

Consulting
Engineers and
Scientists

April 2, 2024
GEI Project No.: 2200549

Mr. Tom Ogg
CAA ICON
5075 S. Syracuse Street, Suite 700
Denver, CO 80237

Sent via email to: TomOgg@caaicon.com

RE: **Vibration Monitoring Report – Northwestern University Ryan Field,
Evanston, Illinois– Report No. 1 (February 22, 2024, through March 31, 2024)**

Dear Mr. Ogg:

We are pleased to present the following report on vibration monitoring performed in general accordance with GEI Proposal No. 610040, dated October 31, 2023.

Introduction

GEI Consultants, Inc. (GEI) is conducting a vibration monitoring program during construction of the Northwestern Ryan Field Stadium Project in Evanston, Illinois. We understand that Northwestern University is concerned regarding the effect that potential vibrations, caused by construction activities, may have on the existing properties adjacent to the project site.

The proposed duration of the vibration monitoring program is approximately 12 months, during demolition and structure construction. This report contains vibration data recorded during the monitoring period between the installation date of February 22, 2024, and March 31, 2024.

Project Background

Remote Vibration Monitor (RVM) Nos. UM10183, UM12092, UM 11876, UM 19052, UM 19035, and UM16916, with remote recording capability, were installed by GEI on February 24, 2024. The six RVMs are in locked enclosures and connected to cellular modems.

The RVMs are set up to continuously collect vibration amplitude measurements (24 hours/day – 7 days/week) and transmit any recorded vibration data of 0.005 inches/sec or greater via cellular modem to our instrumentation server. The data is reviewed weekly.

The locations of the installed RVMs are:

Monitor No.	Location
VM-1 UM 10183	East Property Line
VM-2 UM 12092	South Property Line
VM-3 UM 11876	West Property Line
VM-4 UM 19052	Anderson Hall Mechanical Room
VM-5 UM 19035	Welsh Ryan Arena Mechanical Room
VM-6 UM 16916	North Property line near Baseball Field

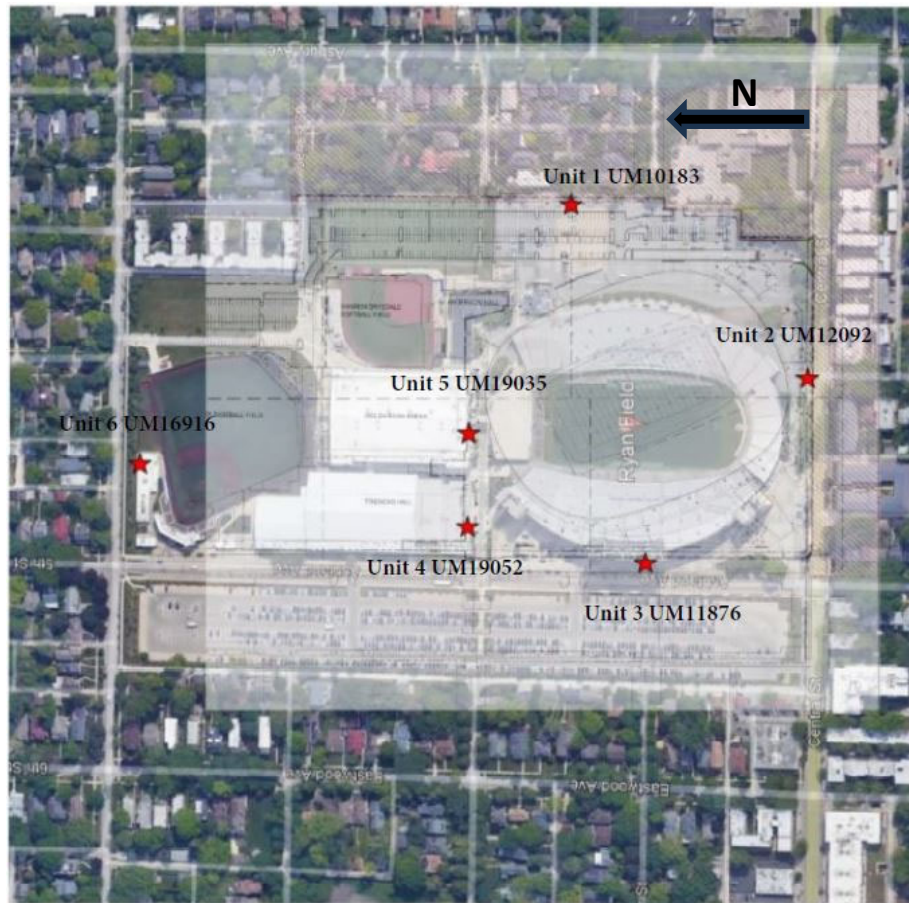


Figure 1: Vibration Monitor Locations

The RVMs are capable of measuring vibration events in three mutually perpendicular directions, or axes; vertical, longitudinal, and transverse to a line between each RVM and the construction site. Vibration levels are measured in terms of the Peak Particle Velocity (PPV) in inches per second.

In the event of an exceedance of the project trigger level vibration threshold, the RVMs are set up to provide alert messages, via email, to our GEI Project personnel Sean Brady, Craig Padar, and Rick Choyce; CAA ICON personnel Tom Ogg, Sarah Baresel, Devin Wertheimer, Brian Byrne, Dan Loosbrock; and TCCO personnel Greg Cuttell and Michael Musial.

Vibration Standard

Based on the U.S. Bureau of Mines (USBM) research report RI-8507, neither cosmetic nor structural damage to buildings (i.e., cracks in plaster, concrete, or masonry) is expected to occur below a vibration amplitude of about 0.5 in/sec in the frequency range 2.0 to 10 Hz, which is typical of vibrations generated by demolition and construction activities, then rising uniformly to 2.0 in/sec at frequencies greater than 40 Hz.

