Railway vibrations

a challenge for sustainable real estate?

Dr Pieter Jong
Part time lecturer & Senior policy advisor
p.jong@tudelft.nl

June 30, 2017
Introduction

- Working paper

- Ministry of Infrastructure and the Environment has commissioned research regarding railway vibrations

- Ongoing research

- In Fall 2017: publication of a report “exploration of possible building regulations regarding railway vibrations” (commissioned by the Ministry)
Question

• What is necessary to ensure that a project developer will take possible vibration nuisance into account, in case of building close to a railway (or other infrastructure)?
Railway vibrations: a complex problem

- Vibrations through the soil. Dutch soil has a high variety (sand, clay, peet etc.); soil characteristics can also vary locally

- A uniform standardized method to calculate and measure vibrations is lacking

- Various actors are involved
Actors involved (planning)

- Municipalities: land use plans
- The minister of Infrastructure and the Environment decides on track decisions (new national railways or adjustments to existing national railways)
- Provinces decide on track decisions regarding regional railways and trams. For example: Regiotram Utrecht manages the regional tram transport system (including Uithof-line) in the province of Utrecht.
Actors involved (management of railways and trams)

- In the Netherlands ProRail manages the national railways.
- Provinces manage regional railways and trams.
Actors involved (users)

- **Use of the railways**
  - Freight trains: cargo transporters
  - People trains: Dutch Railways etc.
- **Use of buildings in the vicinity of the railways:**
  - Dwellings: people who live in the neighborhood of the railways
  - Buildings with businesses in the neighborhood of the railways
Governance of railway vibrations in the Netherlands

- **Technical** standards regarding vibrations:
  - German DIN 4150-2 (1999)

- **Policy** rules regarding railway vibrations (2012): a specific policy rule for measuring and assessment of vibration nuisance for persons in buildings caused by railway traffic. This policy rules apply to Track Decisions.

- No **legal** standard
Cases: examples

• Example: concert hall in Manchester

• Example: music hall in Amsterdam (Stopera)

• In the Dutch municipality of Best BAN Building Company has developed the prestigious housing project ‘Park Guardians’. A consortium of the companies ‘B-Smart foundations’ and ATIS International B.V. has taken measures to prevent railway vibrations.
Case: vibrations in Utrecht

- Vibrations and the design of a new building for the Dutch National Institute of Public Health and Environmental Protection (RIVM)
- Actors:
  - Central Government Real Estate Agency (Dutch: Rijksvastgoedbedrijf)
  - Strukton-Hurks-Heijmans consortium.
Case Utrecht (1)

- Total estimated costs are 267 million Euro’s.
- About one third of the total 70,000 m² of floor space consists of laboratories. These laboratories are very sensitive to vibrations.
- The design of this new building has obtained the highest score regarding sustainability (‘outstanding’).
- In 2015 it became clear that the original design didn’t meet with vibration requirements for laboratories.
Case Utrecht (2)

- Calculations showed: vibration problem is caused by (future) traffic in the neighborhood of the building, for example cars and the future tram/metro (Uithof Line).
- At the end of 2016 the consortium inserted various anti-vibration measures into the design. For example: use of larger and longer foundation piles; a heavier foundation; specific ‘air holes’ in the soil around the building (Dutch: luchtspouwen); and moving the tower and the wing with specific laboratories 20 meters southwards from the tram way.
Case Utrecht (3)

• Building process is delayed for one and a half year...
• On the 16th of January 2017 the Central Government Real Estate Agency issued a starting certificate.
• However, at the moment the Central Government Real Estate Agency and the building consortium are still discussing the financial consequences of the vibrations.
Question

- What is necessary to ensure that a project developer will take possible vibration nuisance into account, in case of building close to a railway (or other infrastructure for example tram, highway)?
Answer

- A good building contract that takes environmental issues into account
- A land use plan with a ‘railway vibrations attention zone’
- Research before decision about land use plan (or deviation from land use plan) regarding environmental vibrations in the plan area
- Research of the initiator of the building project: a vibration safe design
- Etc.
Discussion