

Seismic stations inside structures

Free-field



IMOL station - Imola (Italy)
(ITACA; D'Amico et al., 2020)

Mini-house



CDCA station - Città di Castello (Italy)
(ITACA; D'Amico et al., 2020)

Towers of the electrical
national service



FRN station – Fornovo di Taro (Italy)
(ITACA; D'Amico et al., 2020)

Seismic stations inside structures

Seismic sensors can be isolated from the building foundations by means of cuts around the pillars

THIS HAS NO EFFECT AT FREQUENCIES BELOW < 50 Hz

The motion recorded on the pillar and on the foundation is practically the same because they are both settled on the same ground, which transmits the motion from one to the other



MRN station – Mirandola (Italy)
(ITACA; D'Amico et al., 2020)



FRN station – Fornovo di Taro (Italy)
(ITACA; D'Amico et al., 2020)

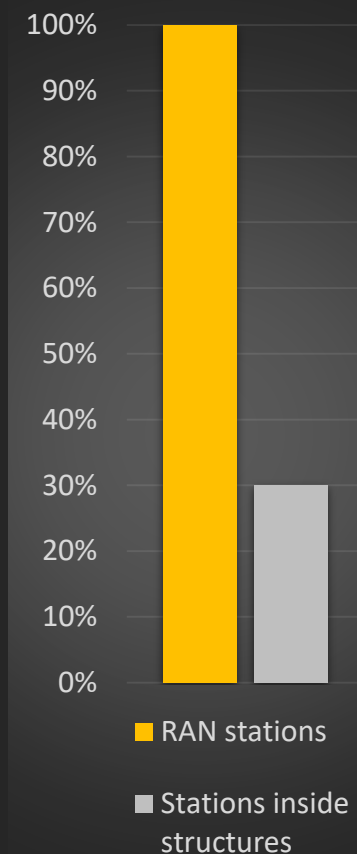
Seismic stations inside structures



(Google Earth)

Locations of the 35 seismic stations investigated where soil-structure interaction effects have been observed over the years.

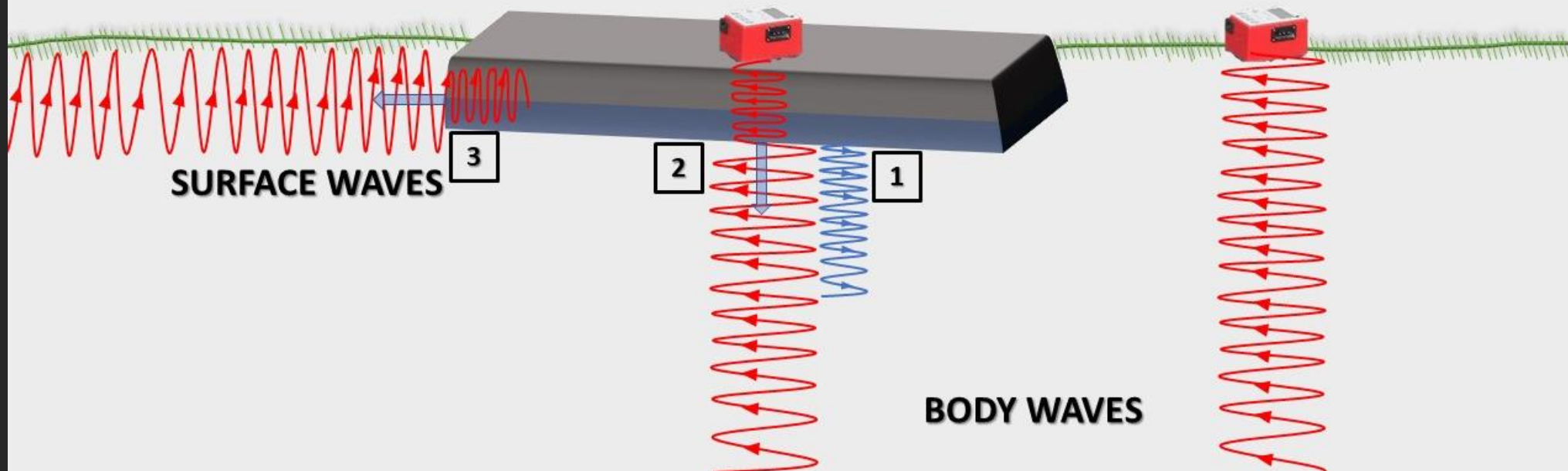
Percentage of seismic stations placed inside structures compared to the total number of seismic stations in Italy (about 600)