We typically establish a vibration alarm threshold for projects similar to this one, and the interested parties are notified of the vibration levels exceeding this threshold level as soon as the event occurs. This notification is transmitted via email. The vibration thresholds established for this project are 0.35 in/sec. The set trigger alarms will notify GEI and designated recipients by email if the recorded vibration levels have exceeded the threshold.

Recorded Data

For the period between February 22, 2024, and March 31, 2024, the maximum daily vibration levels recorded were as follows:

Vibration Monitor Locations	Maximum Daily Vibration Level Range
VM-1 East Property Line RVM No. UM 10183	0.010 to 0.2170 in/sec.
VM-2 South Property Line RVM No. UM 12092	0.010 to 0.4610 in/sec.
VM-3 West Property Line RVM No. UM 11876	0.010 to 0.4010 in/sec.
VM-4 Anderson Hall RVM No. UM 19052	0.010 to 0.3710 in/sec.
VM-5 Welsh Ryan Arena RVM No. UM 19035	0.010 to 0.1570 in/sec.
VM-6 North Property Line near Ballfield RVM No. UM 16916	0.010 to 0.1050 in/sec.

The vibration levels recorded by the vibration monitors were all below the established project threshold of 0.35 in/sec., except for one event at VM-2 with a PPV of 0.4610 in/sec, one event at VM-3 with a PPV of 0.3710 in/sec., and one event at VM-4 with a PPV of 0.371 in/sec. These events are localized disturbances and were all single vibration events slightly over the project alert threshold.

Note: Six significantly large vibrations (about 7 to 10 in/sec) were recorded during this time period. We have assumed based on their magnitude and frequency that they were not related to construction activity. In our experience, direct contact (bumping, kicking, etc.) with the vibration equipment would cause this type of measurement. These six events were excluded from the vibration summary above for the period of March 1st thru March 31st, 2024, report. However, they are indicated on the attached graphs in the Appendix.

The vibration data is graphically summarized for the monitoring period between February 22, 2024, and March 31, 2024, in the appendix of this report.

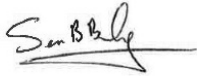
Conclusion

Based on the vibration levels recorded and comparison with the guidelines given in USBM Report RI-8507, we consider it unlikely that any cosmetic or structural damage was caused to the monitored buildings by any of the vibration events summarized in this report.

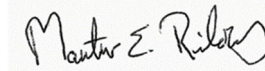
If you have any questions regarding the contents of this report, please do not hesitate to contact Sean Brady at (312) 304-6586.

Respectfully,

GEI CONSULTANTS, INC.



