



SOLUTIONS FOR THE BUILT WORLD

Fall 2015 Iowa DOT Vibration Seminar  
**Procedures Following a  
Vibration Exceedance**

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Wiss, Janney, Elstner Associates, Inc.



# Procedures Following a Vibration Exceedance

- Vibration Exceedance defined in Special Provision
  - Vibration Limits proposed by Contractor after preconstruction Survey
    - Determined by qualified vibration expert
  - Added to contract documents if accepted by Engineer
  - In No Case shall PPV exceed 0.2 in/s
    - Measured at, or in very close proximity, to the monitored structure
  - Alarm system to signal any vibrations that exceed 80% of the limit (0.16 in/s)

# Procedures Following a Vibration Exceedance

- Exceedance Alert
  - Monitor system sends alert notification
    - Emails to pertinent individuals
    - Text messages to pertinent individuals
    - Locally installed siren, horn, or flashing light

Hannen, Robert 1405 Division Burlington IA  
Oct 6 /15 21:13:39, BE13741, O741G1Z6.YR0W

Tue 10/27/2015 ... 8 KB

Hannen, Robert 1405 Division Burlington IA  
Oct 6 /15 20:26:11, BE13741, O741G1Z4.RN0H

Tue 10/27/2015 ... 8 KB

Oct 6 /15 21:19:04, BE13741, O741G1Z7.7S0H

Chan	Tran	Vert	Long
Peak	0.00375 in/s	0.00500 in/s	0.00375 in/s
Freq	>100 Hz.	39 Hz.	34 Hz.

# Procedures Following a Vibration Exceedance

- Exceedance Protocol
  1. Contractor stops any vibration-causing activity
    - a. Resume work if reported values are below limit
    - b. Notify Engineer if limit is exceeded
  2. Vibration monitoring contractor reviews triggered event
    - a. Determines status of event (exceeding or non-exceeding)
    - b. Provide results of review to Engineer
    - c. Engineer determines work status

# Procedures Following a Vibration Exceedance

- Factors that result in non-exceeding event
  - Frequencies too high to be of concern
  - Someone bumped transducer
  - Static-Electric discharge
    - Electrical appliance or lightning
    - RF interference from walkie-talkie
  - High-frequency transient caused by localized impact
    - Dropped tool on slab near seismograph
    - Any vibration at frequency above 100 Hz

# Procedures Following a Vibration Exceedance

- Frequency-Dependent Limit

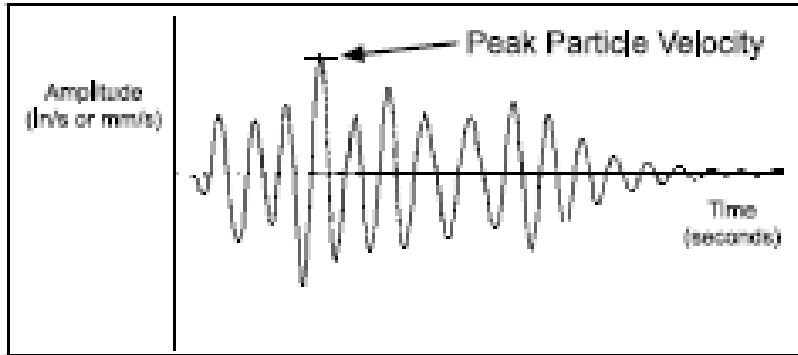


Figure 5.7 Calculating Peak Particle Velocity.

