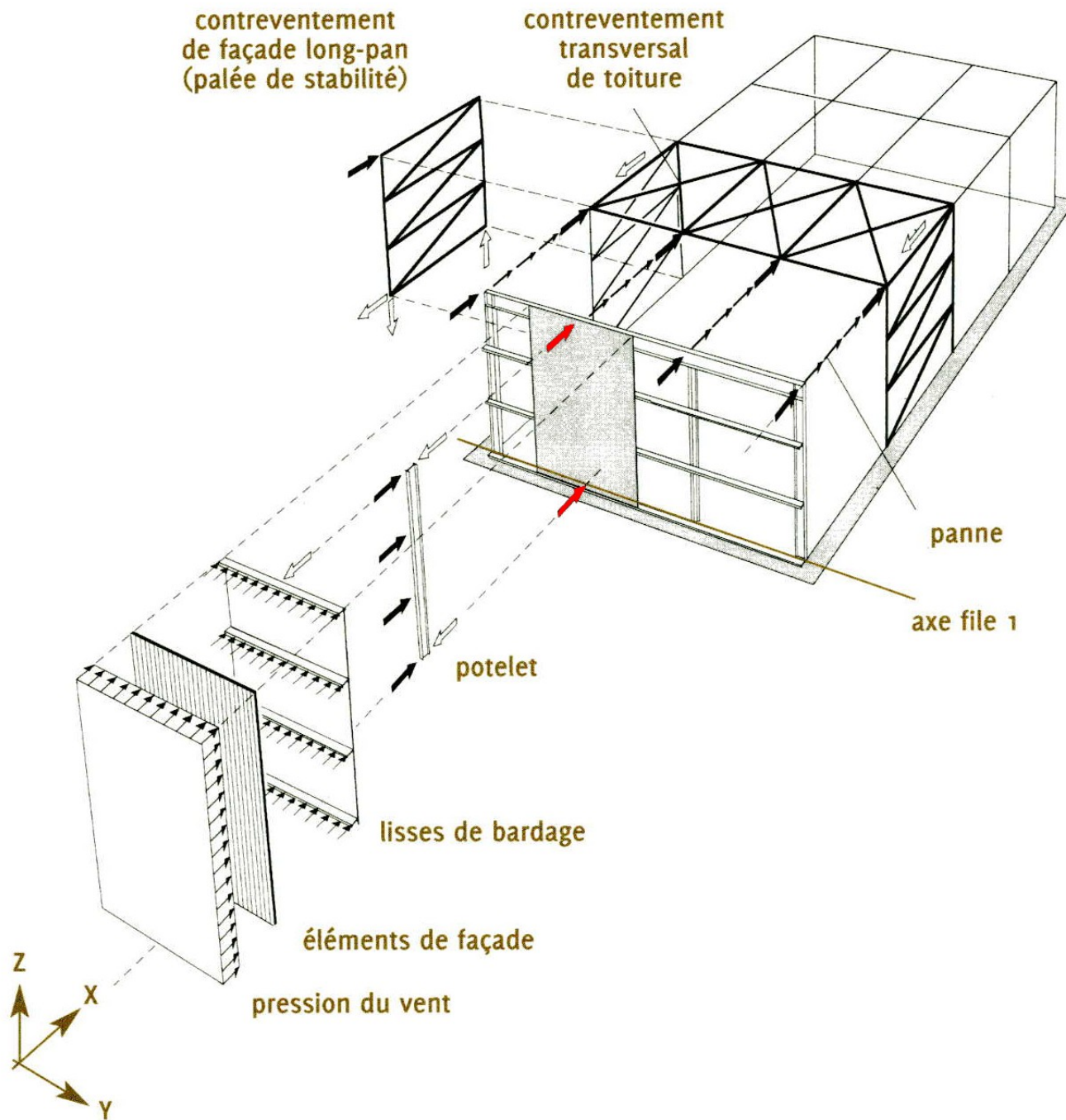


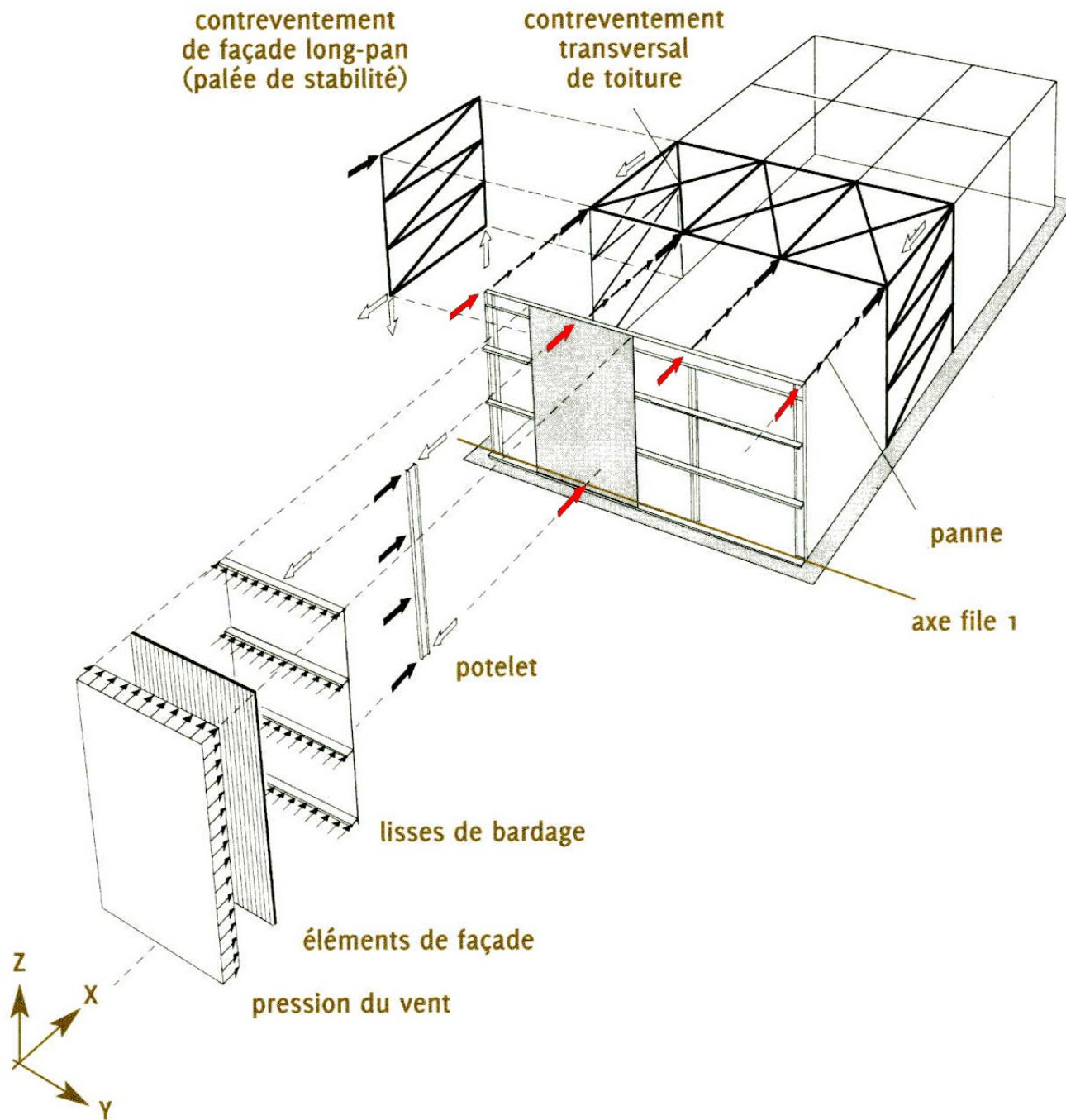


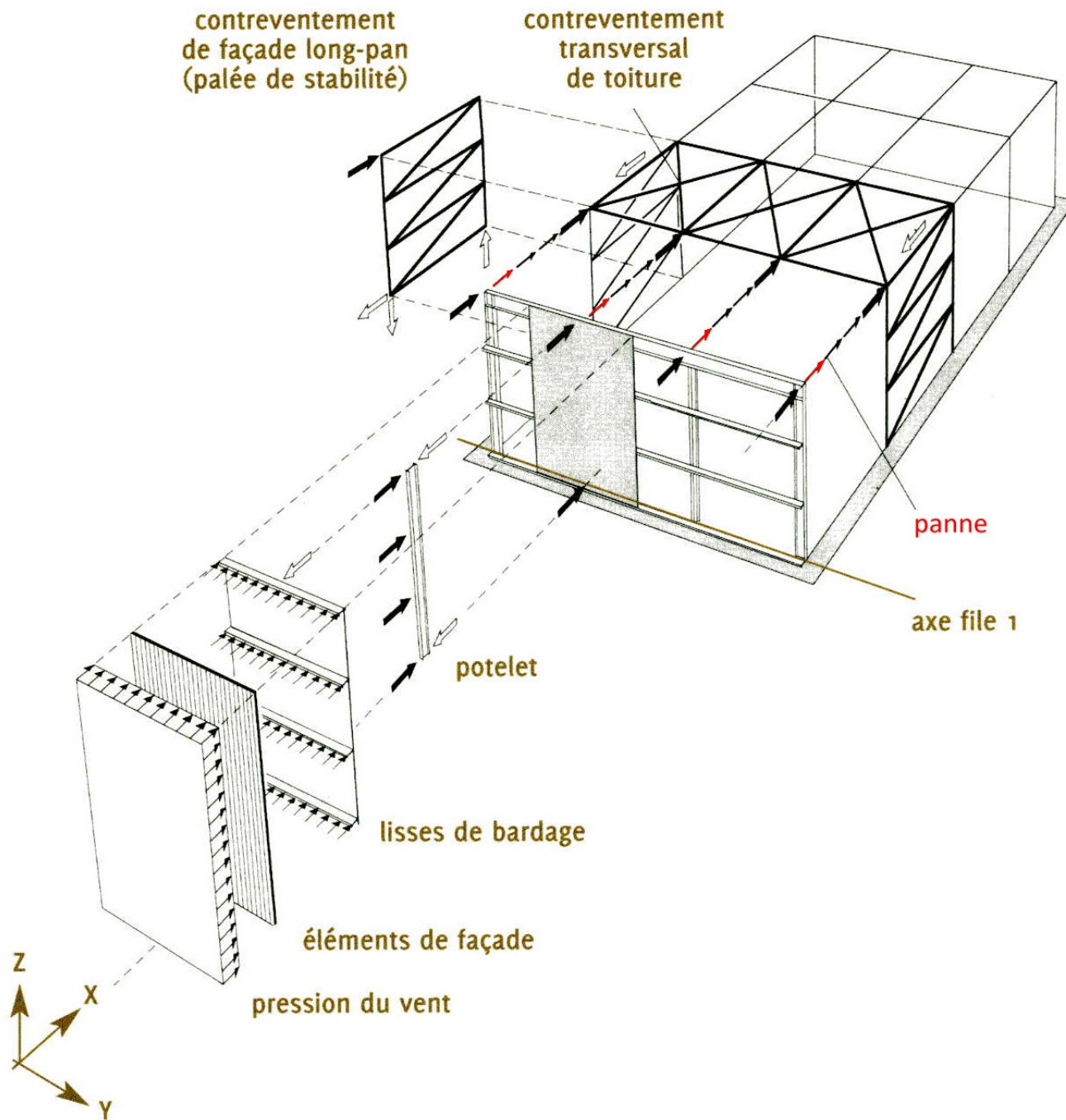


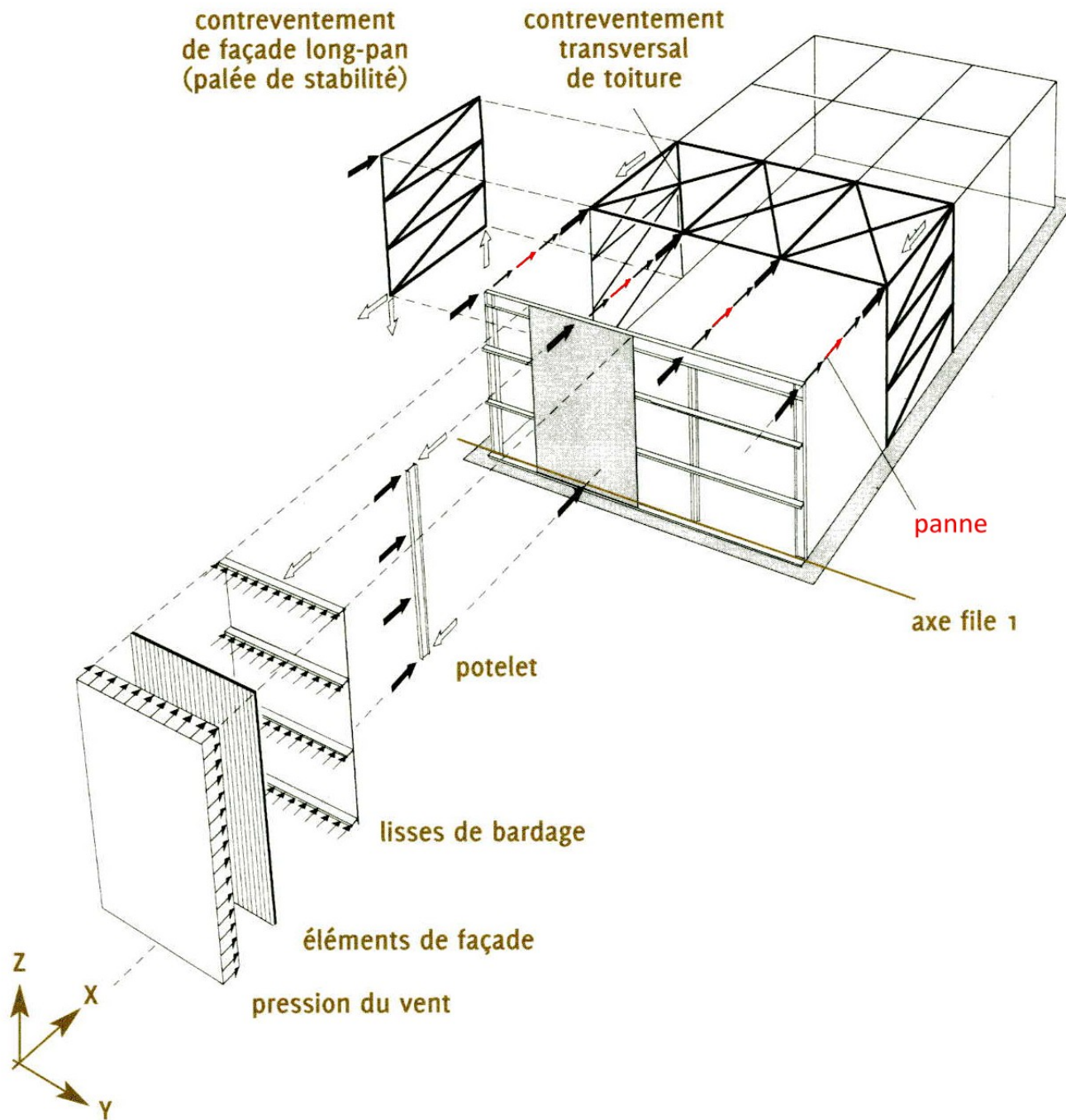


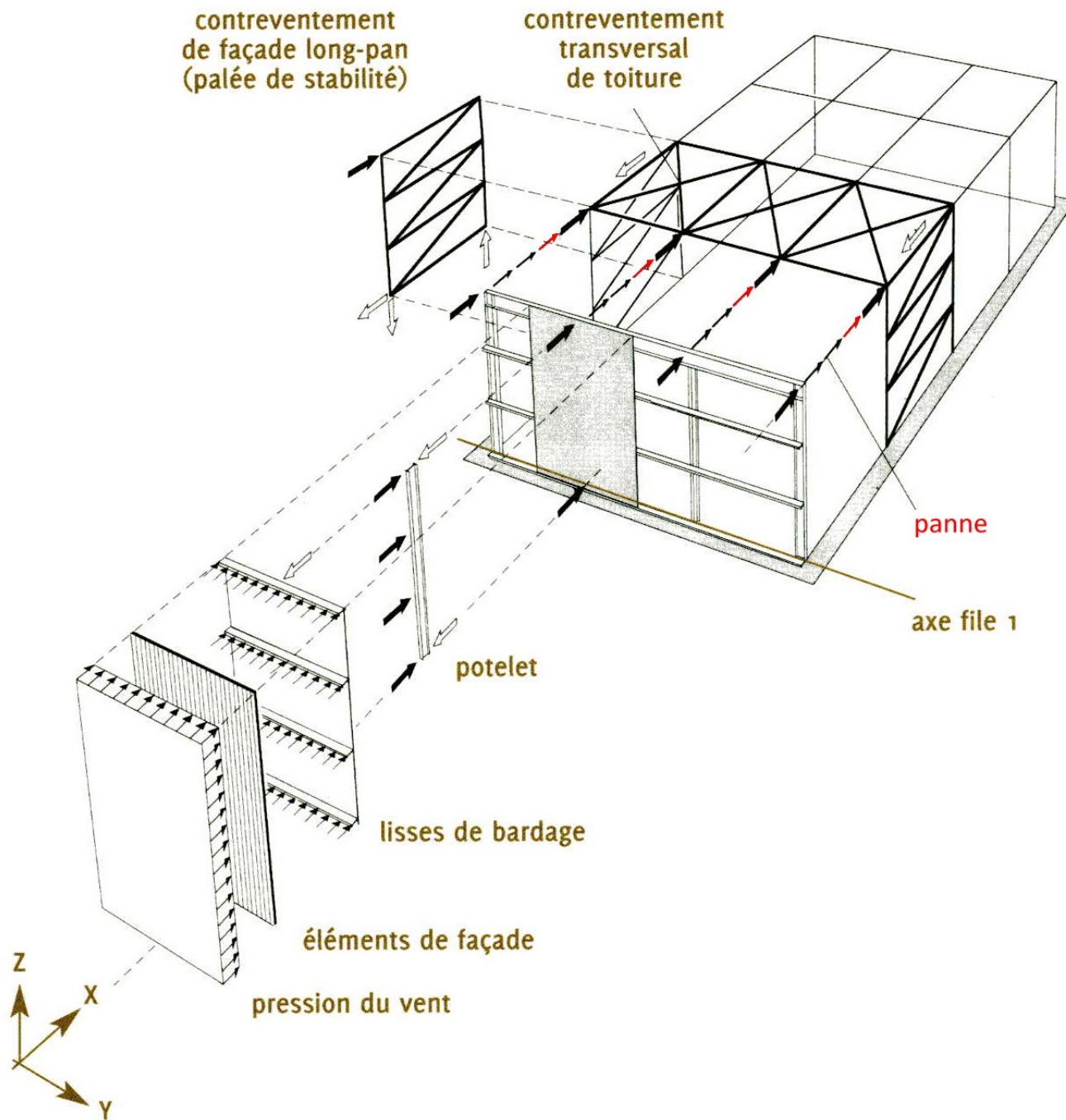