Sean B. Brady
Senior Professional



Mathew E. Ribordy, P.E.
Senior Consultant

Attachments: Vibration Monitoring Data

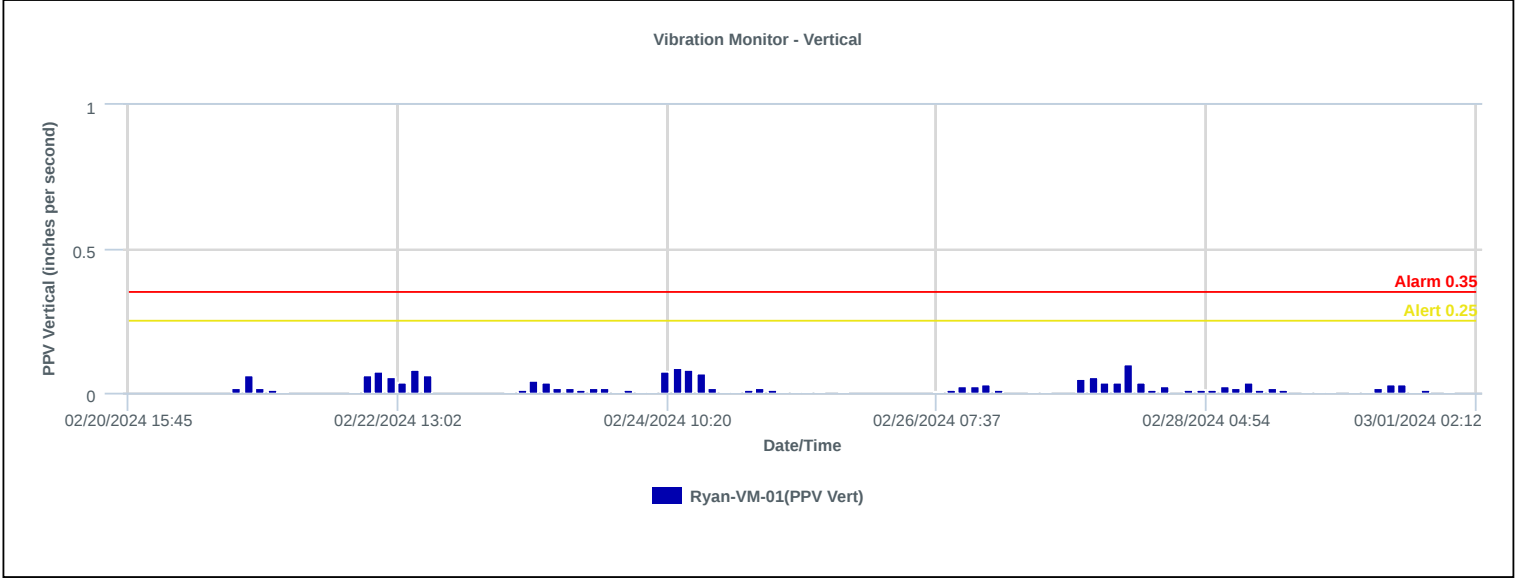
