

**SUPERSEDED BY EB 23-024
EFFECTIVE 8/3/23**



New York State
Department of
Transportation
**ENGINEERING
INSTRUCTION**


EI
05-044

Title: **SPECIAL SPECIFICATION FOR BUILDING CONDITION SURVEY(S) AND VIBRATION MONITORING (NONBLASTING)**

Distribution:

- | | |
|---|--|
| <input type="checkbox"/> Manufacturers (18) | <input type="checkbox"/> Surveyors (33) |
| <input type="checkbox"/> Local Govt. (31) | <input checked="" type="checkbox"/> Consultants (34) |
| <input checked="" type="checkbox"/> Agencies (32) | <input checked="" type="checkbox"/> Contractors (39) |
| | <input type="checkbox"/> _____ () |

Approved:


Robert L. Sack, Deputy Chief Engineer
(Research)

23 Dec 05
Date

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of September 7, 2006.
- This EI does not supersede any previous issuances.
- The information transmitted by this issuance will reside in the Special Specifications directory of the Toolbox Server.

PURPOSE: The purpose of this EI is to issue the revised special specification for building condition survey and vibration monitoring (nonblasting).

TECHNICAL INFORMATION:

- Design guidance for the use of the special specification for building condition survey and vibration monitoring (nonblasting) is being issued concurrently via EI 05-045.
- The revised special specification for building condition survey(s) and vibration monitoring is not intended to be used as a pay item for vibration monitoring during blasting operations. Monitoring vibrations generated via blasting operations are controlled by the *Standard Specifications* §203-3.05 Rock Excavation C. Explosive Loading Limits and are described in the Geotechnical Engineering Manual (GEM-22) *Procedures for Blasting*, issued under EB 05-012.
- Nonblasting construction operations (e.g., excavation, pavement removal, backfill and compaction, demolition, driving of piles and sheeting, etc.) may damage or distress adjacent sensitive buildings, structures, or utilities. The special specification is intended to assess the condition of the building, structure or utility prior to these adjacent construction operations to develop a condition baseline. A companion special specification includes requirements for monitoring vibrations to record the intensity of the adjacent construction operation(s). This information may be used to resolve disputes.
- PIN Approval: The building condition survey and vibration monitoring (nonblasting) special specifications are to be approved on a project-by-project basis. Designers must send their request for approval to the Design Quality Assurance Bureau (DQAB) and the Geotechnical Engineering Bureau (GEB) through the Regional Special Specification Coordinator as per Highway Design Manual (HDM) Chapter 21.

● The special specification was revised as follows:

1. The building condition survey was coupled with a new item to monitor vibrations from construction operations other than blasting. Designers previously used Special Notes which would include the cost for vibration monitoring in other items of work.
2. The vibration monitoring criteria was revised to include a submittal of a written vibration monitoring plan. The criterion for the submittal is outlined in the special specification.
3. A vibration criteria figure was added. The figure is a plot of frequency vs. maximum allowable particle velocity from the US Bureau of Mines.
4. Each location identified in the contract documents will have a building condition survey performed, which will include a submittal of all documentation and findings. If deemed appropriate, these locations will be continuously monitored until identified adjacent construction operations have been completed. The vibration monitoring will include daily submittals of the monitoring results and, upon completion of construction operations, a final report summarizing the collected data.

IMPLEMENTATION:

● The following special specifications are disapproved:

- Item 634.99----17: Building Condition Survey
Item 634.9903--11: Building Condition Survey

TRANSMITTED MATERIALS:

Attached are the following special specifications:

- Item 634.9901--17: Building Condition Survey.
Item 634.9902--17: Vibration Monitoring (Nonblasting).

BACKGROUND: Vibration monitoring is a specialized procedure for recording, analyzing, and quantifying vibrations resulting from construction operations. Vibration monitoring specialists utilize a seismograph, an instrument that records vibrations in the earth, to examine the extent of vibrations from a Contractors' demolition and/or construction procedure(s).

CONTACT: Questions or comments regarding this issuance should be directed to Randy Romer of the Geotechnical Engineering Bureau at (518) 457-4714, rromer@dot.state.ny.us. Questions or comments regarding the technical aspects of the special specification should be directed to Doug Hadjin of the Geotechnical Engineering Bureau at (518) 457-4728, dhadjin@dot.state.ny.us.

DESCRIPTION

A. Building Condition Survey:

This work shall consist of performing a building condition survey(s) and preparing permanent records as indicated in the contract documents prior to the commencement of work, after completion of work, and at locations and times during construction as directed by the Engineer.