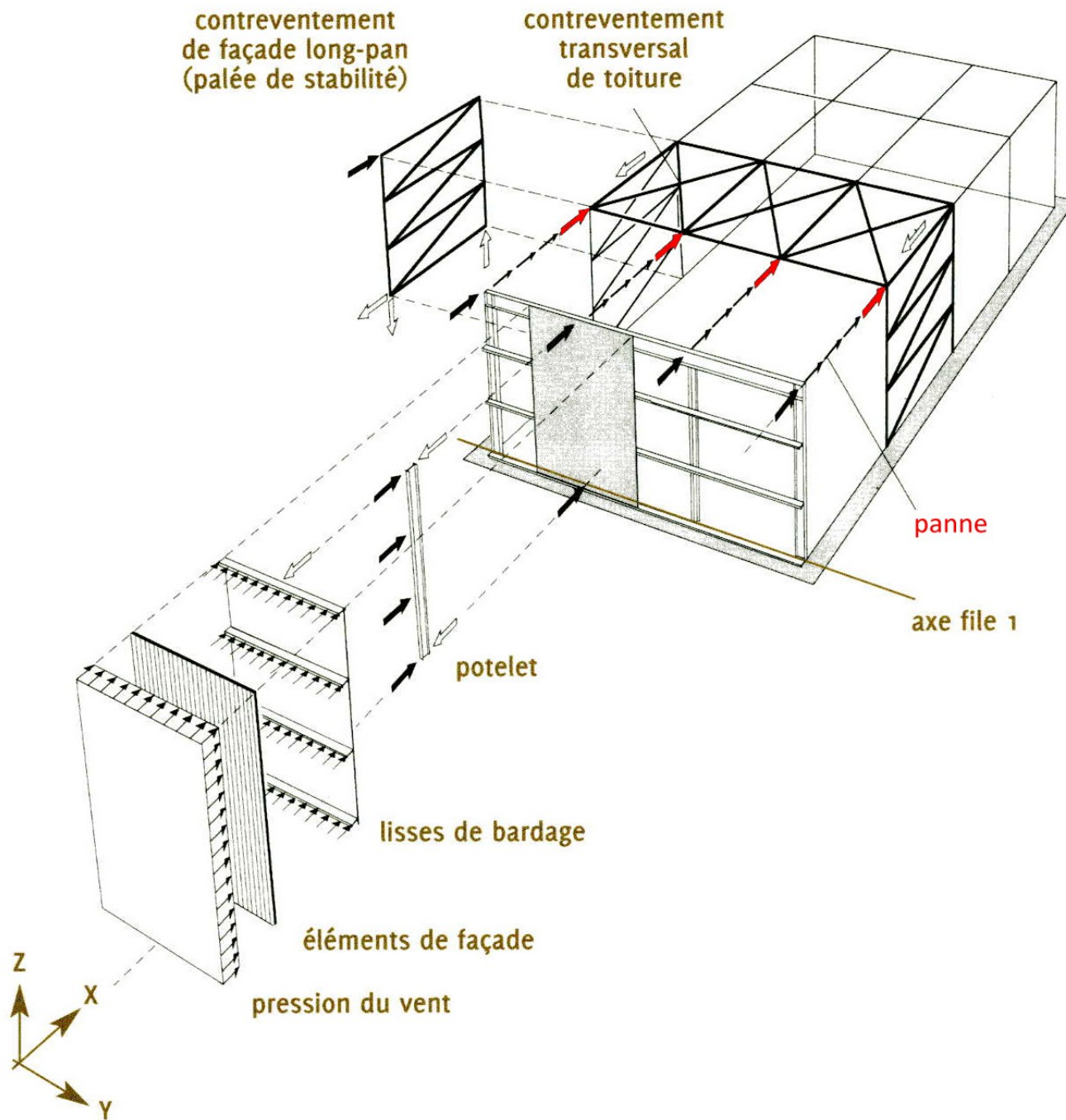


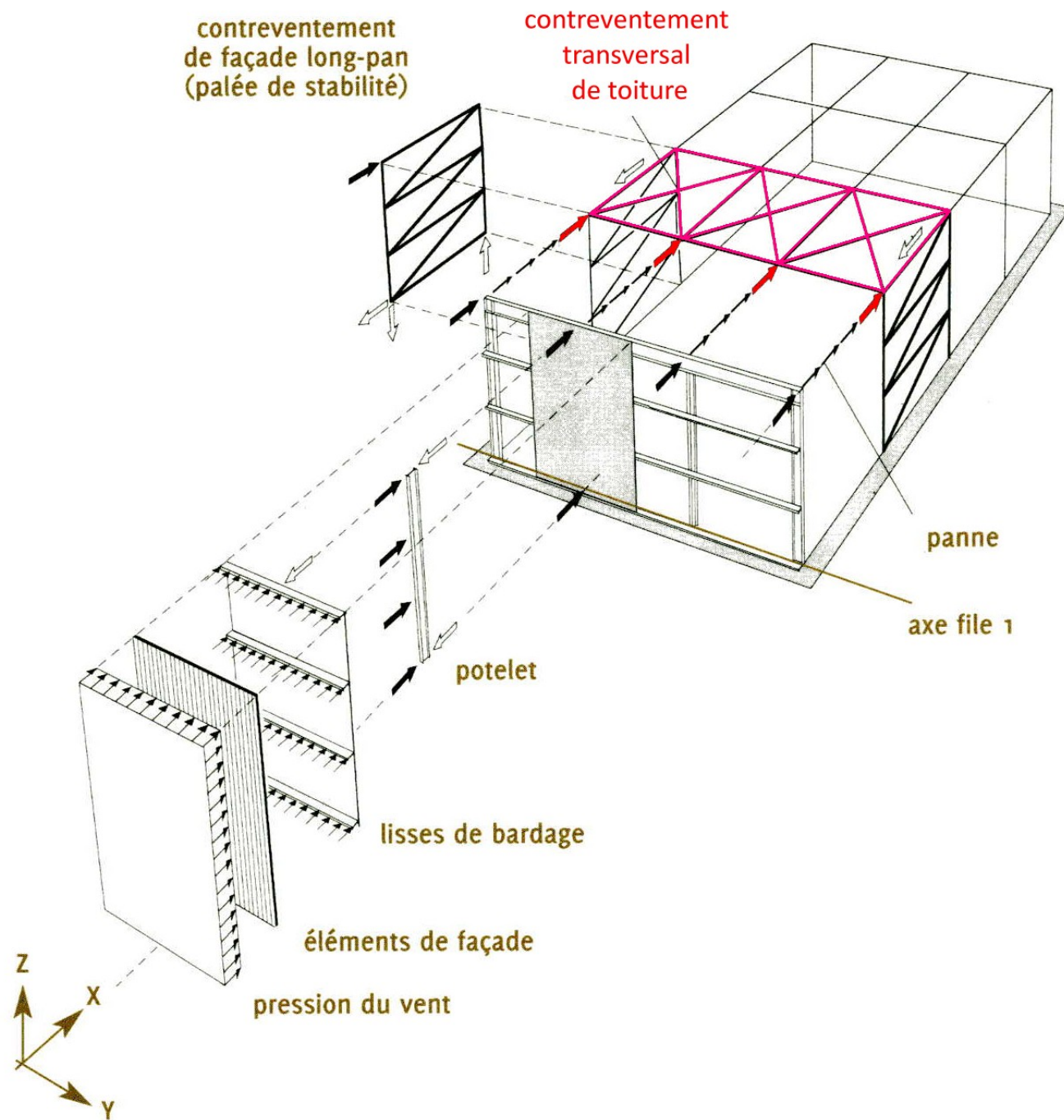


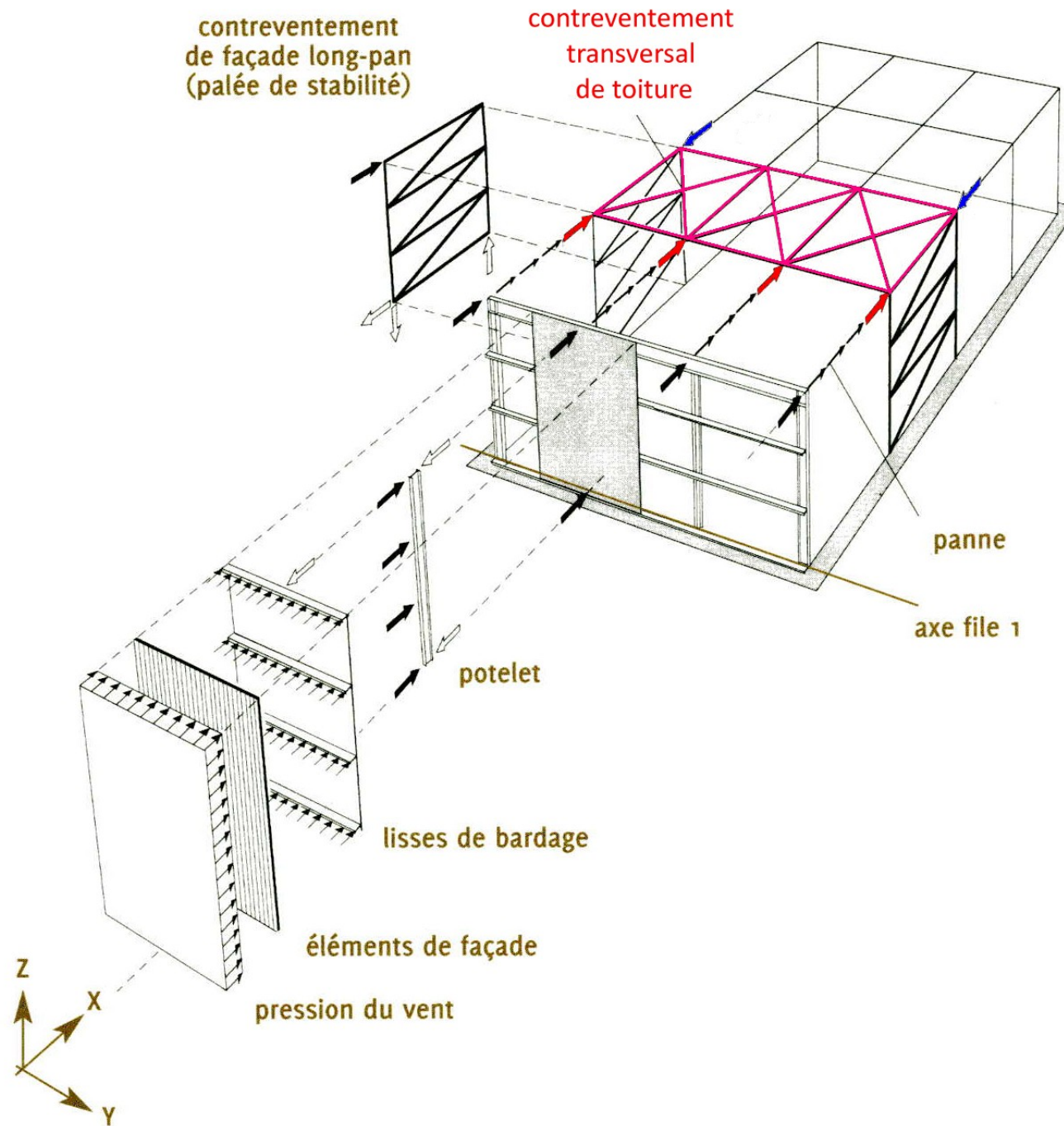


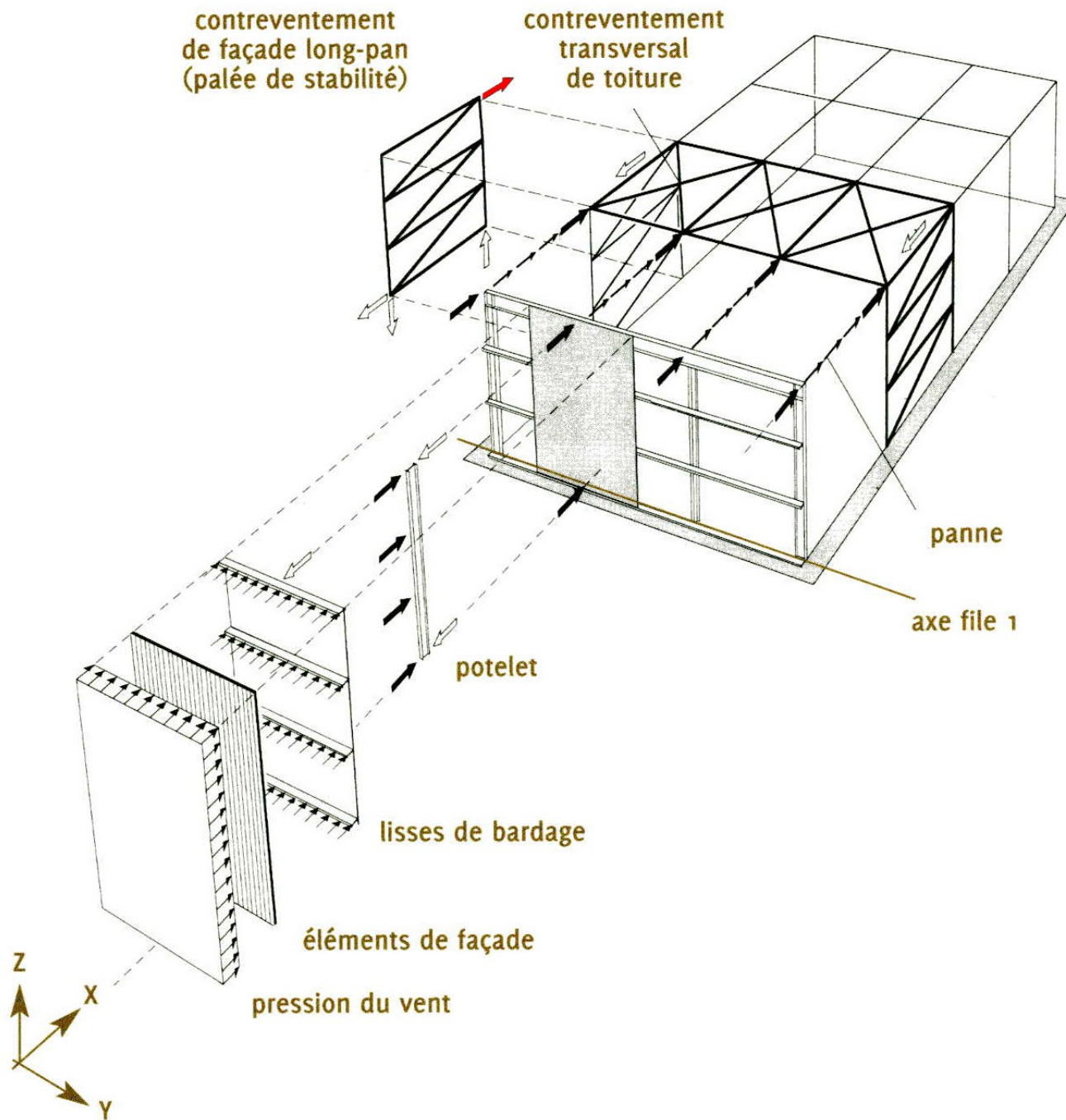