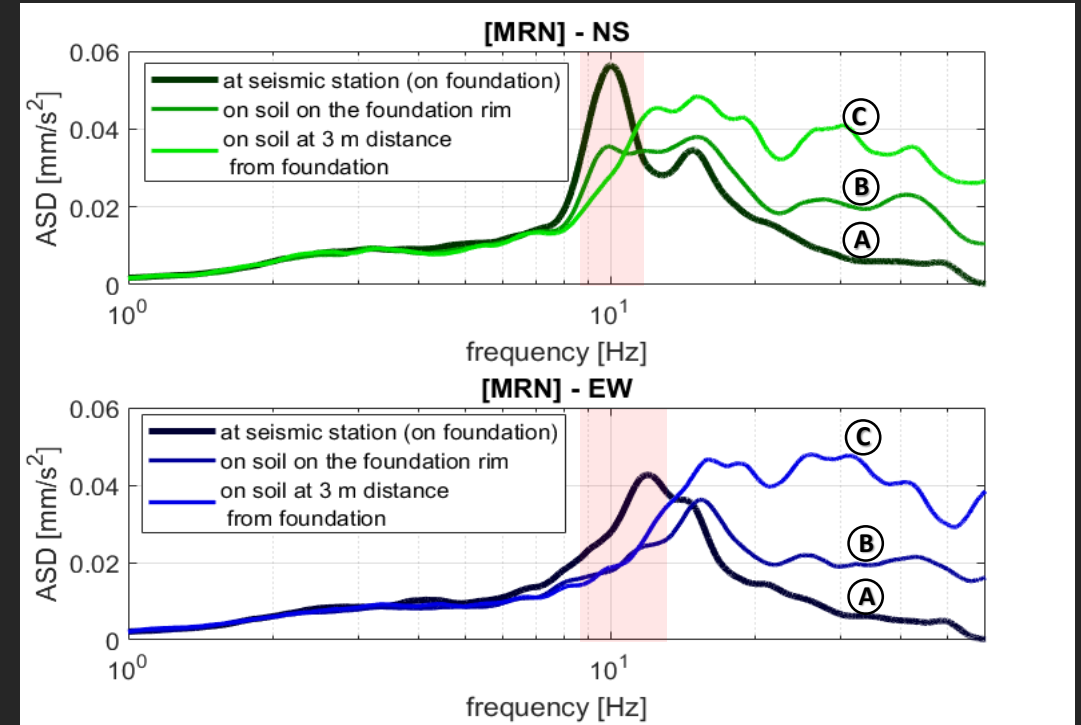
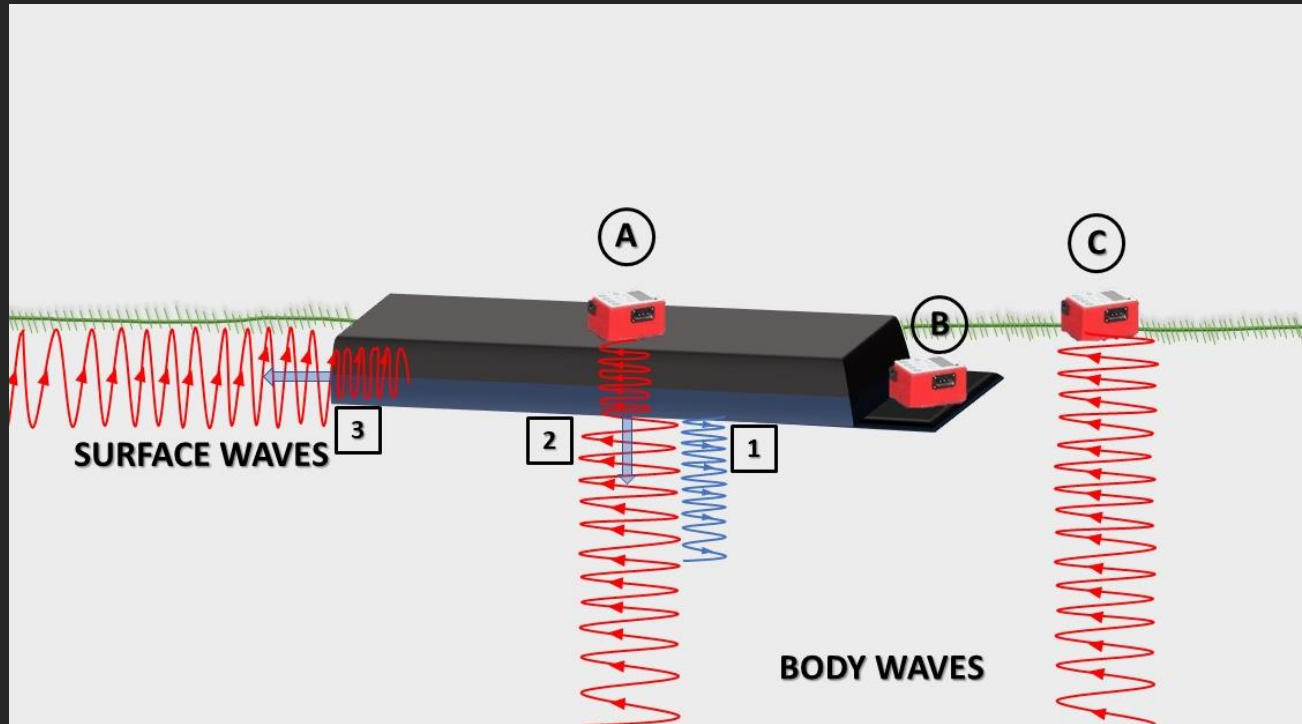
Soil-structure interaction: 3 effects

