IOWA | DOT

SPECIAL PROVISIONS
FOR
VIBRATION MONITORING TO PROTECT HISTORIC STRUCTURES

Scott County
HDP-4252(606)--71-82

Effective Date
January 21, 2026

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

236054.01 DESCRIPTION.

A. This specification identifies the Contractor's responsibilities for protecting the properties listed below. The Contractor shall develop a work plan which minimizes the potential for possible vibration damage due to construction and demolition activities near the identified structures. The Contractor shall also monitor vibrations and crack behavior at the identified structures to protect them from any vibration induced damage.

B. The following properties shall be protected per the requirements in this special provision.

Address	Property Owner	National Register Status
108 N 2nd St	Annette Rainsford	Listed
102 N Cody Rd	DME Diversified LLC	Eligible, Contributing to Historic District
527 Wisconsin St	Justin Cato & Brooke Miller	Listed
All structures are located within 100 feet of Wisconsin St in the city of LeClaire, Iowa		

236054.02 PRECONSTRUCTION SURVEY.

A. No information is available concerning the condition of these properties.

B. Perform a pre-construction condition survey at the above listed addresses and provide a copy of the survey report to the Engineer no later than 30 calendar days prior to starting work. The Contractor shall have a Professional Engineer licensed in the State of Iowa and experienced in evaluating structural vulnerabilities and vibration monitoring perform the survey. The Professional Engineer shall have 5 years of experience conducting vibration analyses for the protection of structures and shall be proficient with the following vibration standards: ANSI S2.47, AASHTO R-8-96, U.S. Bureau of Mines RI 8507, as well as International vibration standards (in particular,

DIN 4150-3). The Professional Engineer shall demonstrate their capability by being willing to provide at least two completed vibration analysis sample projects to the General Contractor and the Engineer.

The firms listed below have completed this type of vibration monitoring previously:

- Wiss, Janney, Elstner Associates, Inc., 330 Pfingsten Road, Northbrook, IL 60062
- Exponent, Inc., 185 Hansen Ct., Suite 100, Wood Dale, IL 60191
- Klienfelder East, Inc. 3730 South 149th Street, Suite 107, Omaha, NE 68144
- Terracon Consultants, Inc., 600 SW 7th Street, Suite M, Des Moines, IA 50309
- Braun Intertec Corp., 5915 4th Street SW, Suite 100, Cedar Rapids, IA 52404

C. At a minimum the survey shall document all aspects of the structural condition through observations, actual measurements, plan sketches, photographs, and any other data the preparer may deem appropriate. The survey report shall be submitted to the Engineer electronically.

D. Perform a pre-construction condition survey that includes photos and plan sketches indicating existing vulnerabilities, an evaluation of the risk from construction vibration, and recommendation of maximum safe peak particle velocity (PPV) threshold. Determine the construction methods required to protect the properties listed above based on the pre-construction survey and the safe vibration threshold.

E. The Contractor is responsible for arranging with the property owner the rights-of-entry to their property in order to engage in condition surveys, vibration monitoring, and crack monitoring.

236054.03 MONITORING PLAN.

A. Provide to the Engineer a monitoring plan no later than 30 calendar days prior to commencing work. The plan will be reviewed by the Engineer and the Location and Environment Bureau (charles.bernhard@iowadot.us), and any comments will be returned within 20 calendar days. The Contractor will then have 10 calendar days to revise the work plan and resubmit a final plan to the Engineer and the Location and Environment Bureau prior to commencing work.

B. The plan shall describe the following:

- Construction methods and equipment chosen to achieve low project vibration levels.
- Alternative construction methods and equipment that will be used if the PPV threshold is reached or exceeded.
- Detailed description of the vibration and structural integrity monitoring systems and if necessary catalog cuts of monitoring equipment that will be used; how the monitoring equipment will be calibrated and re-calibrated if necessary during the life of the project; description and schematics if necessary of how the independent components will function as a system.
- Identification of the individual, and their contact information, designated to oversee the vibration and crack monitoring system(s); and daily recording activities required in this specification. A brief description of qualifications or resume of the individual is also required.
- How monitoring equipment will be deployed to continuously record vibration events, including crack monitoring during construction activity. Depending on the monitoring equipment deployed and method chosen for networking, it is possible there will need to be both electrical and telecommunications connections available at multiple remote locations. The monitoring plan will address how utility service will be provided to the monitoring equipment, protection of the monitoring equipment from potential vandalism and the elements, and monitoring of the overall system's day-to-day operation. The plan shall describe in reasonable detail the method and means used to identify and monitor existing cracks and document new cracks. For significant cracks or cracks that appear to have a high potential to migrate, it is recommended that crack monitoring gauges be utilized.
- Details for establishing and deploying an alarm system to announce immediate shut down of all site activities if a vibration event occurs which exceeds the PPV threshold established for the properties listed above. The alarm system shall include a phone modem which will dial cell phones of the Engineer and Contractor site personnel in the event of an exceedance.