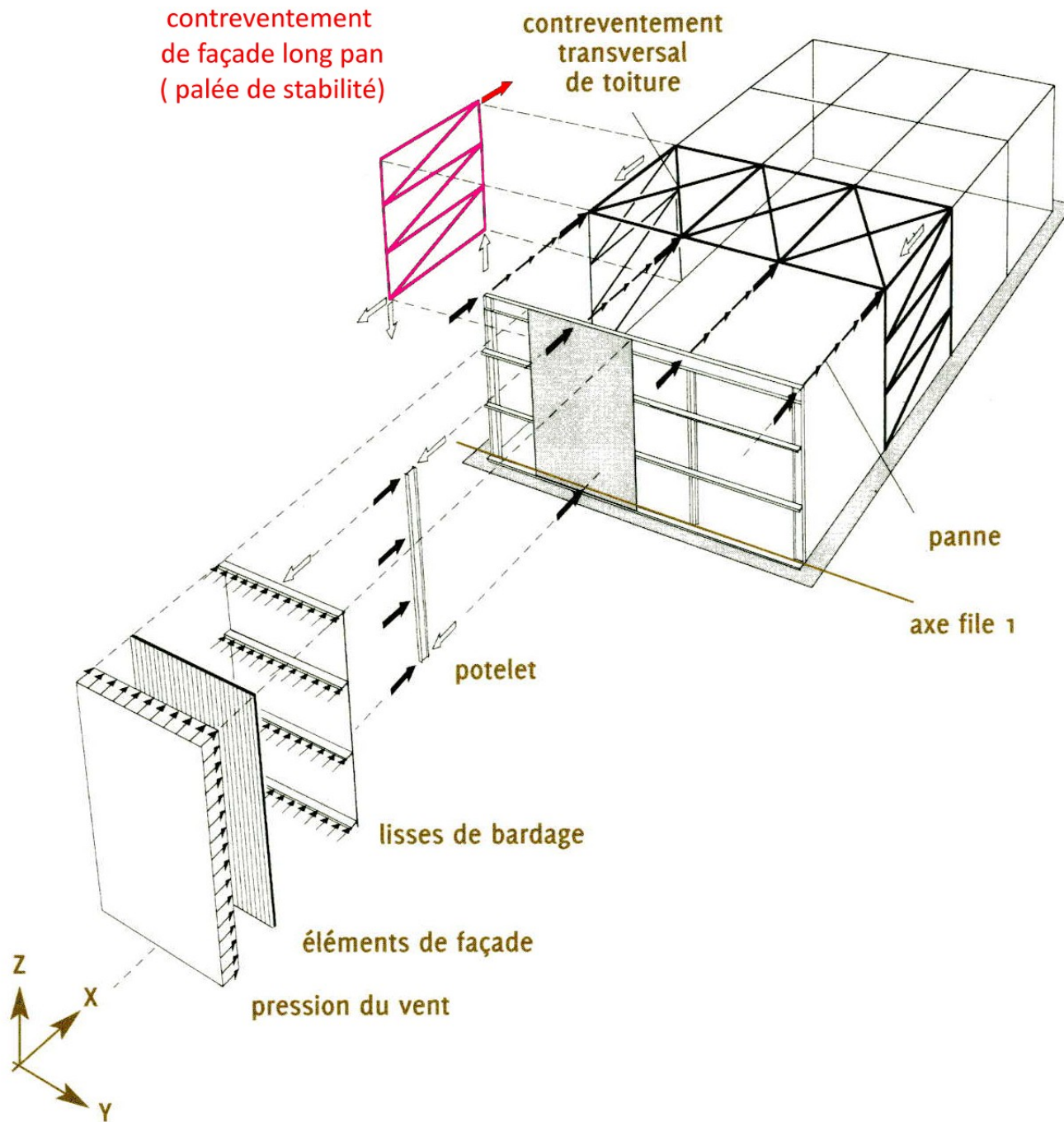


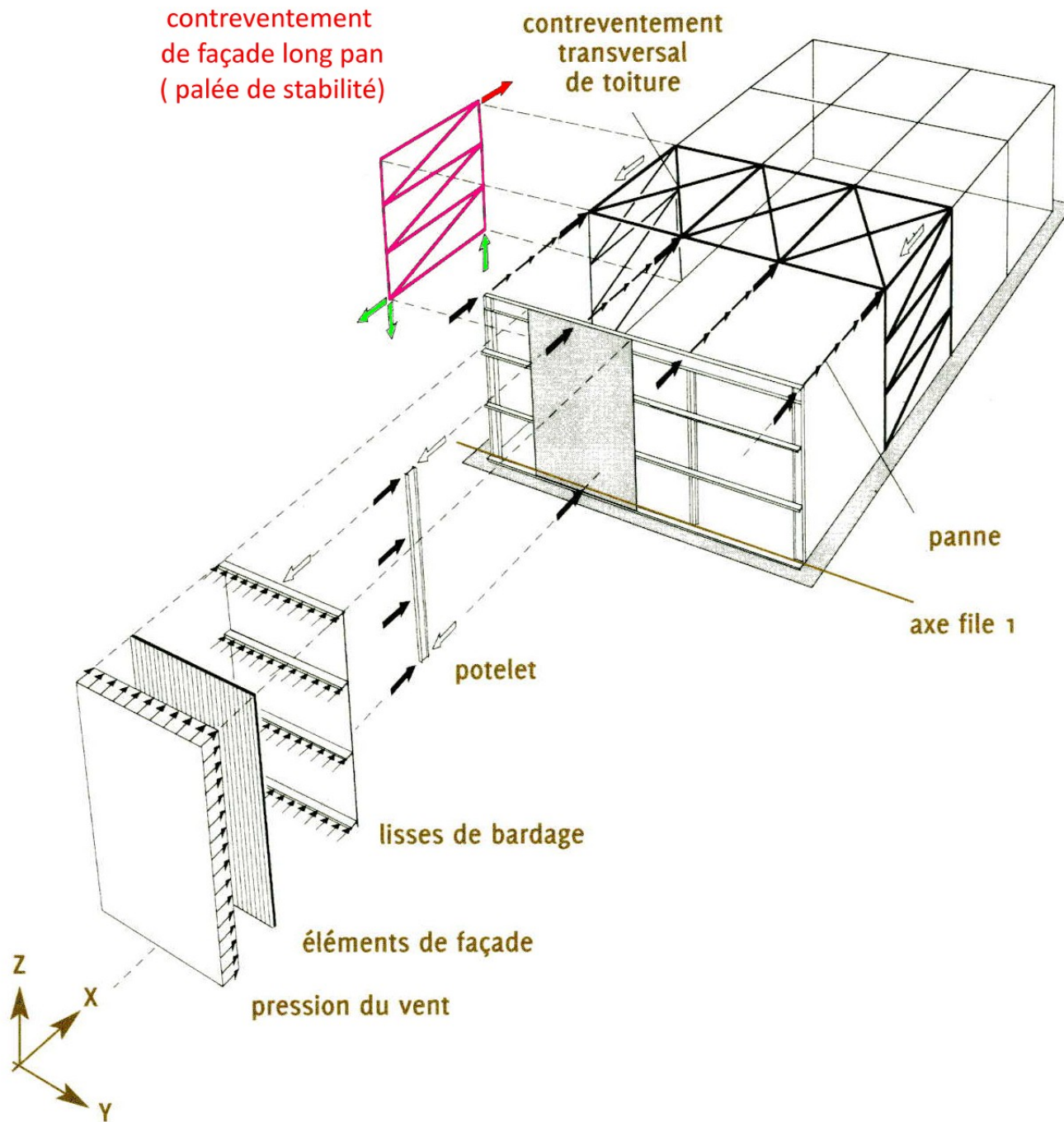






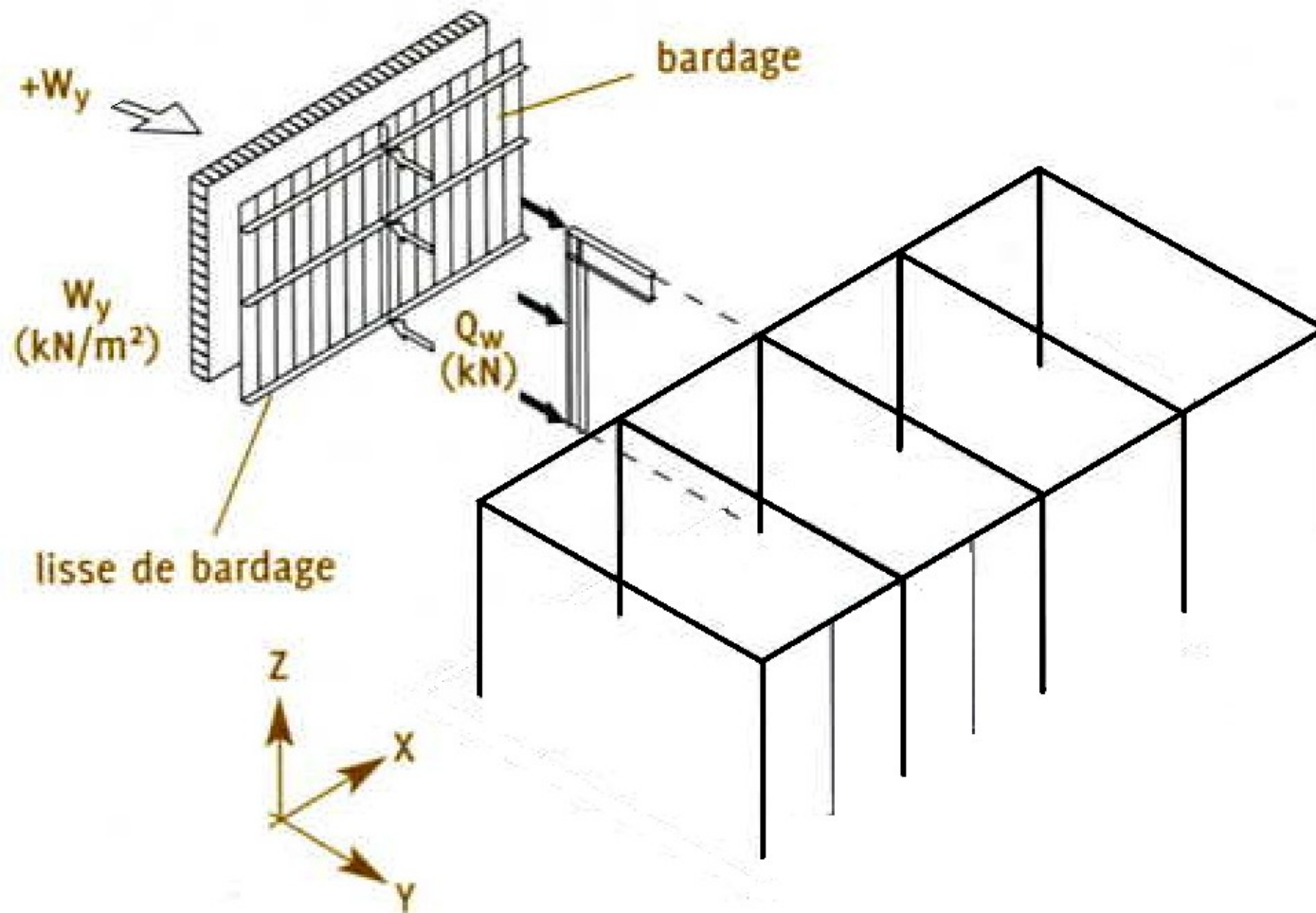


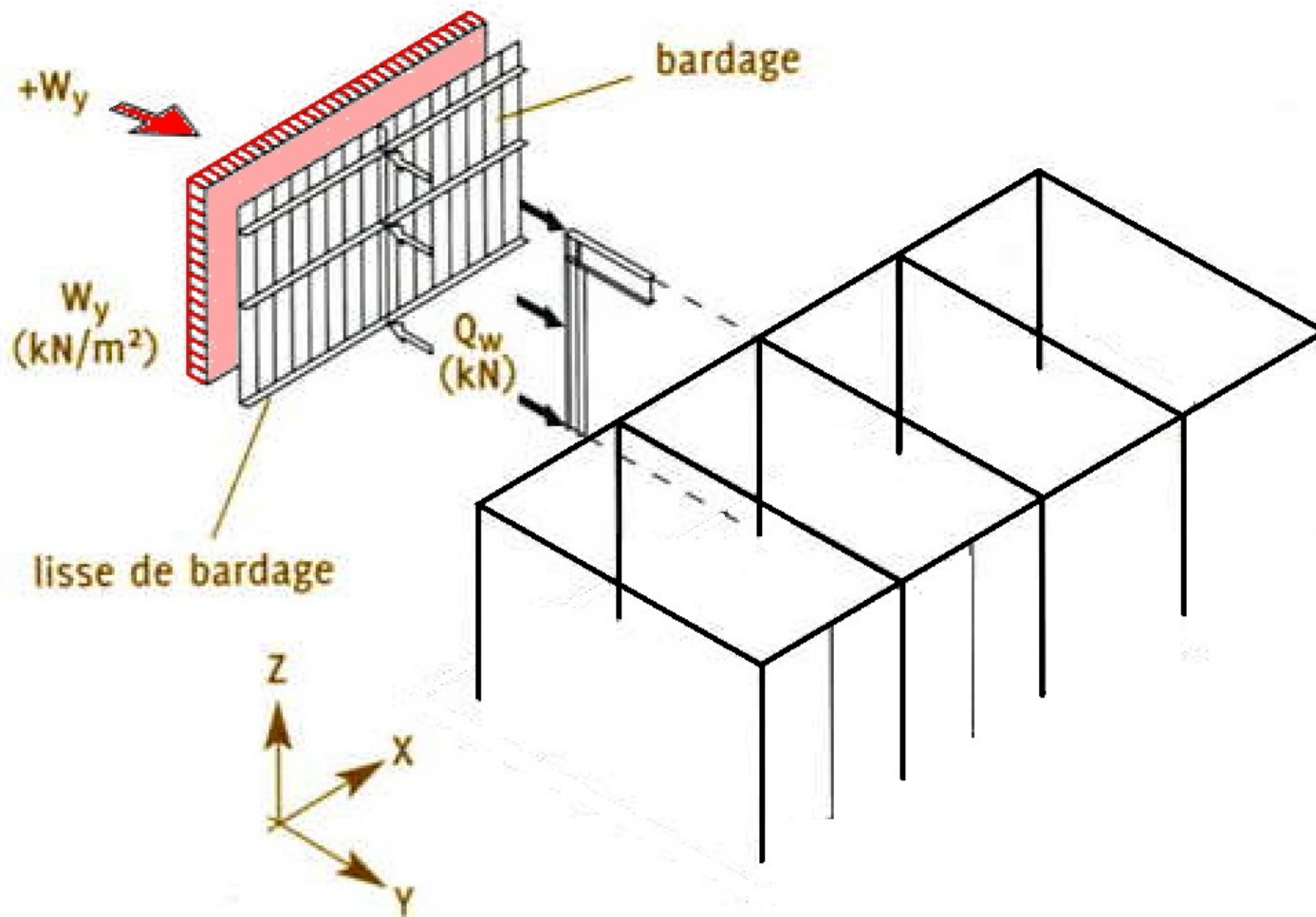


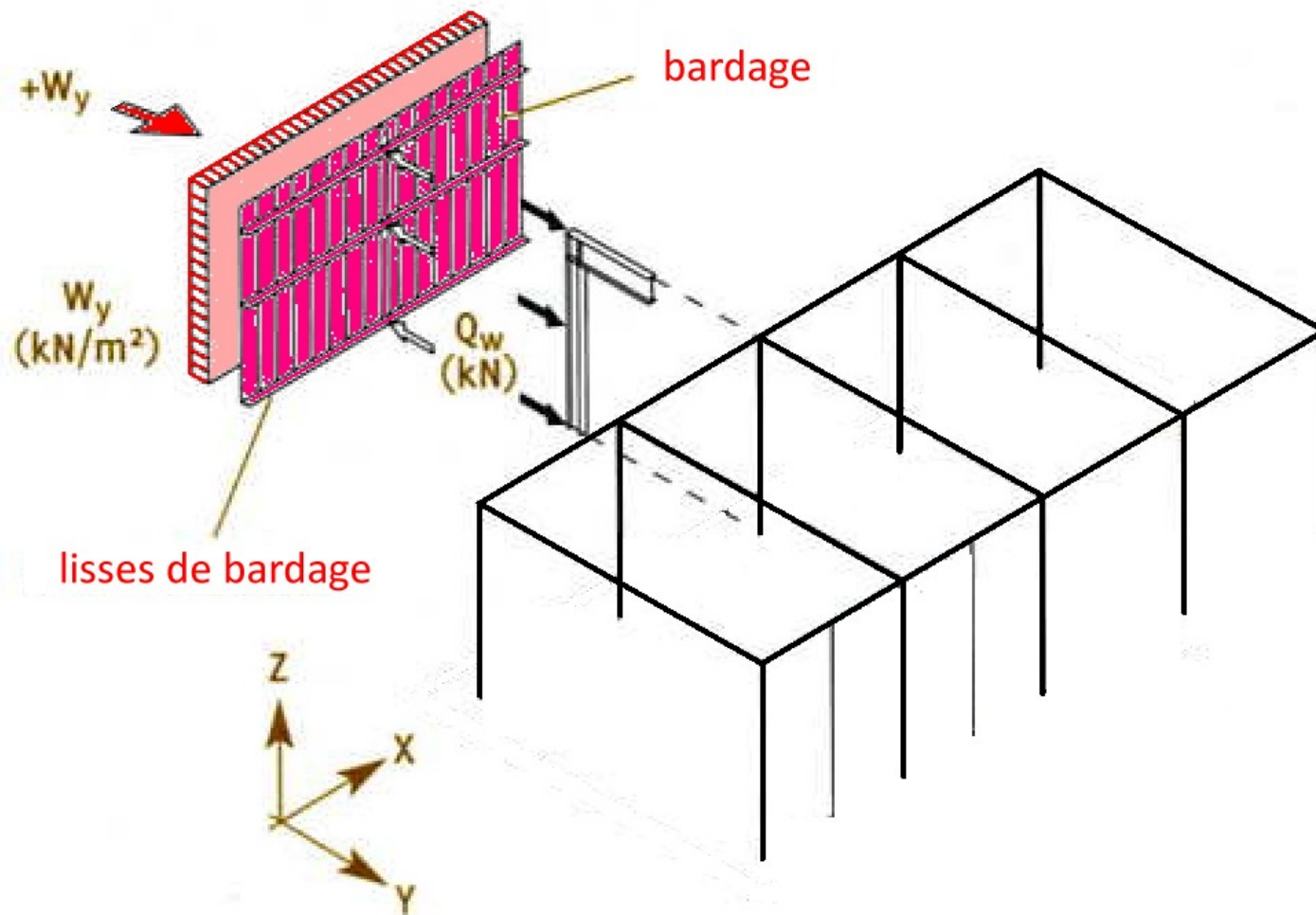