B. Vibration Monitoring (Nonblasting):

This work shall consist of performing vibration monitoring of background and construction activities and preparing daily and summary report(s) of vibration readings.

MATERIALS

A. Building Condition Survey:

Provide general photography and video equipment, analog or digital, capable of superimposing the date and time on all images.

B. Vibration Monitoring (Nonblasting):

Provide a 3-component seismograph, capable of measuring particle velocity data in three mutually perpendicular directions. Annual factory calibration is required throughout the duration of the work.

CONSTRUCTION DETAILS

The Contractor shall engage the services of a firm capable of furnishing a New York State licensed Professional Engineer to conduct a condition survey of the existing building(s) indicated in the contract documents in the Special Note entitled Vibration Criteria and an experienced vibration monitoring Consultant to measure peak particle velocities prior to, and during, construction operations. Submit as proof to the Deputy Chief Engineer (Technical Services) the experience and qualifications of the firm's personnel conducting the work.

A. Building Condition Survey:

Provide, as a minimum, the following information:

1. Photographic and videotape documentation of the interior and exterior condition of the building(s).
2. Extent and location of existing signs of building distress such as cracks, spalling, signs of settlement, flooding, leaking, etc.

The Engineer may accompany the Contractor on each building condition survey for verification of the data recorded. Provide two copies of all documentation of each building condition survey to the Engineer.

B. Vibration Monitoring (Nonblasting):

The Deputy Chief Engineer (Technical Services) may waive the requirements of vibration monitoring based on the results of the building condition survey.

ITEM 634.9901 17 – BUILDING CONDITION SURVEY
ITEM 634.9902 17 – VIBRATION MONITORING (NONBLASTING)

Perform continuous vibration monitoring during construction operations when adjacent construction activities make monitoring prudent. The Contractor shall perform the work in a manner that will limit construction vibration at the specified locations to within the limits set within the contract documents.

Submittal of Written Vibration Monitoring Plan:

Prior to performing work adjacent to specified locations, a written Vibration Monitoring Plan prepared by the Contractor shall be submitted to the Engineer a minimum of 10 work days in advance for approval. The Engineer will send a copy of the Vibration Monitoring Plan to the Geotechnical Engineering Bureau, Engineering Geology Section for review and written comment. The vibration monitoring plan may be returned to the Contractor for revision or clarification.

The vibration monitoring plan shall include the necessary information to outline the recording collection. The vibration monitoring plan shall include, but not be limited to, the following items:

1. Contract Designations

- The name of vibration monitoring specialist(s).
- The scheduled start date and length of construction operations which require vibration monitoring.
- The limits of vibration monitoring work, including sites on or off State-owned right-of-way.
- The location of all structures to be monitored in proximity to the construction operation.
- The location of any underground utilities in proximity to the construction operation.

2. Experience and Equipment

- Submit proof and details, as references, of two projects in the past five years where the vibration monitoring consultant performing the work has satisfactorily monitored construction operations by recording maximum peak particle velocities (PPVs). Include contact information for each reference.
- Submit information on the required 3-component seismograph, capable of measuring particle velocity data in three mutually perpendicular directions, including: the manufacturer's name, model number, and documentation of factory calibration performed within the last 12 months.

3. Methods and Procedures

- The location of adjacent structures to be monitored and maximum allowable PPVs as indicated in the contract documents. If not otherwise specified, a maximum allowable PPV in accordance with the United States Bureau of Mines (USBM) Vibration Criteria (Figure 1) shall be observed at all structures.
- The location of seismograph(s) placements, as directed by the Contractor's Professional Engineer. Recording seismographs may be installed on selected structures.
- Appropriate details for anchoring the geophone(s).
- The procedure for tracking PPV throughout construction operations (e.g., Pile Driving Operations: pile tip vs. vibrations may be correlated through time of day. A record of the

time of day at each depth interval, included on the pile driving records, would be required to correlate to a time-based readout of PPV).