- Method for coordinating with the Engineer whereby the Contractor's retained licensed engineer will conduct a post-alarm survey in the event of a PPV threshold alarm occurrence.
- Establish a protocol for the identification of the activity or construction equipment that caused the PPV threshold to be exceeded.
- Description of the process which will be used to verify that the monitoring equipment will function as planned before starting work and the process which will be used to verify (daily) that the monitoring equipment remains in calibrated working order.
- Detail a protocol including responsible parties to be notified if an exceedance occurs. This includes but is not limited to the construction superintendent and the DOT's lead inspector.
- Daily activity log of vibration activity and crack monitors to ensure the identification of the cause of any vibration event. Depending on equipment deployed, crack monitors could be monitored remotely or by visual inspection. In either case, a daily inspection log for the duration of the construction project shall be maintained either in written or electronic form.
- Daily testing and logging of entire geophone/seismograph/communications network (start of day test). If the equipment fails the daily test, correct the deficiency before proceeding with planned activities for that day or temporarily suspend work until the equipment is repaired or replaced. All daily logs will be available to the Engineer for review and a summary of daily logging will be provided in the post-condition survey.

236054.04 PRE-CONSTRUCTION SITE PREPARATION.
At the properties designated in Article 236054.01:

A. Crack Monitoring.
In accordance with the project's monitoring plan, mark existing cracks in such a way that future observations would clearly indicate whether cracks remained unchanged, opened, closed, or propagated. Monitor and log all cracks and crack monitoring devices daily and immediately notify the Engineer of any observed change. It is recommended, but not required, to have and record metrological data for the proximity to the project. Cracks that can be documented during the project to respond to changes in meteorological conditions will not require additional explanation in the final report.

Following is a list of companies that supply crack monitoring equipment; however other equipment of equal reliability and quality will be acceptable.
- Tell-Tale Crack Monitors, RST Instruments Ltd.; 800.665.5599; www.rstinstruments.com
- Crack Monitoring Equipment, Geotest Instrument Corp.; 866.430.7645; www.crackgauge.com
- Avongard Crack Monitor, Avongard Products USA; 800.244.7241; www.avongard.com

B. Vibration Monitoring.
In accordance with the project's monitoring plan, install all monitoring equipment and maintain during the project in accordance with manufacturer's recommendations, calibration standards, and specifications. Do not begin site work until all monitoring equipment is deployed and verified to be operating in accordance with factory recommendations and specifications.

C. Proof of Installation.
Demonstrate that the installed equipment will continuously and accurately measure vibrations, electronically log the vibration history (date/time stamp) and provide a communication notice system that notifies site personnel should the PPV threshold be exceeded. The monitoring equipment shall remain in-place and in operation throughout the project.

236054.05 VIBRATION LIMITS.
After a thorough conditions evaluation, propose in the pre-construction survey a PPV level for the monitored structure. The PPV level proposed shall be determined by a qualified expert in the field of vibration monitoring. If the Engineer agrees that the level proposed will reasonably protect the structure, that PPV level will be added to the contract documents by mutual benefit for the specific property. In no case shall the PPV level exceed 0.2 inches per second [ips] as measured at or in very close proximity to the monitored structure. To ensure the PPV level is not exceeded, utilize an alarmed monitoring system to signal any vibration event that equals or exceeds a threshold of 80% of the PPV level.

236054.06 DEMOLITION/CONSTRUCTION.

A. Periodically check to ensure that the monitoring system(s) are continuously operating within manufacturer's specifications during the project.

B. Immediately cease work if the alarm at the structure indicates the PPV threshold is reached or exceeded causing a vibration event. In the event of an exceedance notify the Engineer immediately. Conduct a post-alarm survey. The shut down shall remain in effect until, to the Engineer's satisfaction, the cause of the exceedance has been identified; the potential for another exceedance has been addressed by replacing faulty monitoring equipment; the work process has been modified; or a recommended change to the equipment being used has been provided. Do not resume work until approved by the Engineer.

236054.07 POST-CONSTRUCTION SURVEY.
Perform a post-construction survey and analysis at the designated adjacent structure to determine if any structural changes are the result of the construction activity. Provide the Engineer with a copy of all post construction survey reports, daily log summaries for vibration and crack monitors, and analysis documents comparing pre and post structural condition prior to contract acceptance.

236054.08 METHOD OF MEASUREMENT.
The item Vibration Monitoring will be measured as a lump sum unit of work.

236054.09 BASIS OF PAYMENT.
Vibration Monitoring will be paid for at the contract lump sum price. This price shall be full payment for pre-construction surveys; furnishing, installing, monitoring, and removing crack monitoring gauges; preparing and providing a report documenting crack monitoring during this project; furnishing, installing, monitoring, and removing vibration monitoring equipment; preparing and providing a report documenting vibration data collected during this project; notification of vibration events; post-construction surveys; reports; and all labor, equipment and materials necessary to complete the work as described. There will be no compensation for delays as the result of exceeding the PPV threshold or delays from faulty or damaged monitoring equipment. There will be no compensation for adjustment of construction activities or equipment to reduce the vibration levels to less than the maximum PPV, should an exceedance occur.