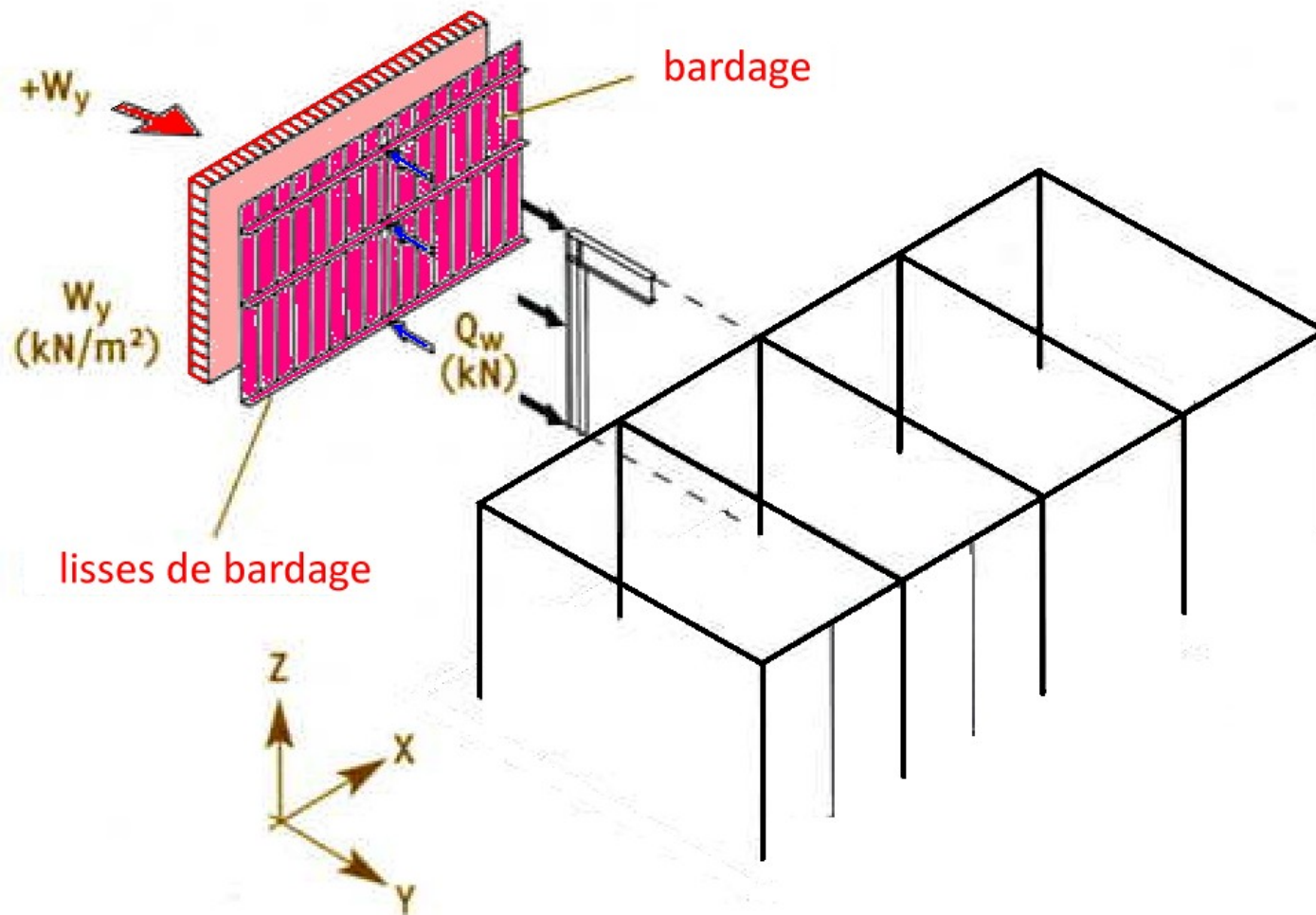
- **Stabilité statique :**

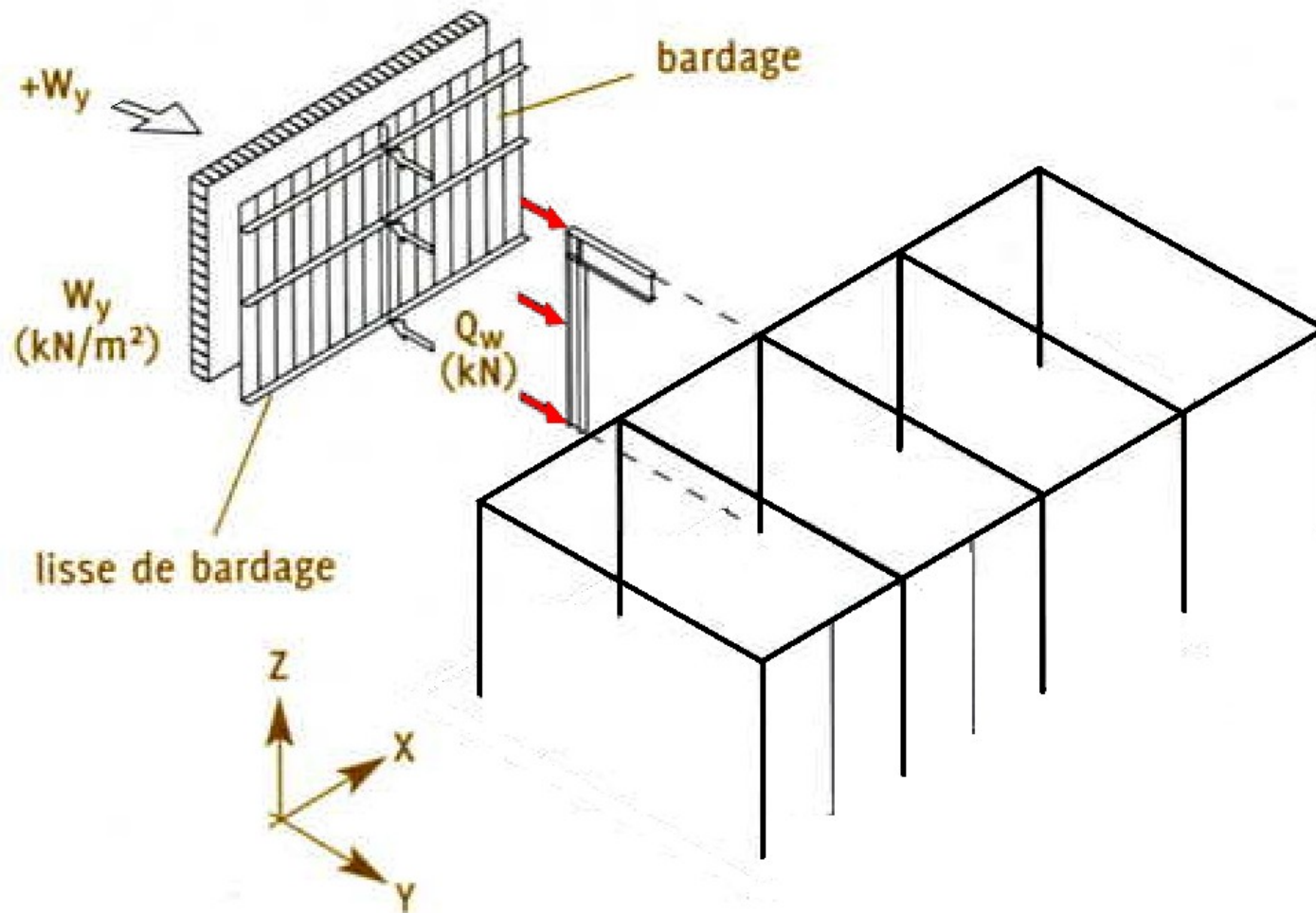
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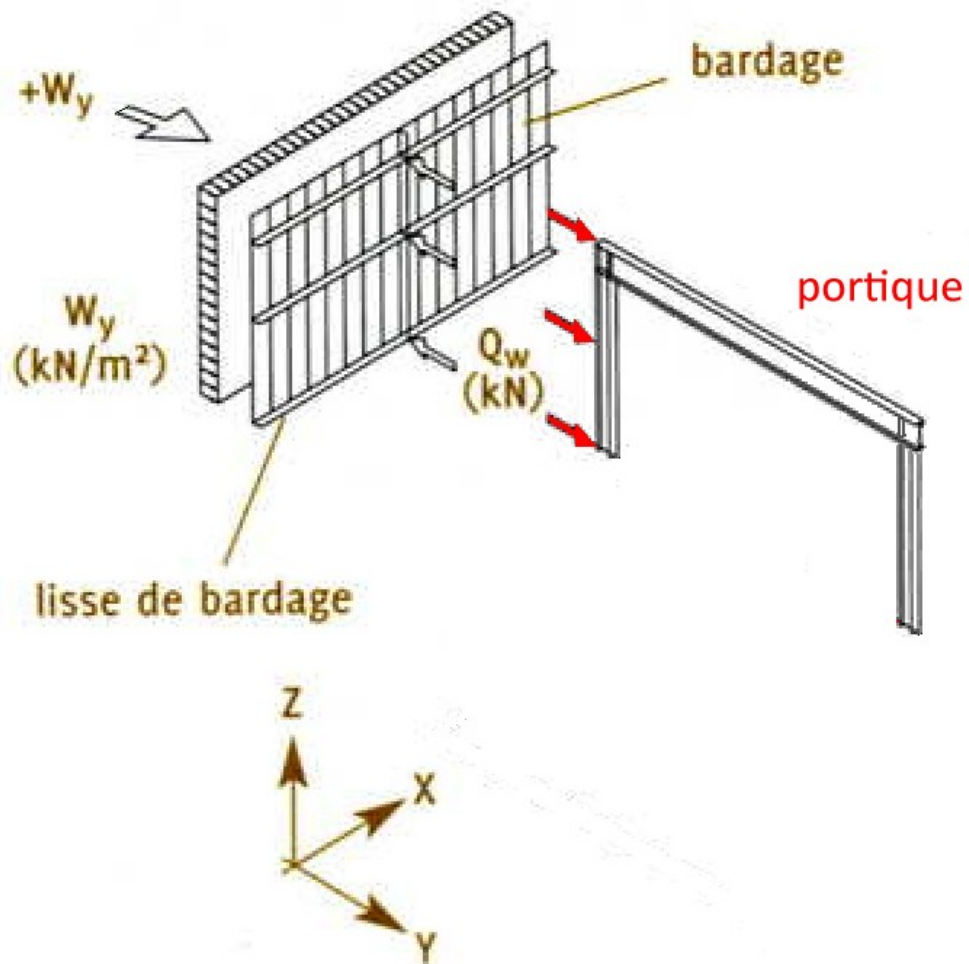