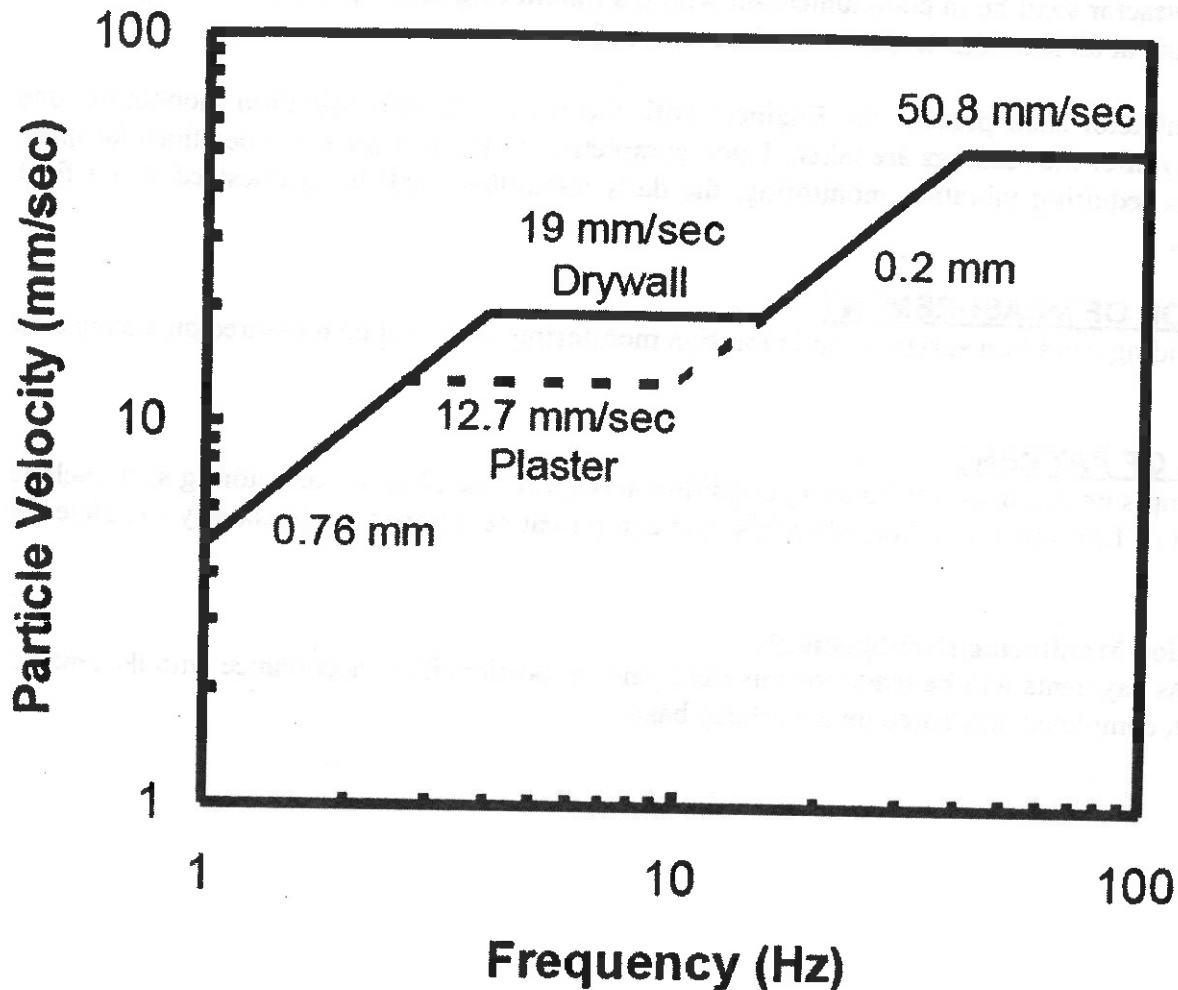


Figure 1 – USBM Vibration Criteria (after Siskind et al, 1980)
The figure provides a “threshold damage” limit, defined as cosmetic damage (e.g., cracking) within the structure, categorized by both frequency ranges and particle velocity

The Contractor shall inform the Engineer immediately each time measured particle velocities exceed 85% of the allowable peak particle velocity. The Contractor shall make equipment or procedural modifications as required to avoid exceeding the allowable vibration intensity.

If the measured velocities exceed the maximum allowable PPVs, the Contractor shall stop operations immediately and revise equipment and procedures to reduce vibrations to allowable levels.

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If the seismographs show any indication of damage or vandalism, the seismographs shall be immediately recalibrated or replaced.

The Contractor shall be in communication with his monitoring firm's personnel during vibration monitoring at all locations to verify the data recorded.

The Contractor shall provide the Engineer with the results of daily vibration monitoring, one work day after the readings are taken. Upon completion of the construction operations for those locations requiring vibration monitoring, the daily submittals shall be synthesized into a final report.

METHOD OF MEASUREMENT

The building condition survey(s) and vibration monitoring work will be measured on a lump sum basis.

BASIS OF PAYMENT

The lump sum bid price for building condition survey(s) and vibration monitoring shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work.

Vibration Monitoring (Nonblasting):

Progress payments will be made for this item paid proportionally in accordance with the amount of work completed, measured on a workday basis.