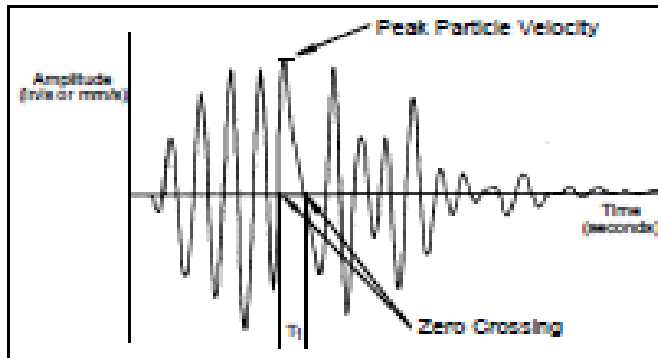
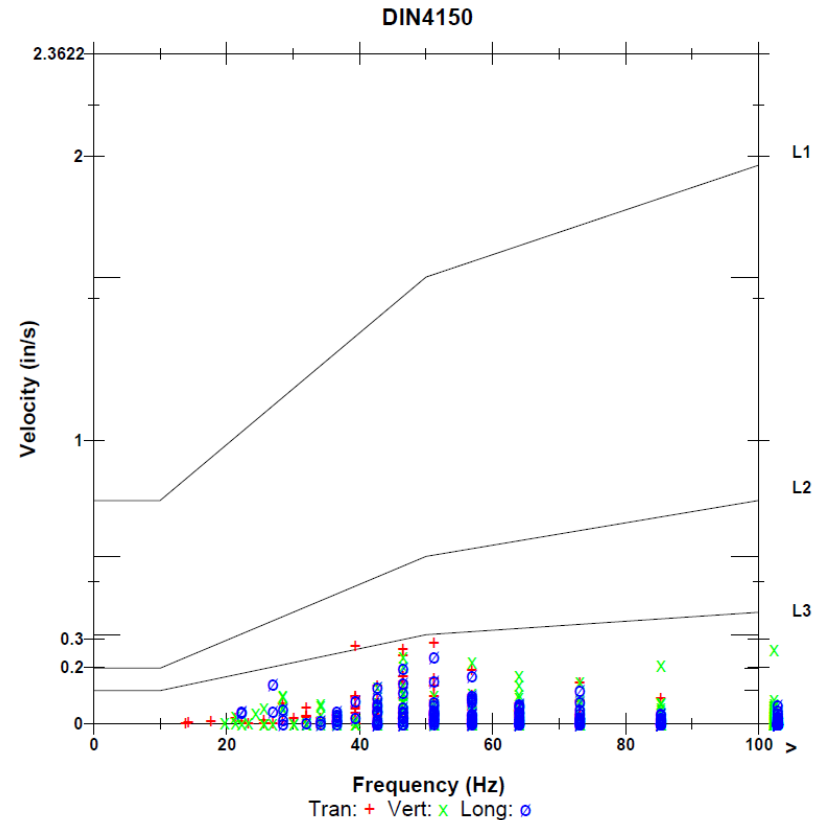
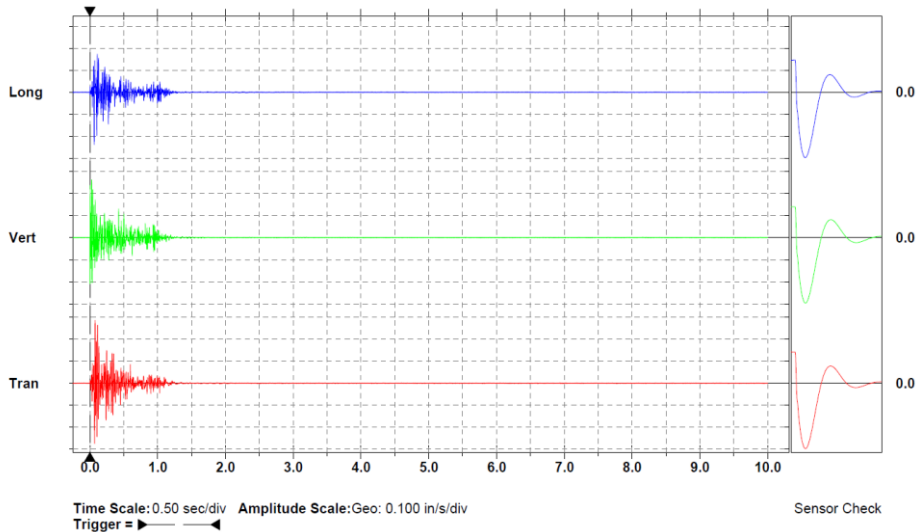


Figure 5.8 Calculating the Zero Crossing Frequency.

- What do we look for?
- Peak amplitude & associated frequency is reported by the seismograph.
- Zero-crossing half-sine frequency
- Look for other amplitudes at other frequencies.