Effect: soil-structure interaction

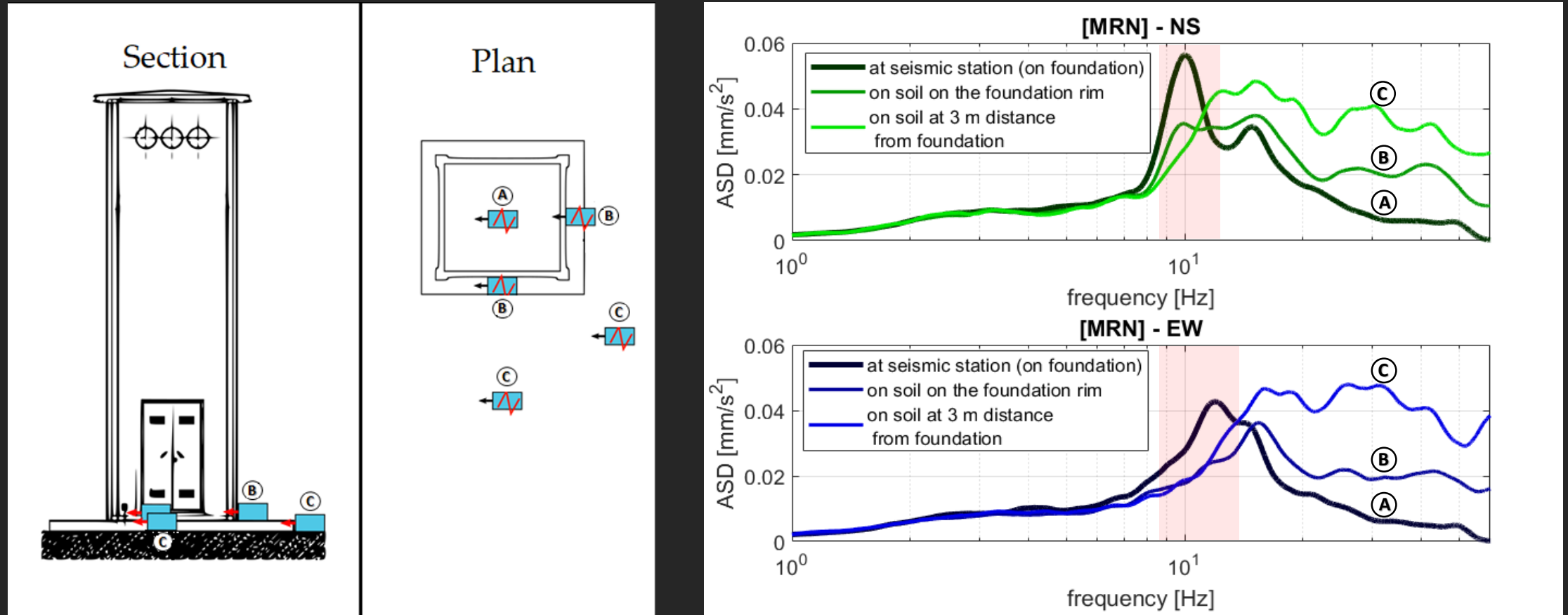
- 1 **Radiation** of the structure own motion to the ground, included the seismometer pillar
- 2 **Downwards reflection** of body waves as they hit the foundation
- 3 **Back reflection** of surface waves as they hit the foundation