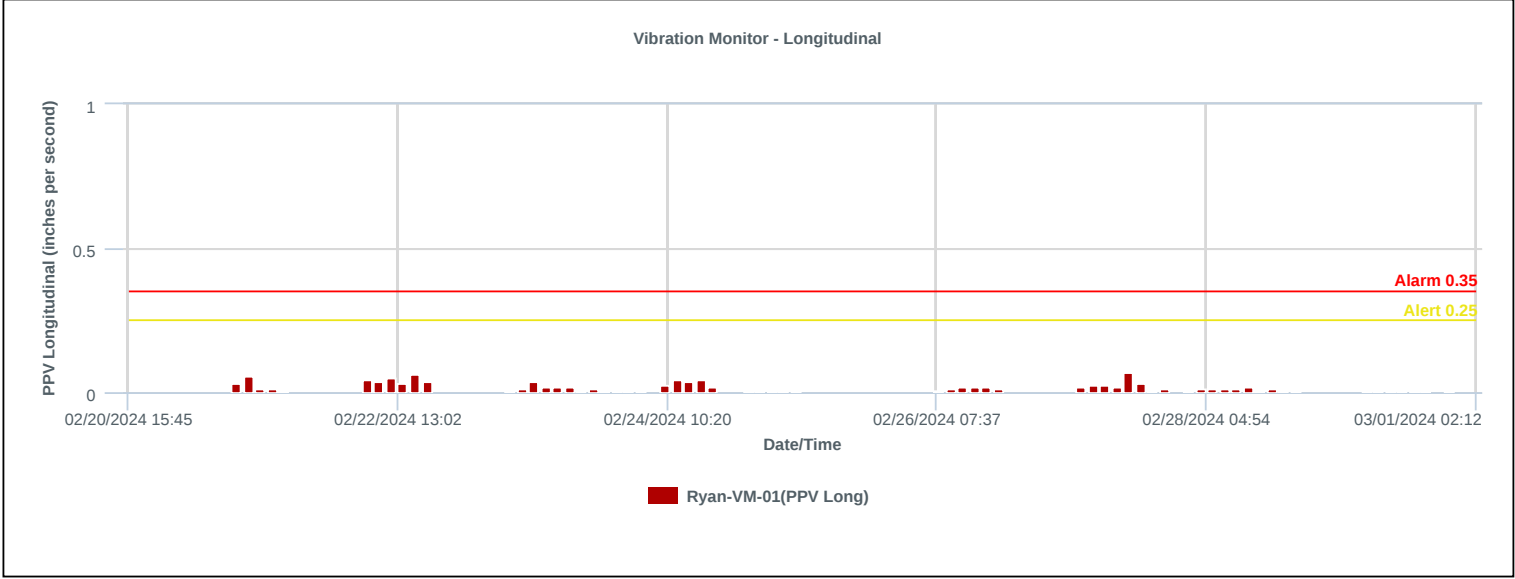
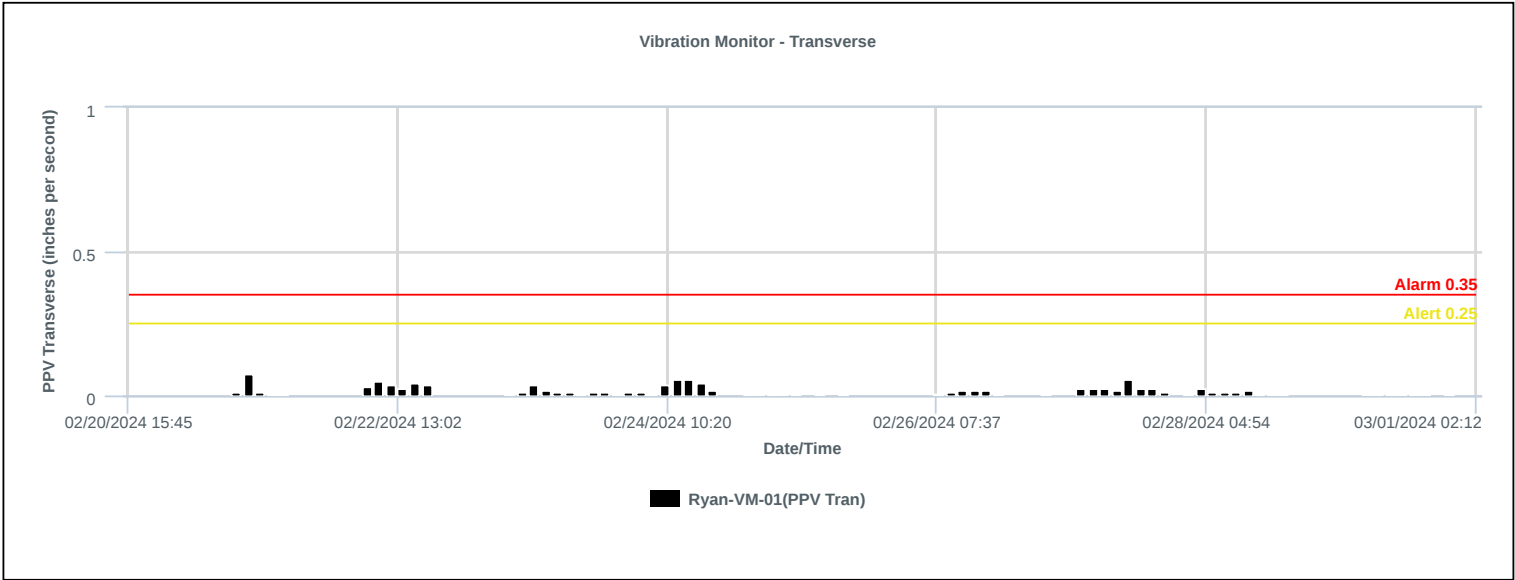
Appendix for Vibration Monitoring Report