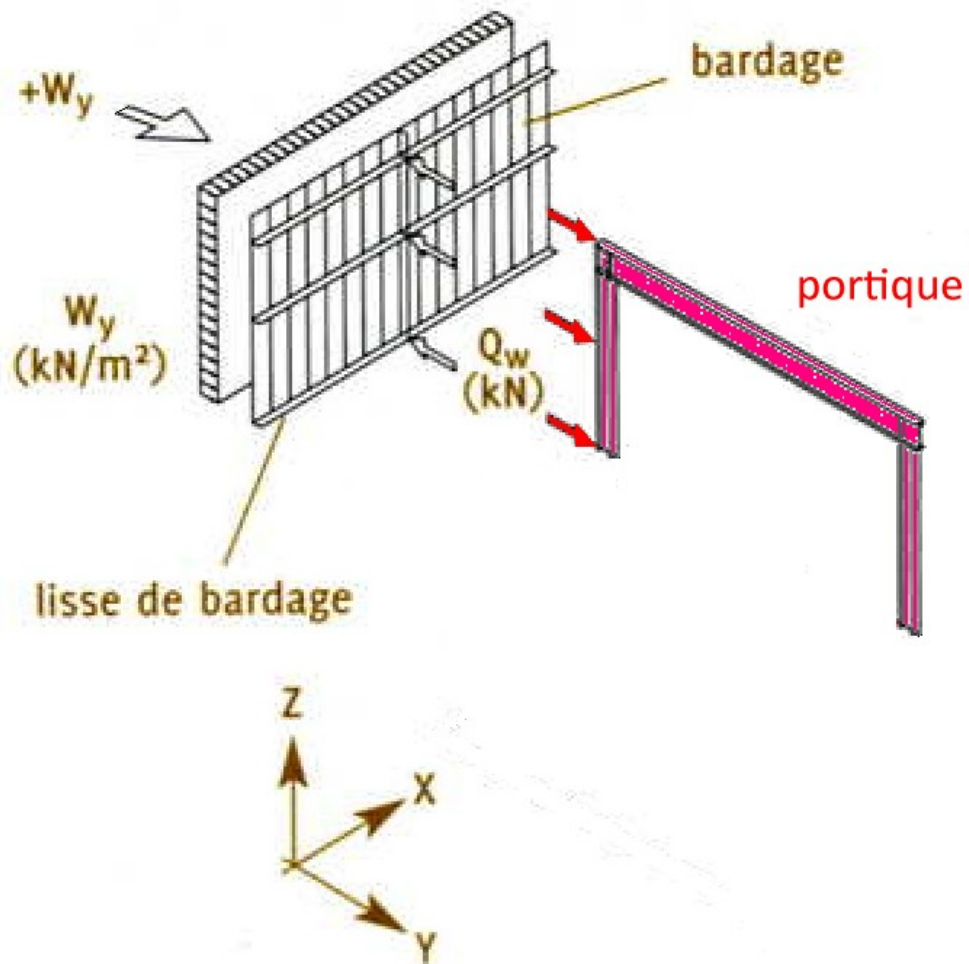


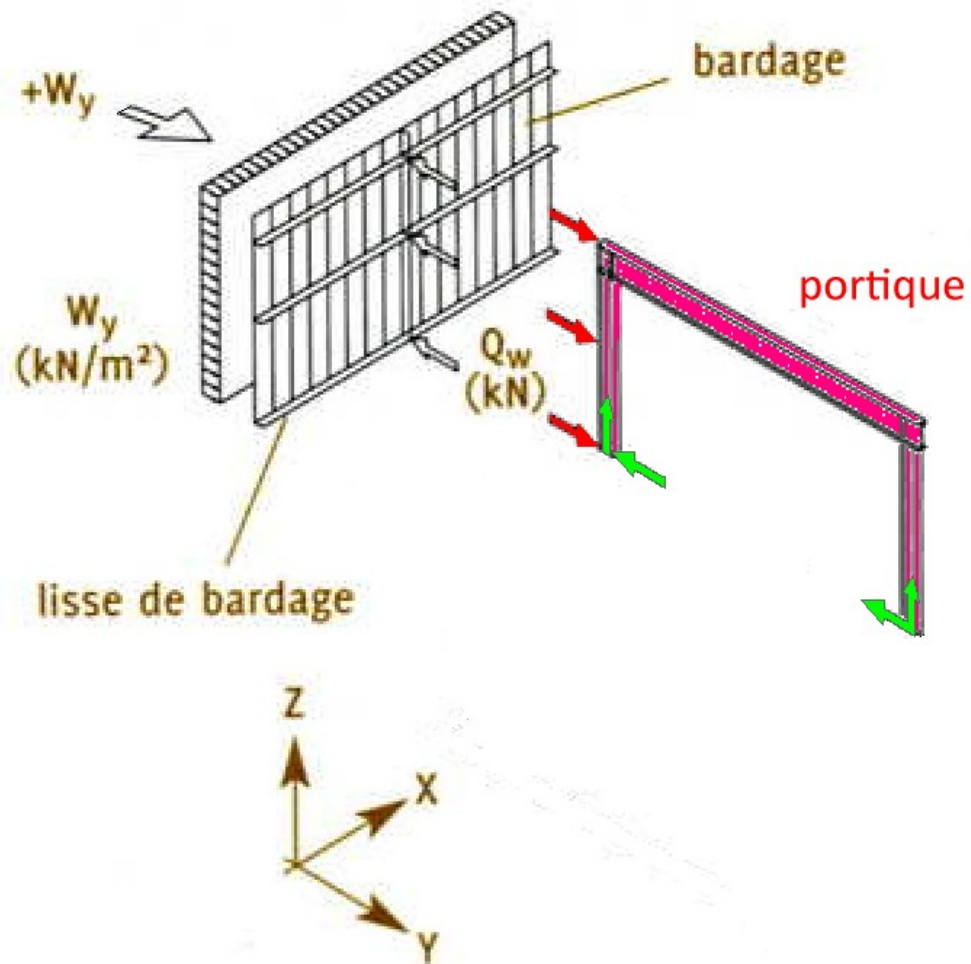


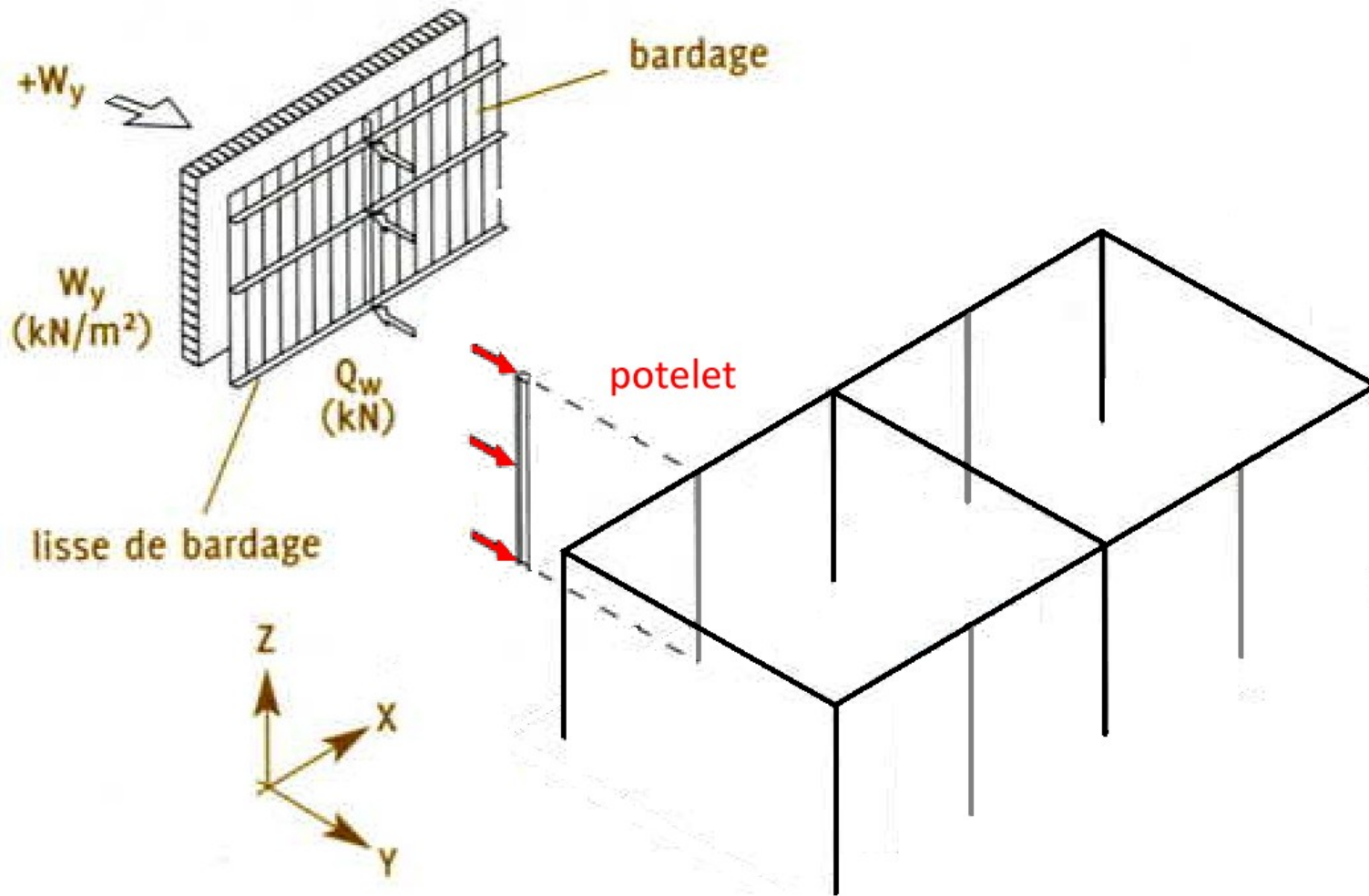


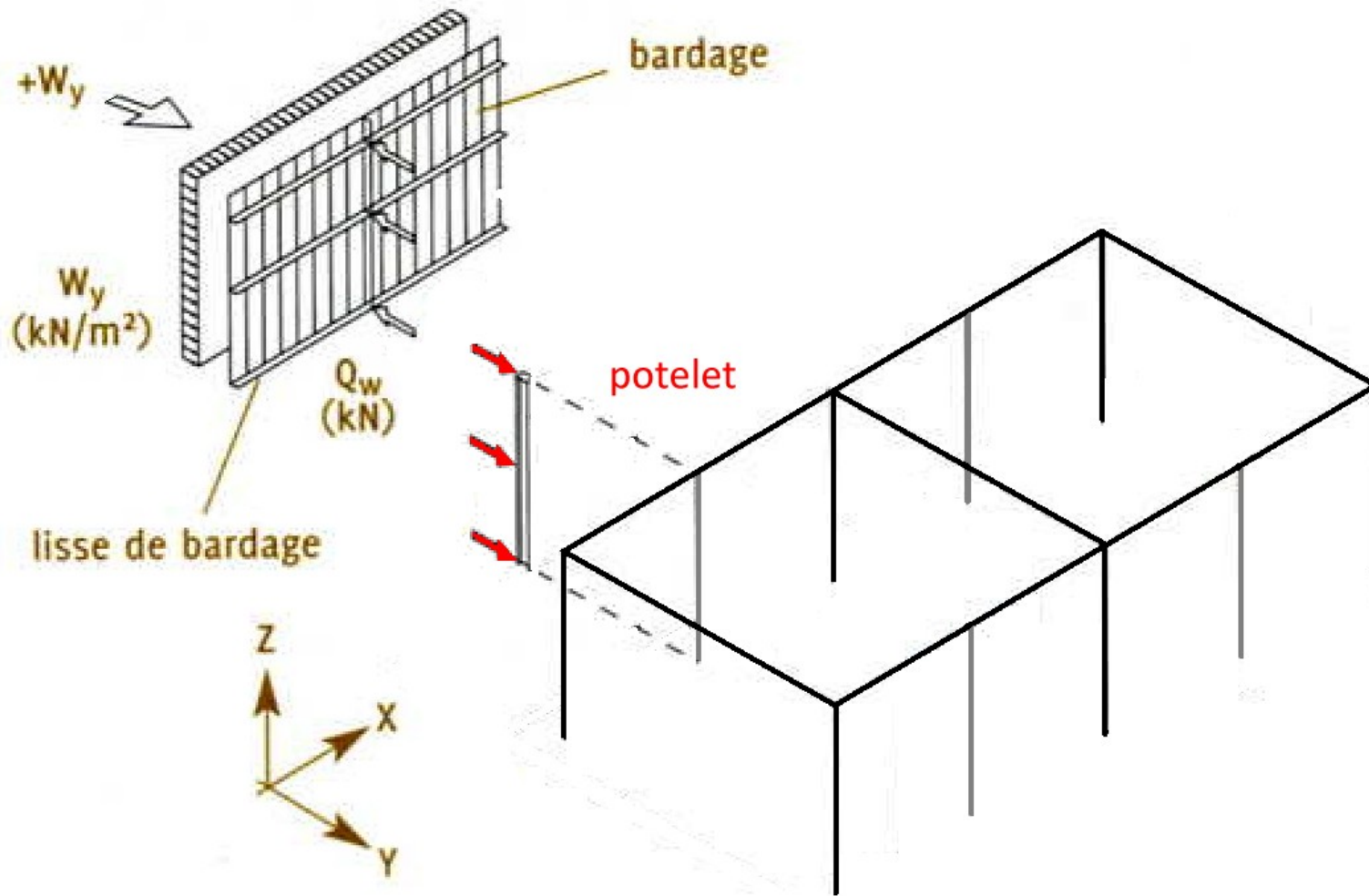


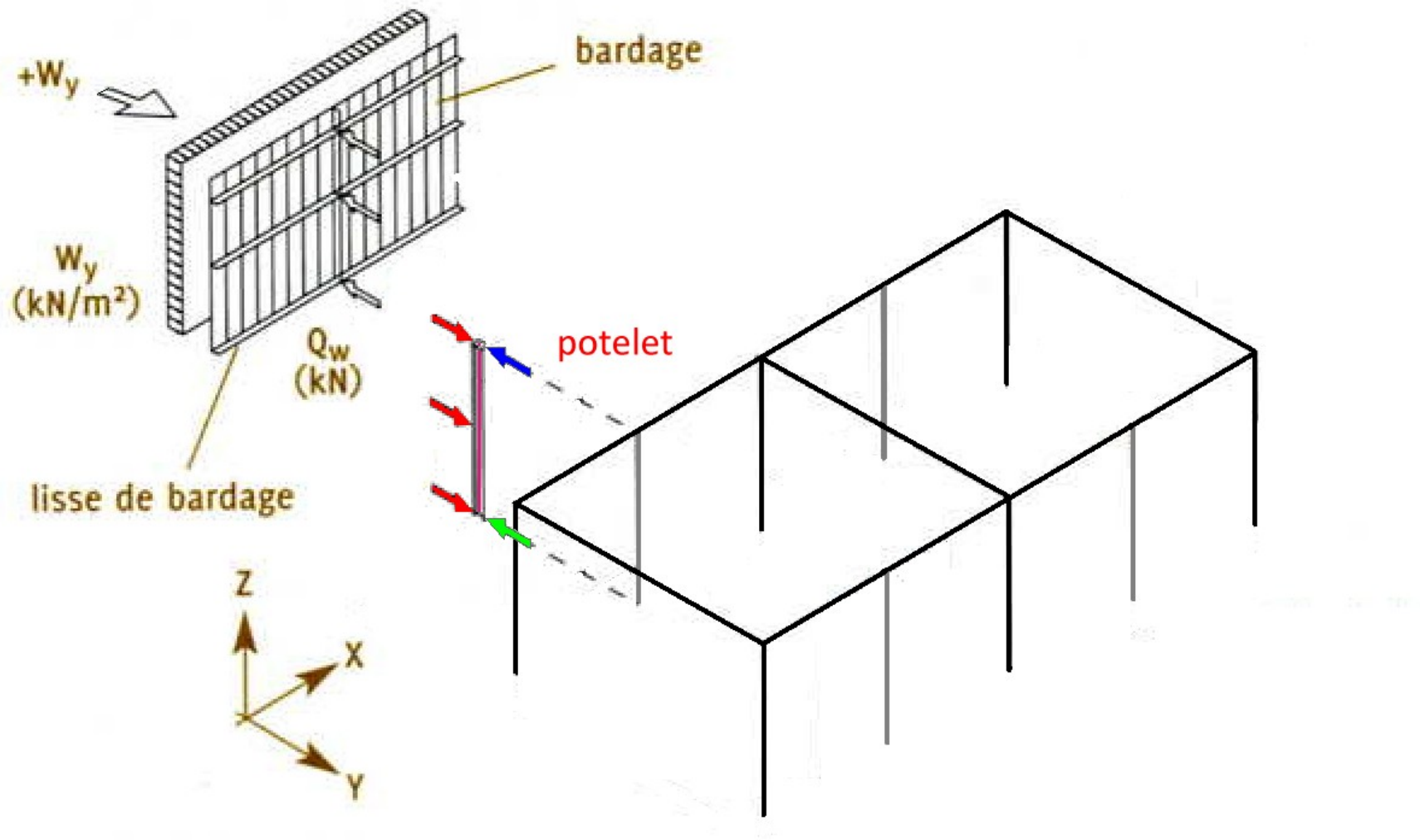


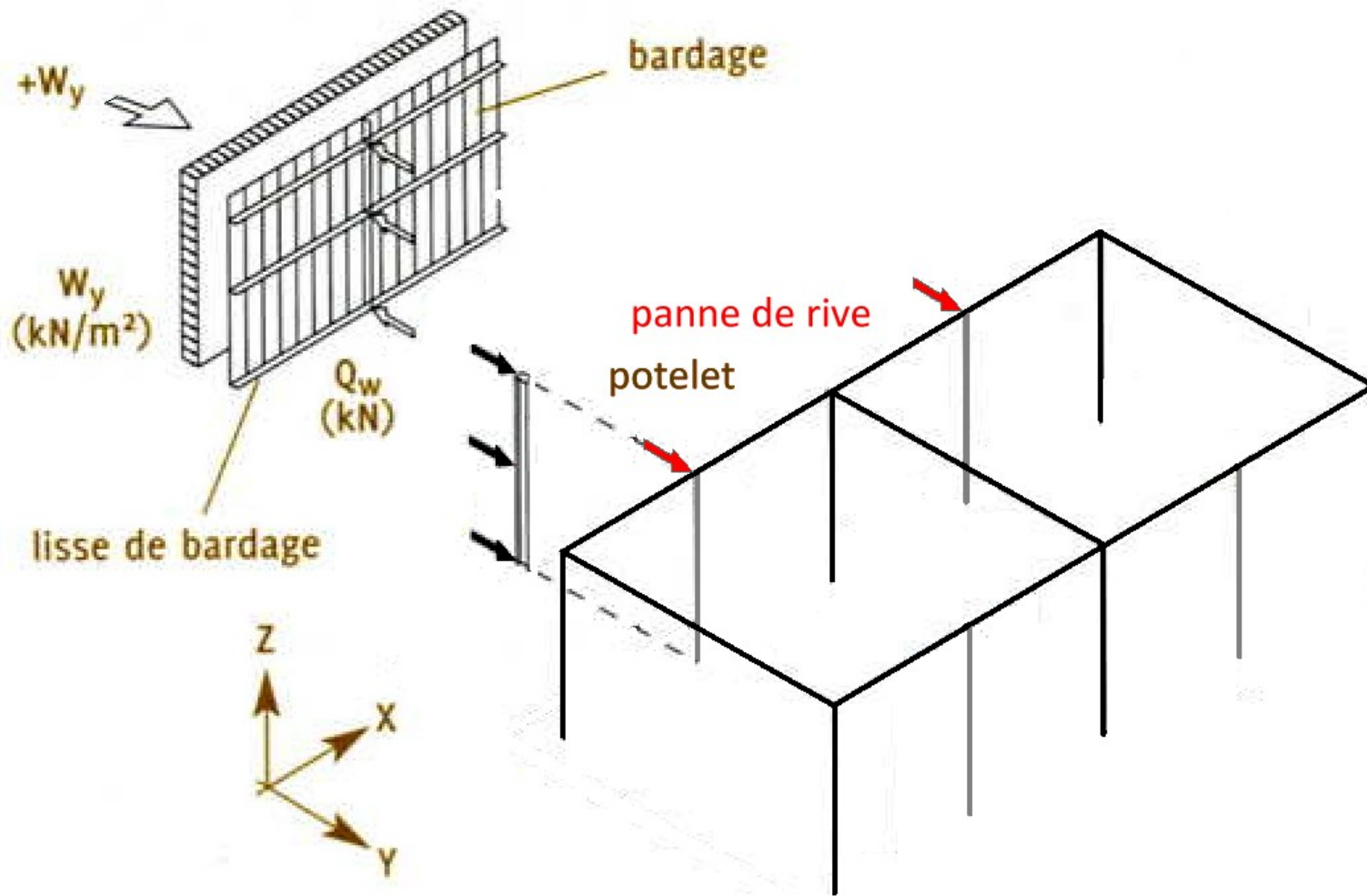