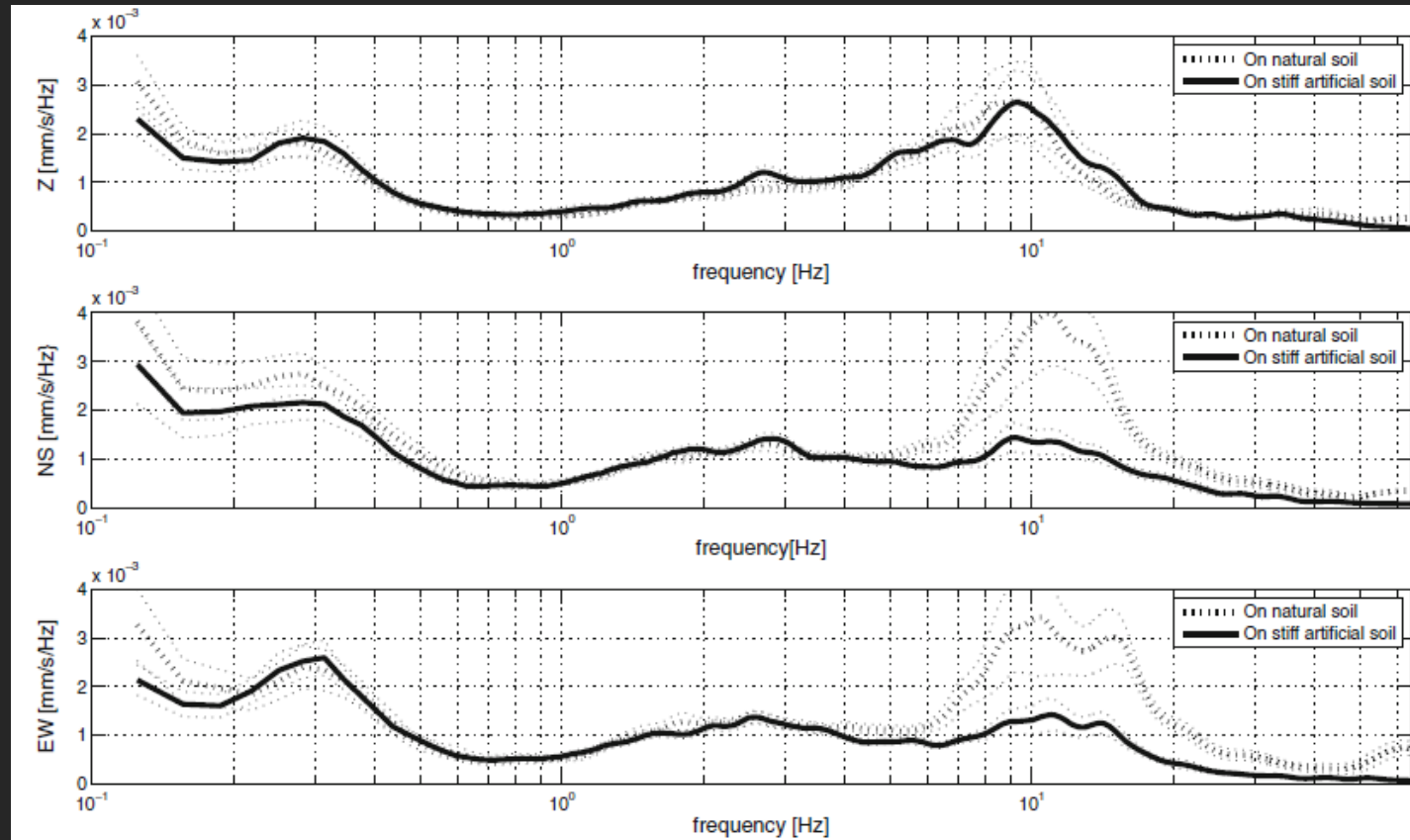
Effects on the spectral components of the recorded motion



Effects on the spectral components of the recorded motion



Effects on the spectral components of the recorded motion



(Castellaro & Mulargia, 2009)

Conclusions

From these results it is evident that a strong contamination of the seismic recordings occurs at mid- to high- frequency (generally > 5 Hz)

It is important to remark the consequences that this can have on

The assessment
of seismic site
effects

The assessment
of PGA

The computation of
attenuation laws