Report No. 1

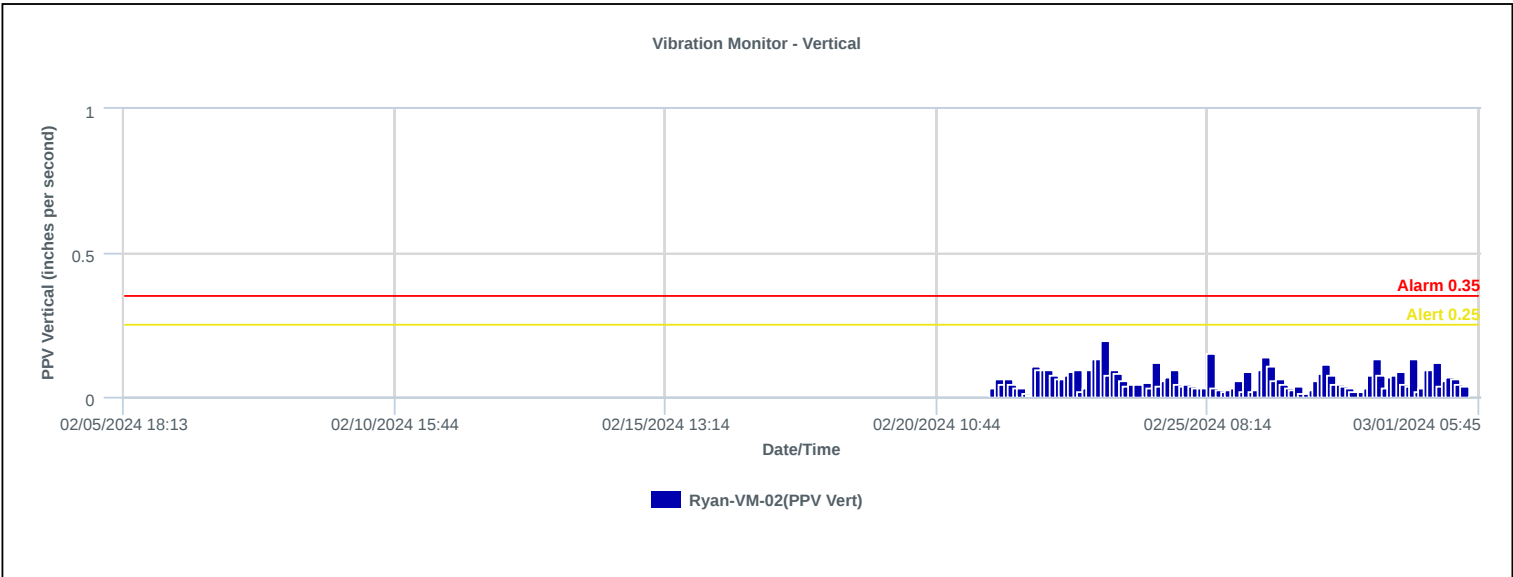
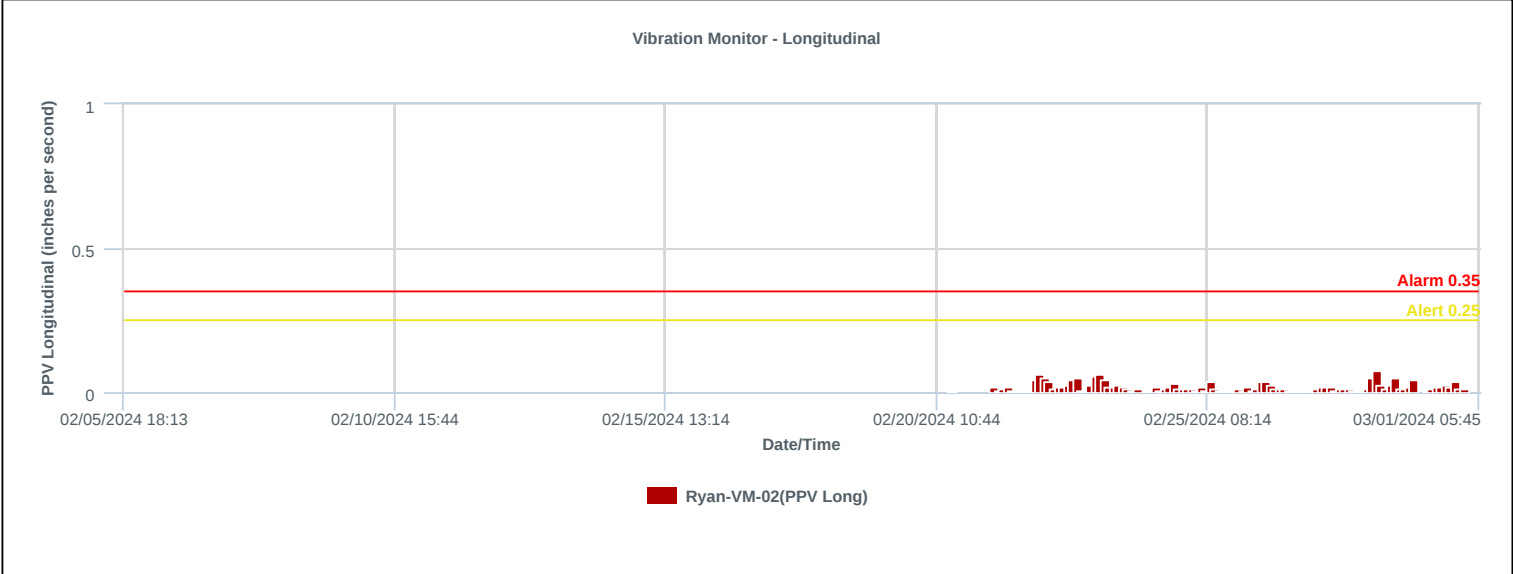
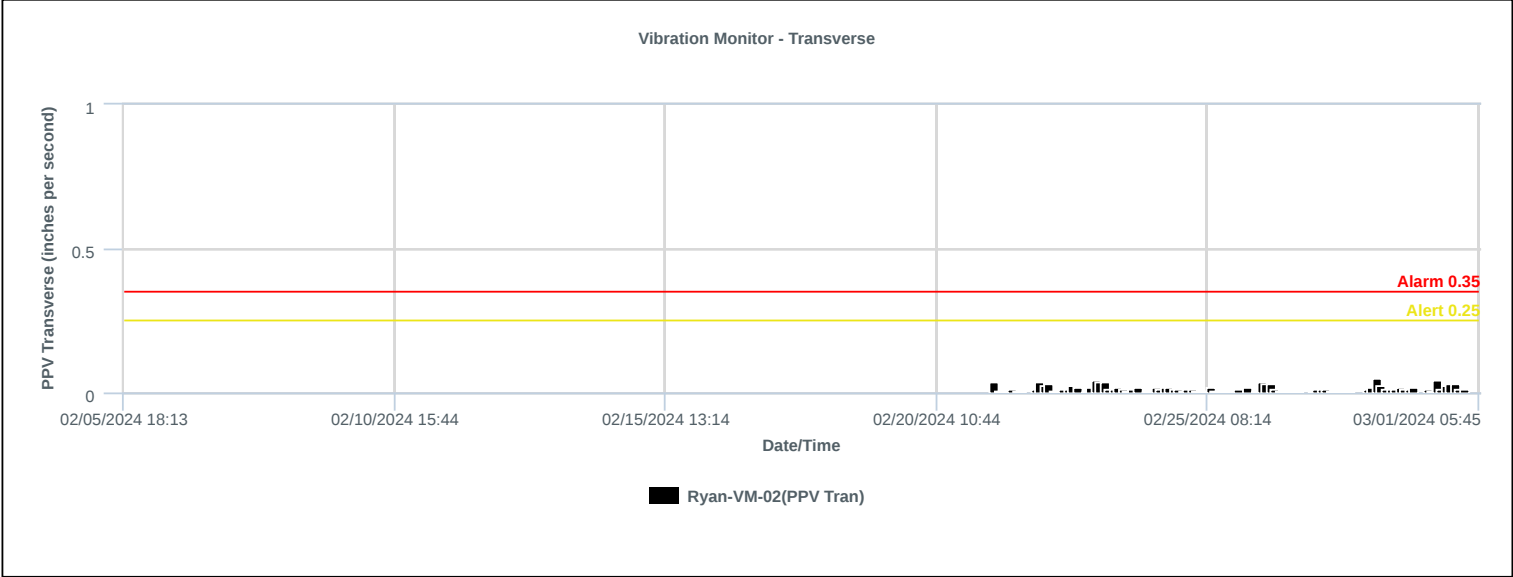
February 22, 2024, through March 31, 2024