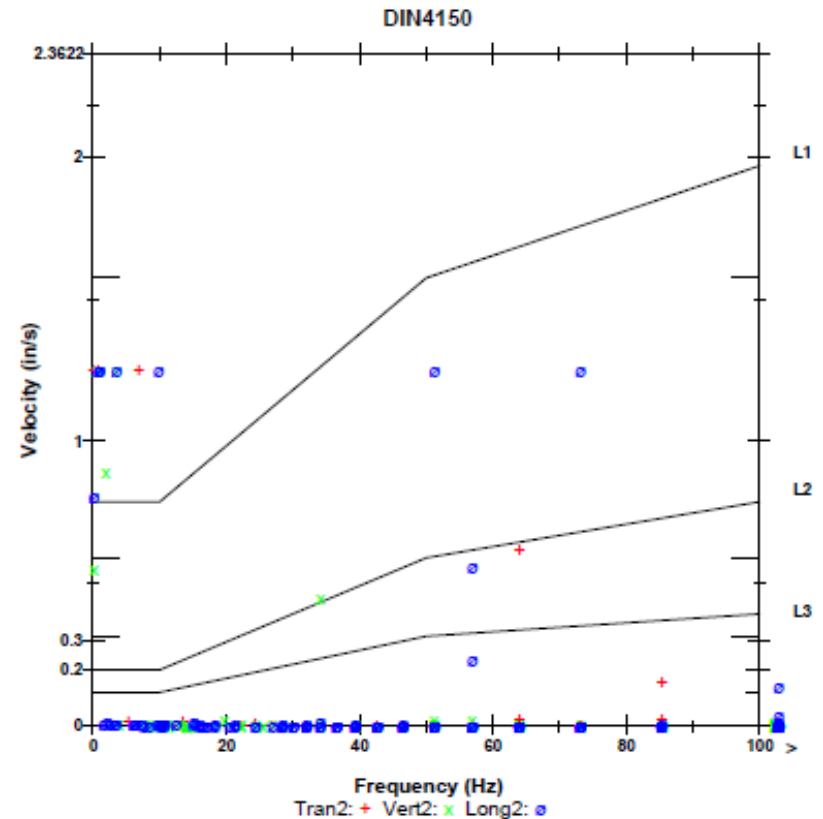
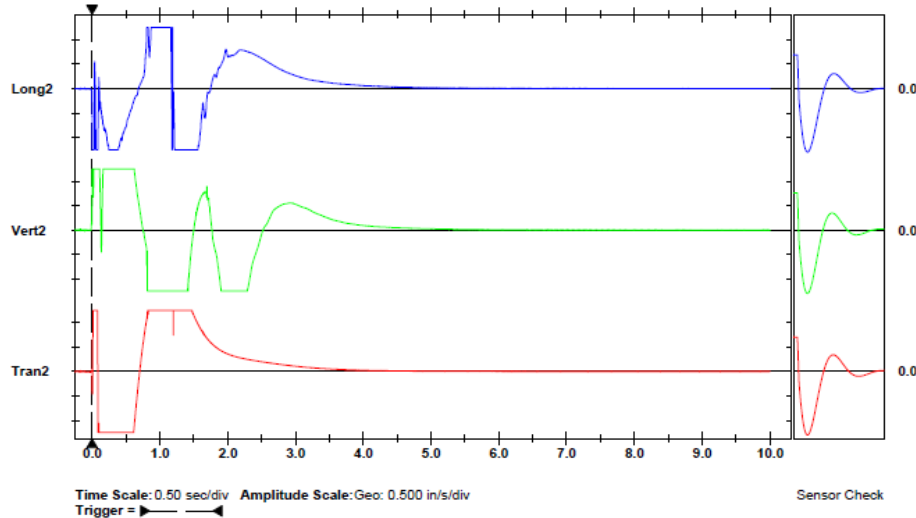
# Procedures Following a Vibration Exceedance

## Normal Vibration Event



# Procedures Following a Vibration Exceedance

## ■ Kicked Transducer





# Procedures Following a Vibration Exceedance

- Exceedance Protocol (continued)
- 3. Work remains halted until Contractor has:
  - a. Identified the cause of the exceedance, and
  - b. Modified procedures to avoid exceedances, or
  - c. Provided recommendations for using different equipment
    - a. Different monitoring equipment
    - b. Different construction equipment
- 4. Work shall not resume until approved by the Engineer

# Procedures Following a Vibration Exceedance

- Questions?