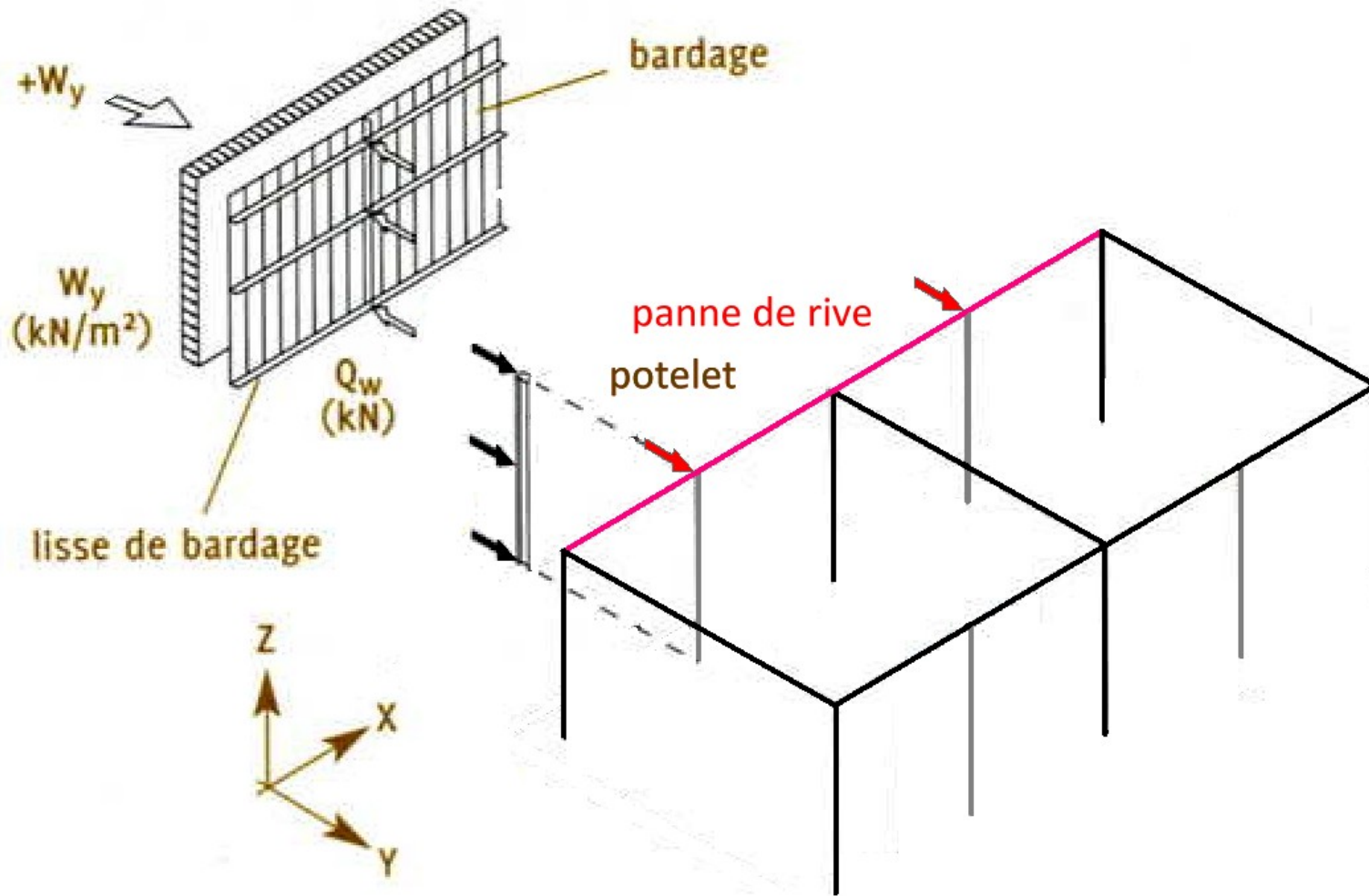


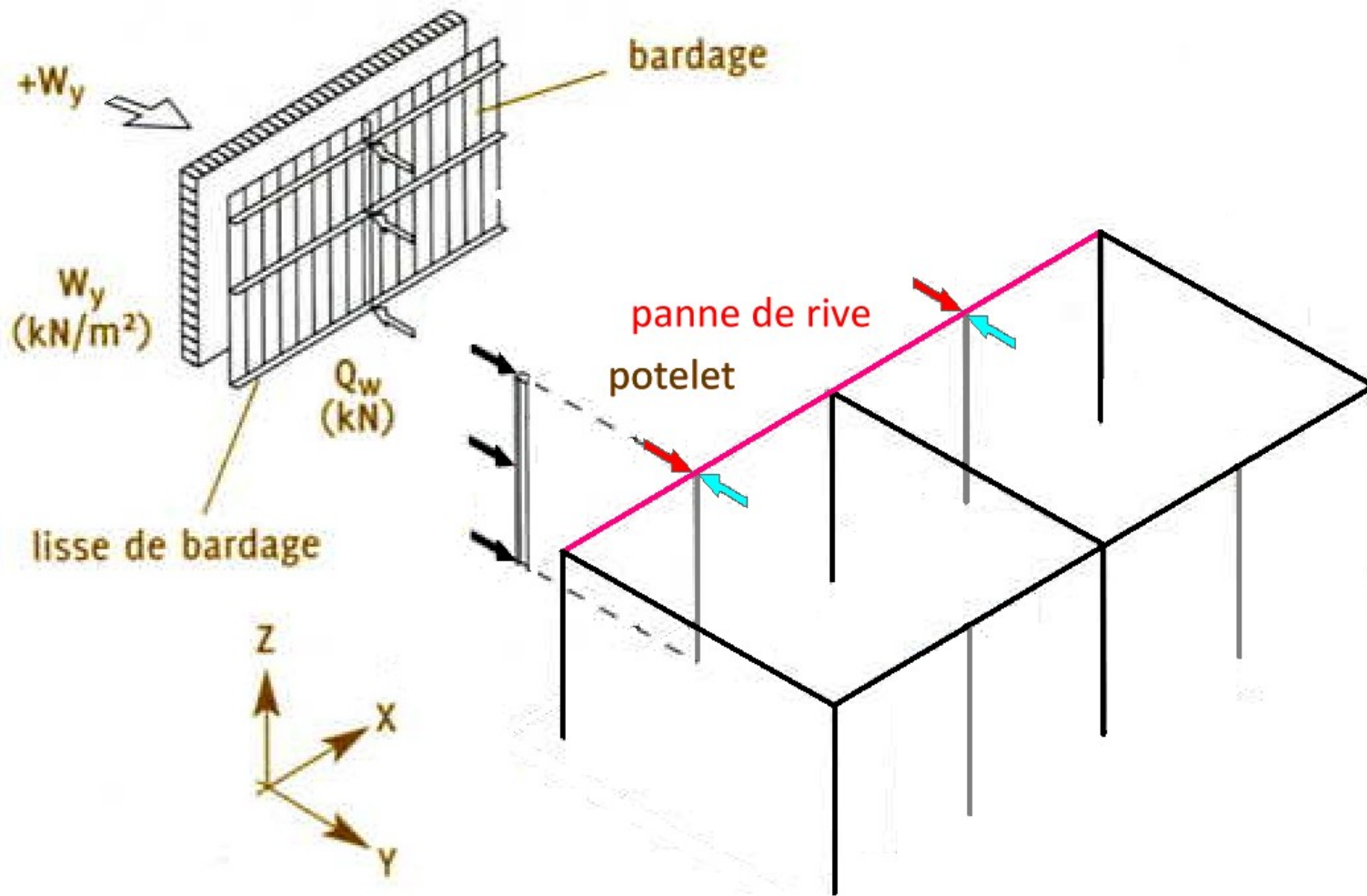


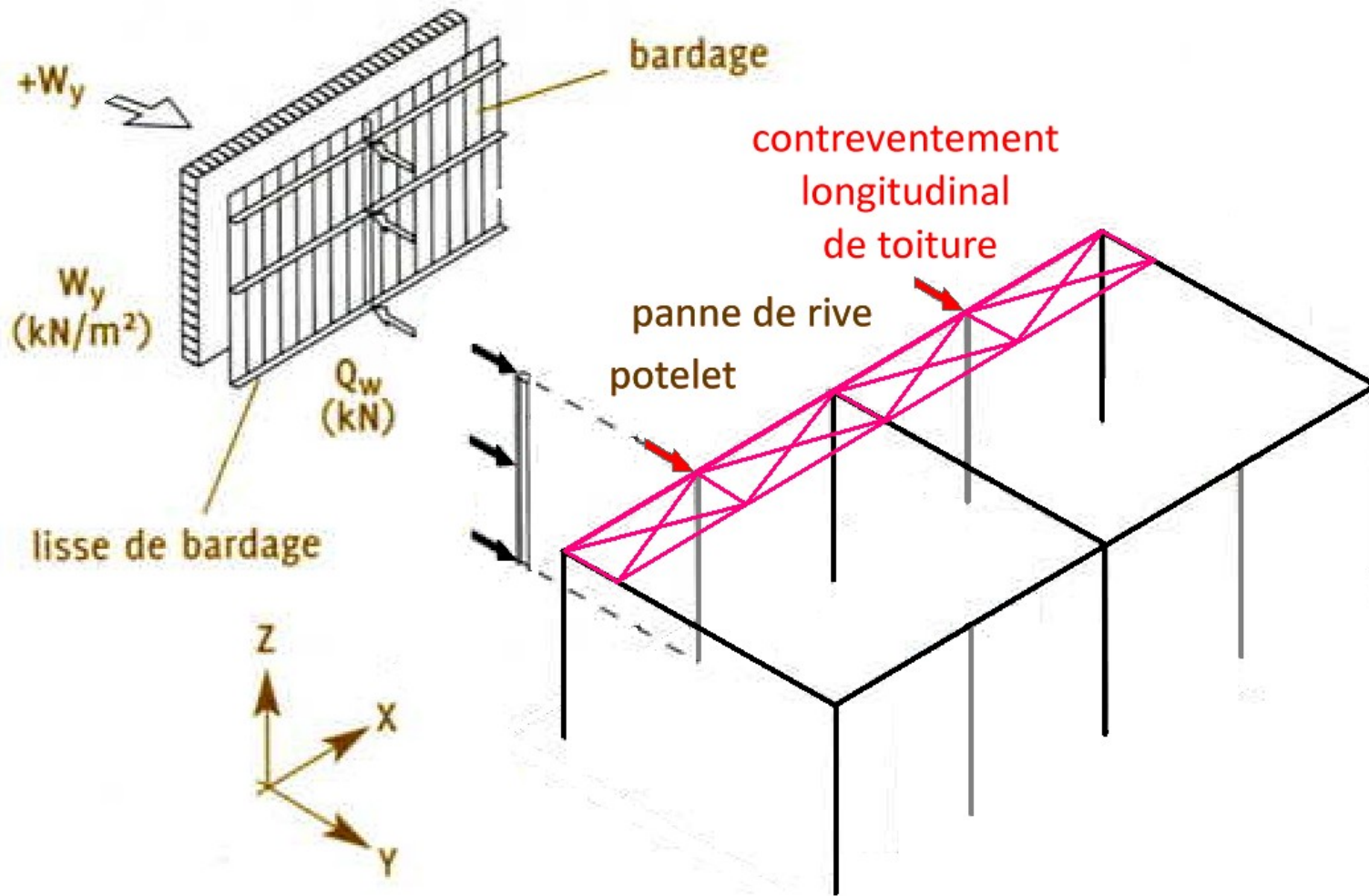


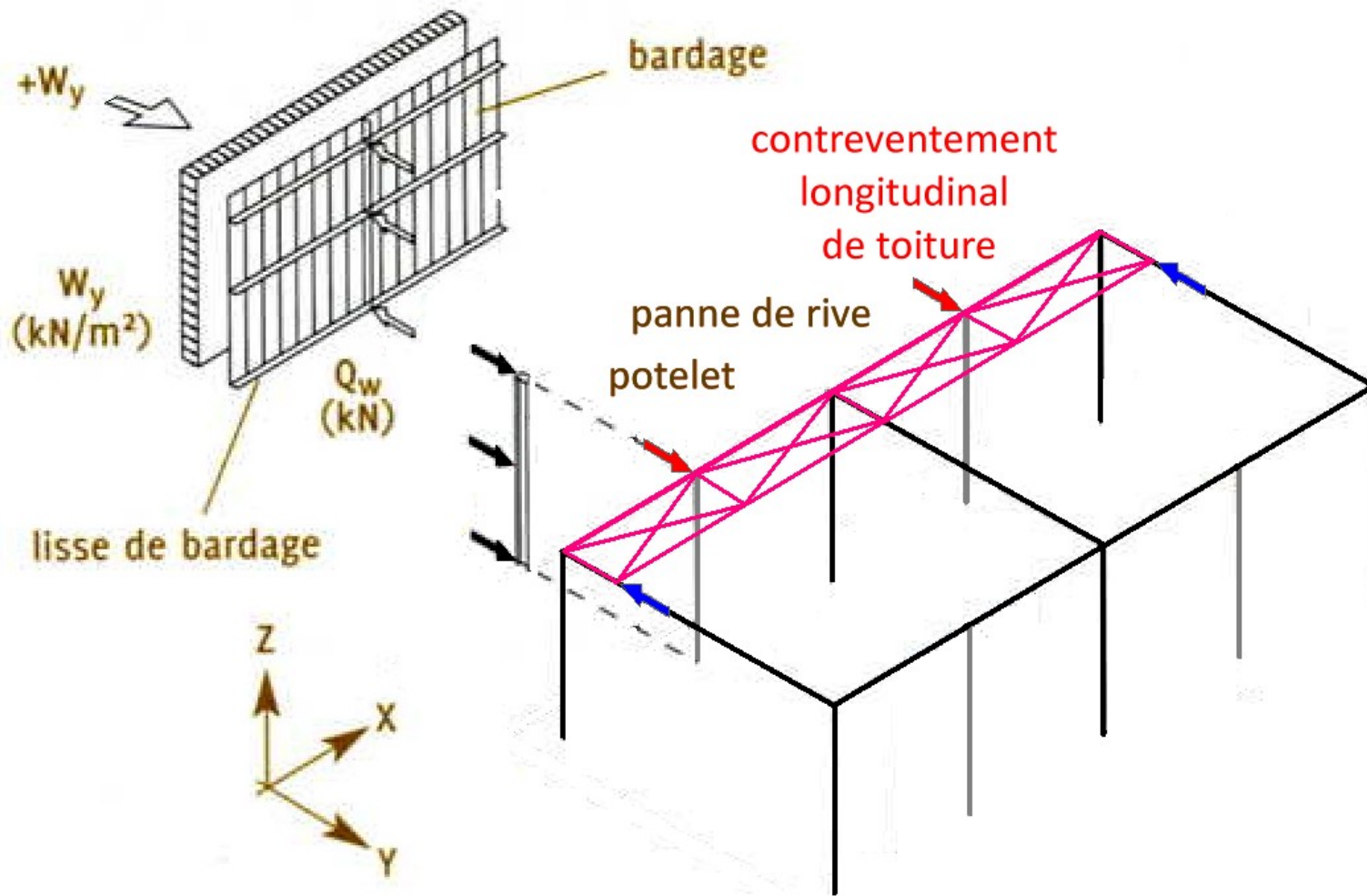


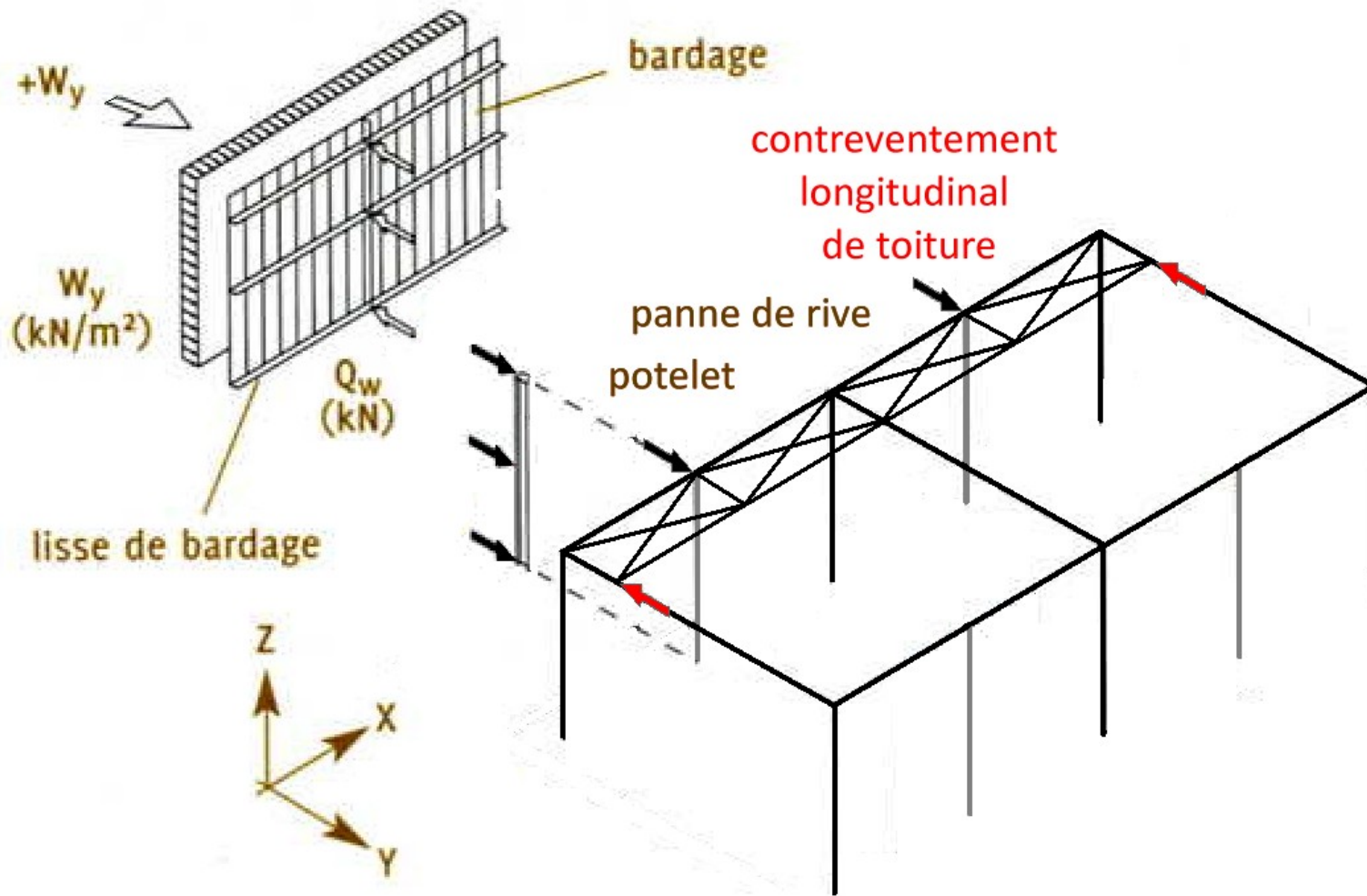


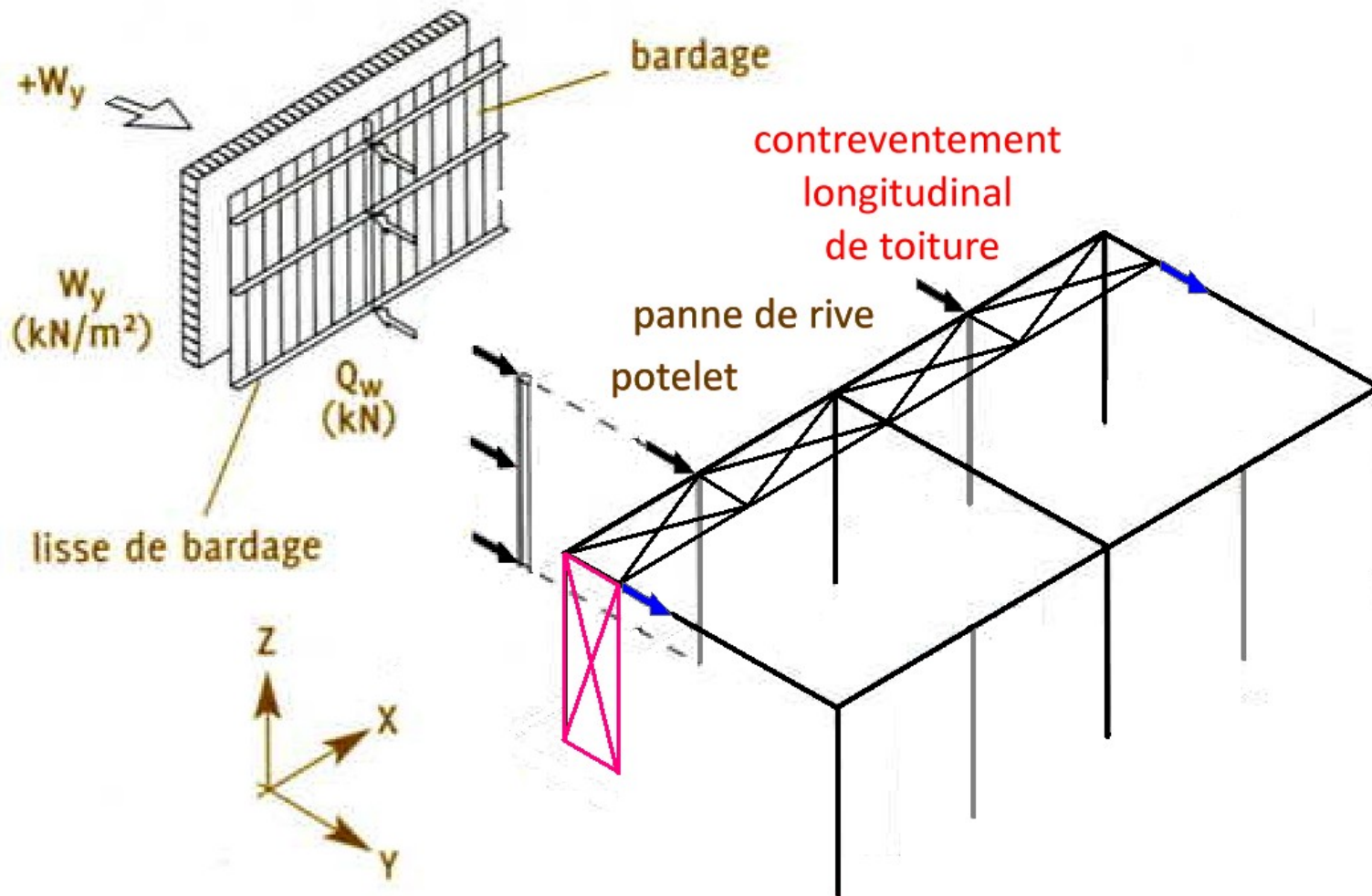