**Northwestern University Ryan Field
Evanston, Illinois**

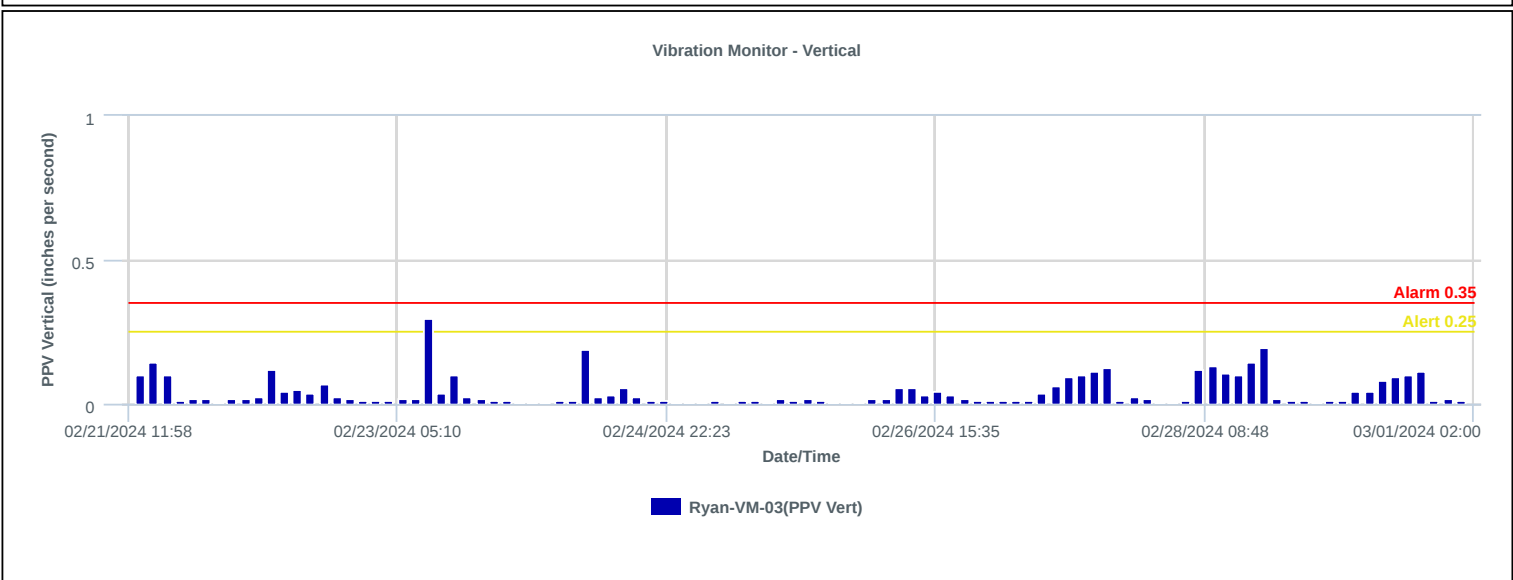
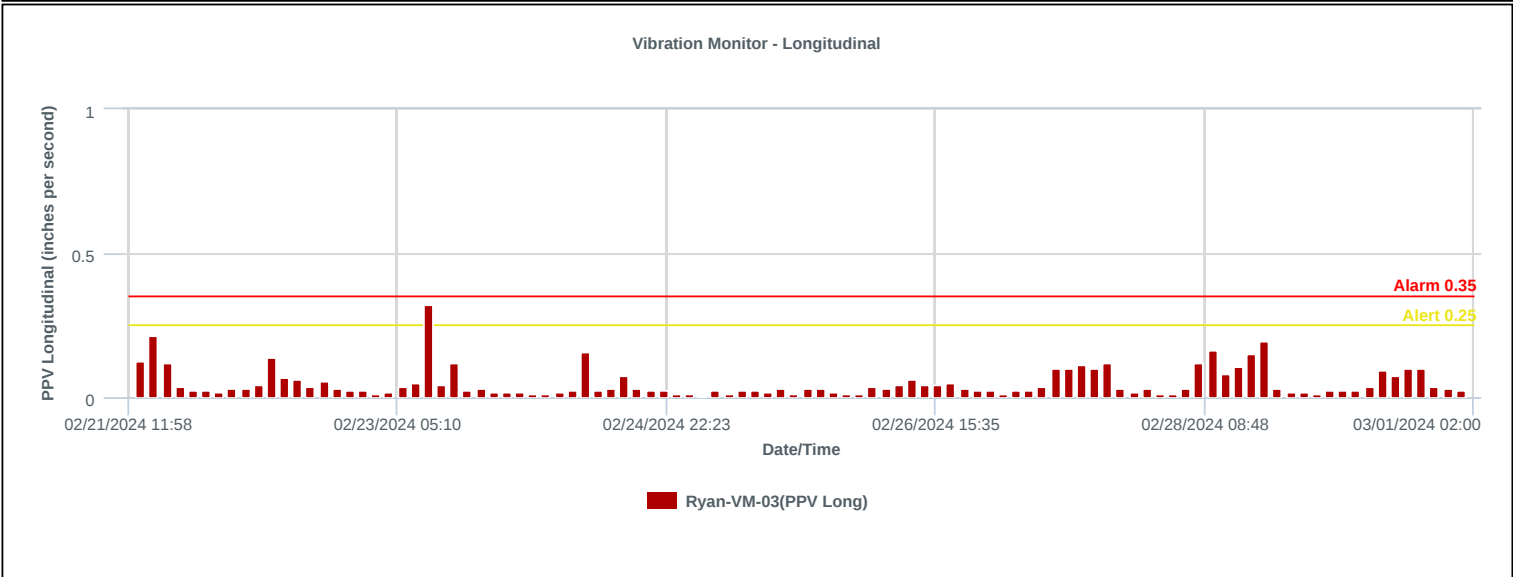
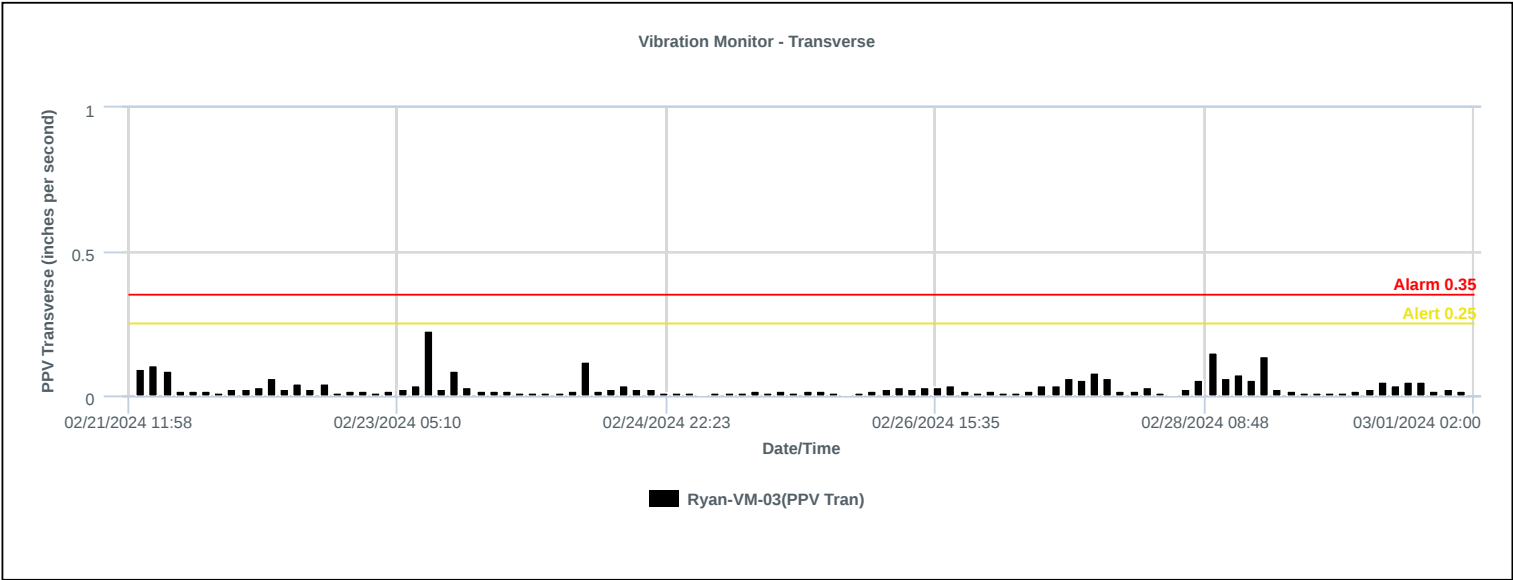
Ryan Field - VM-01



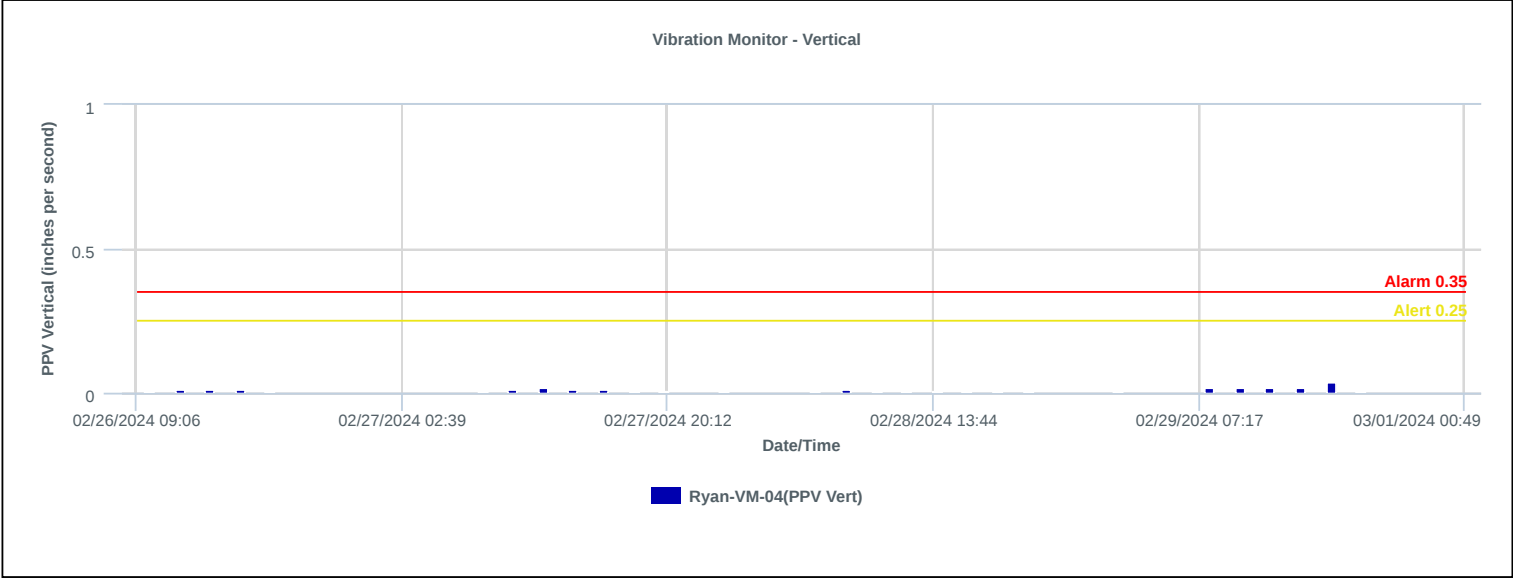
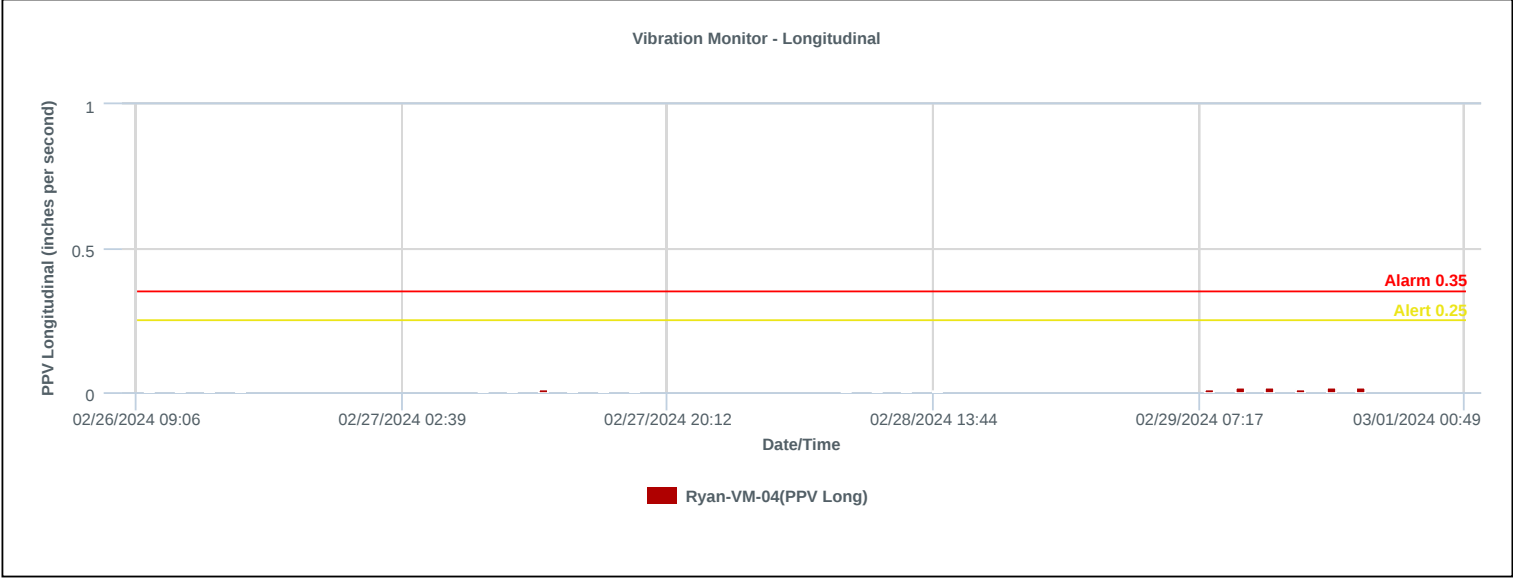
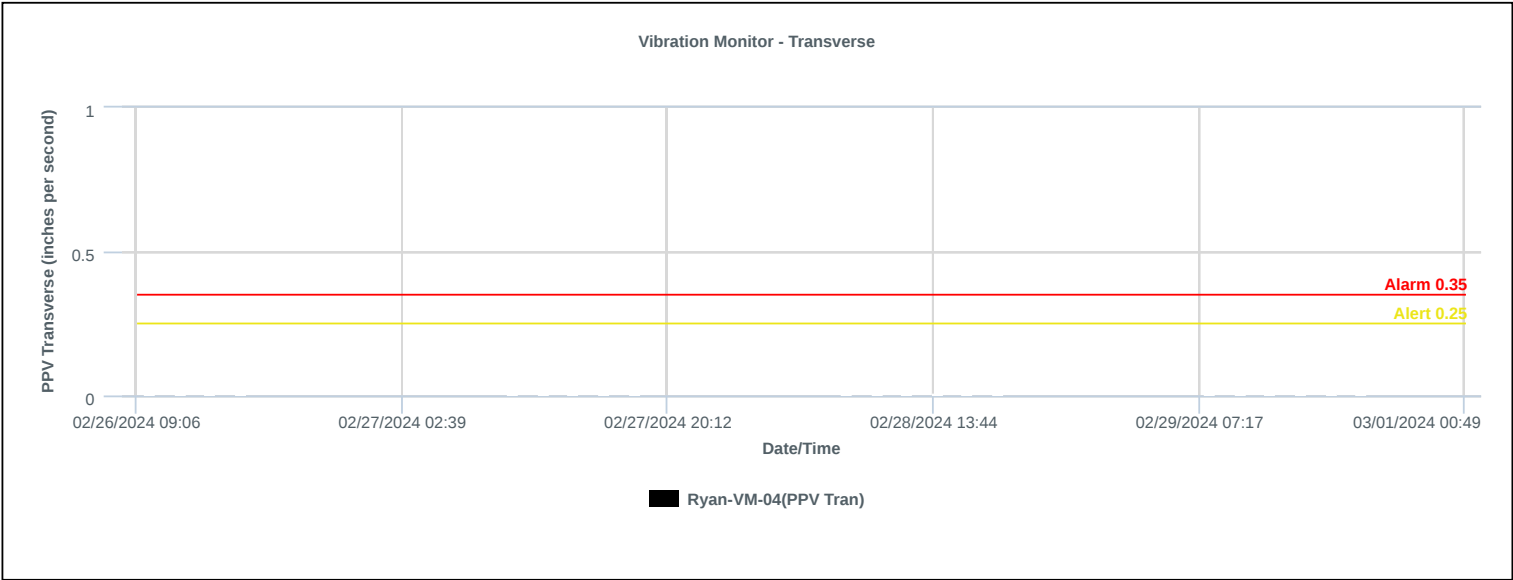
Ryan Field - VM-02