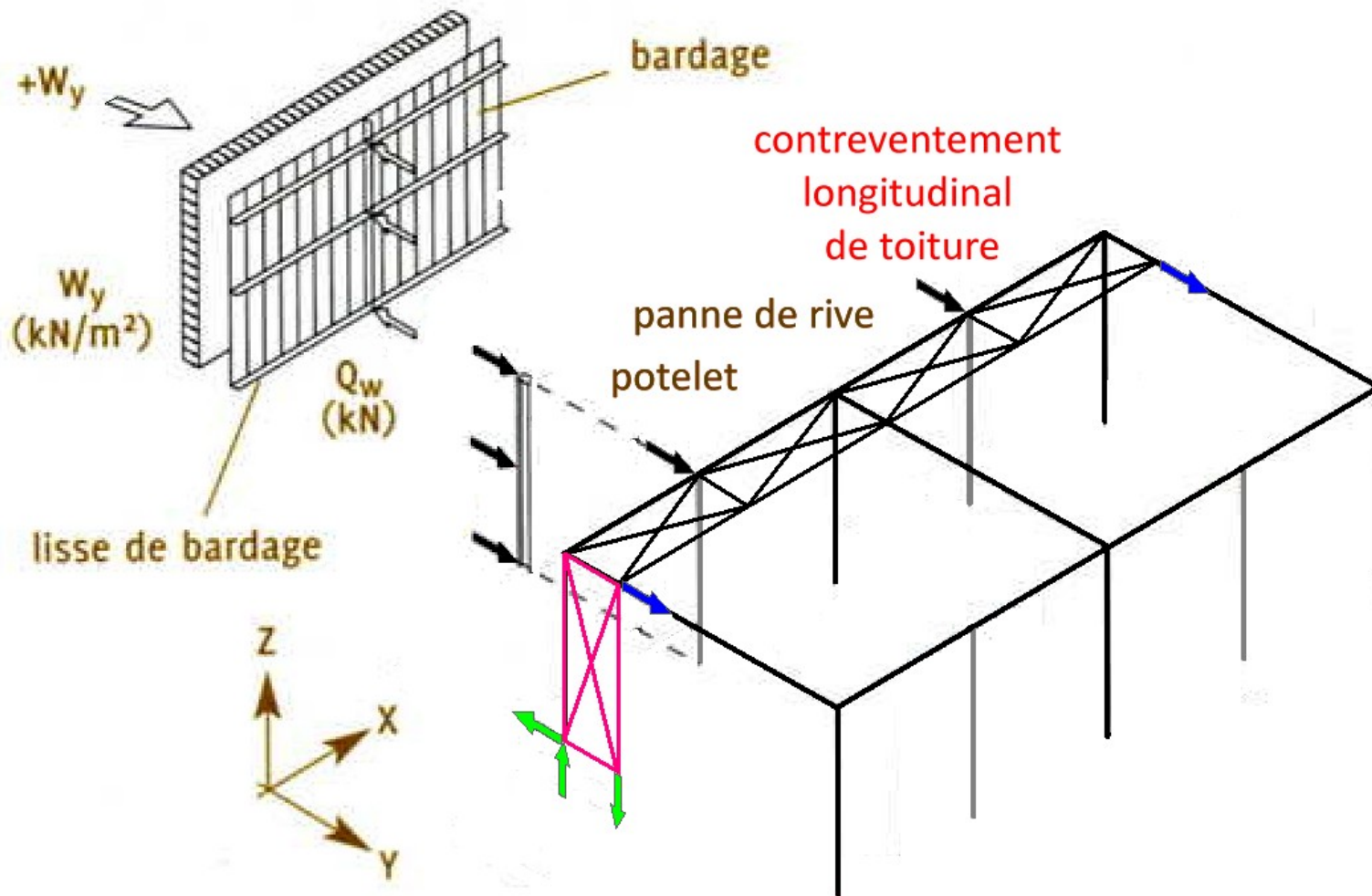






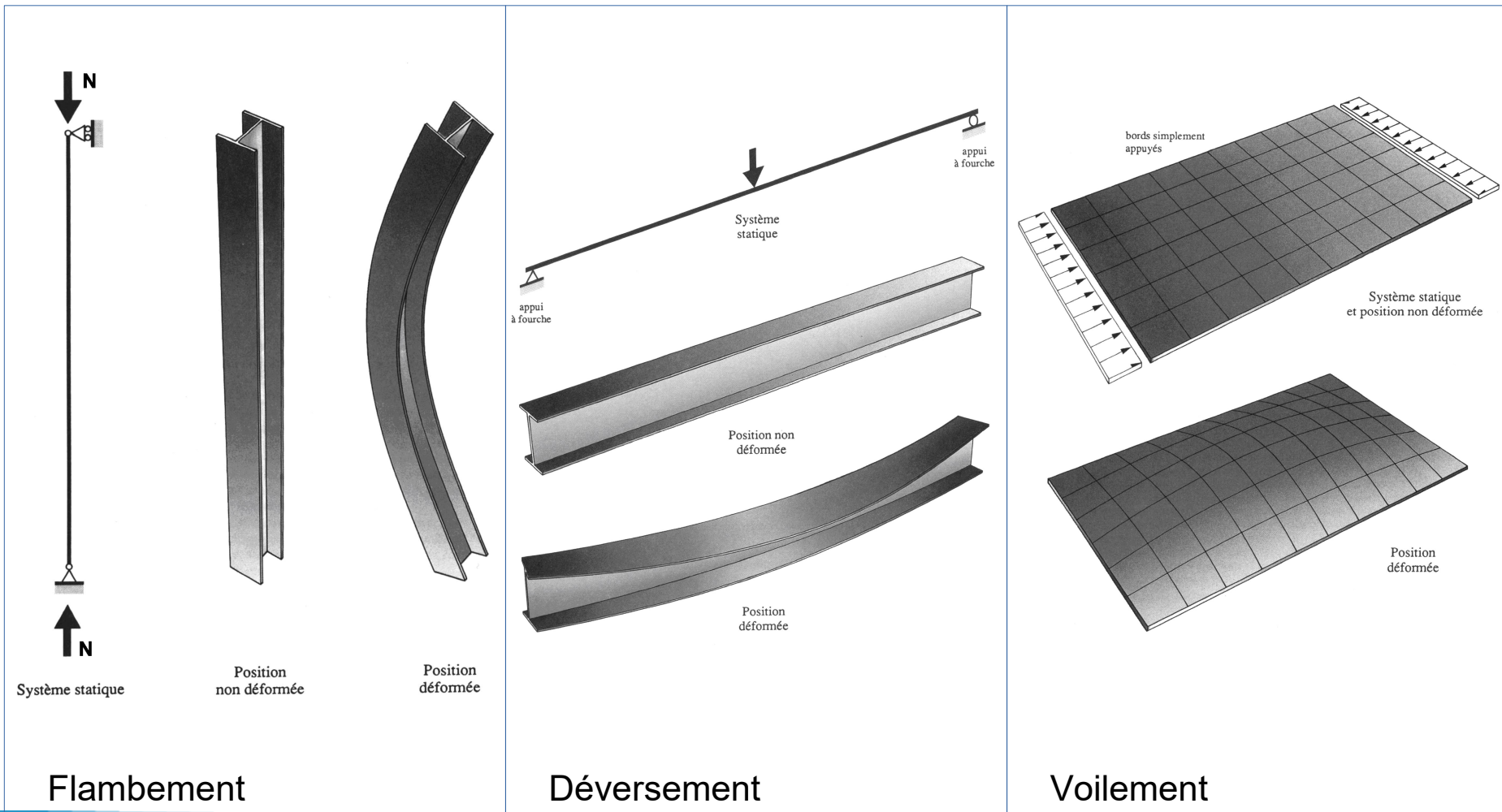






• **Stabilité de forme :**

- Lutter contre les phénomènes d'instabilité



- **Les contreventements ont pour objectifs d'assurer trois fonctions:**
 - Limiter les déformations,
 - Assurer la stabilité statique de la structure,
 - Assurer la stabilité de la forme

CONTACT

Philippe MARON

ISABTP - UPPA

philippe.maron @univ-pau.fr

www.univ-pau.fr/~maron/mecanique/



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