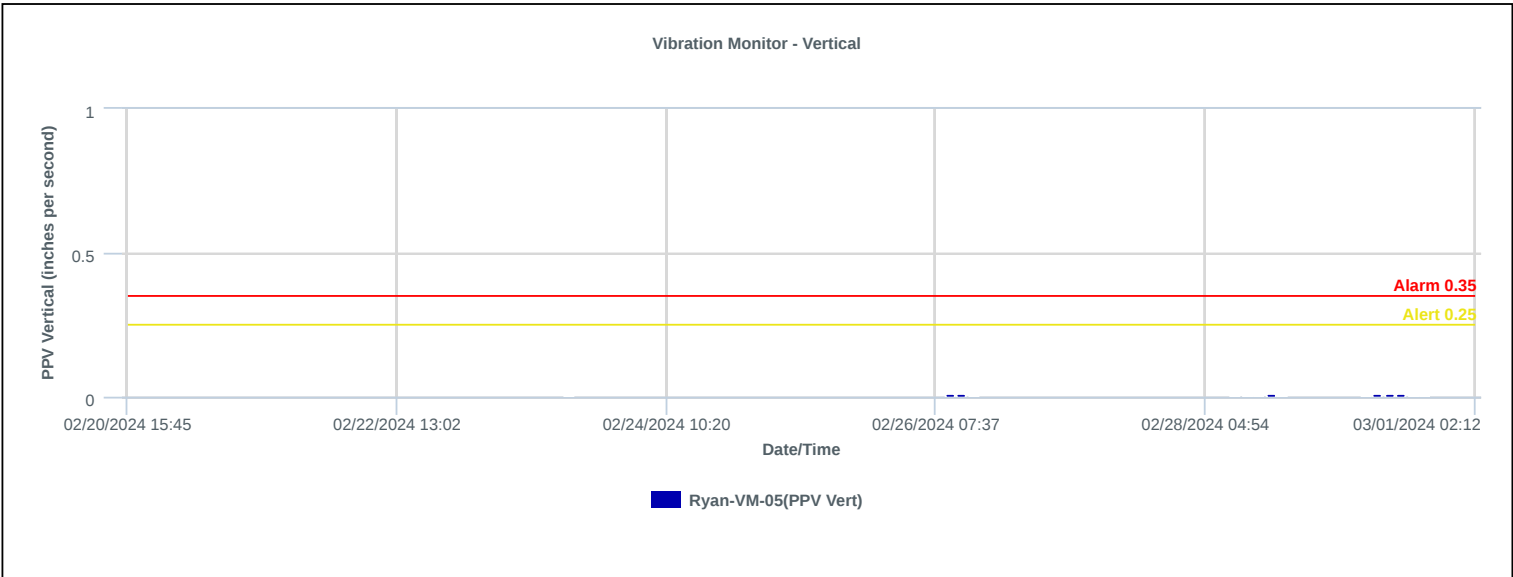
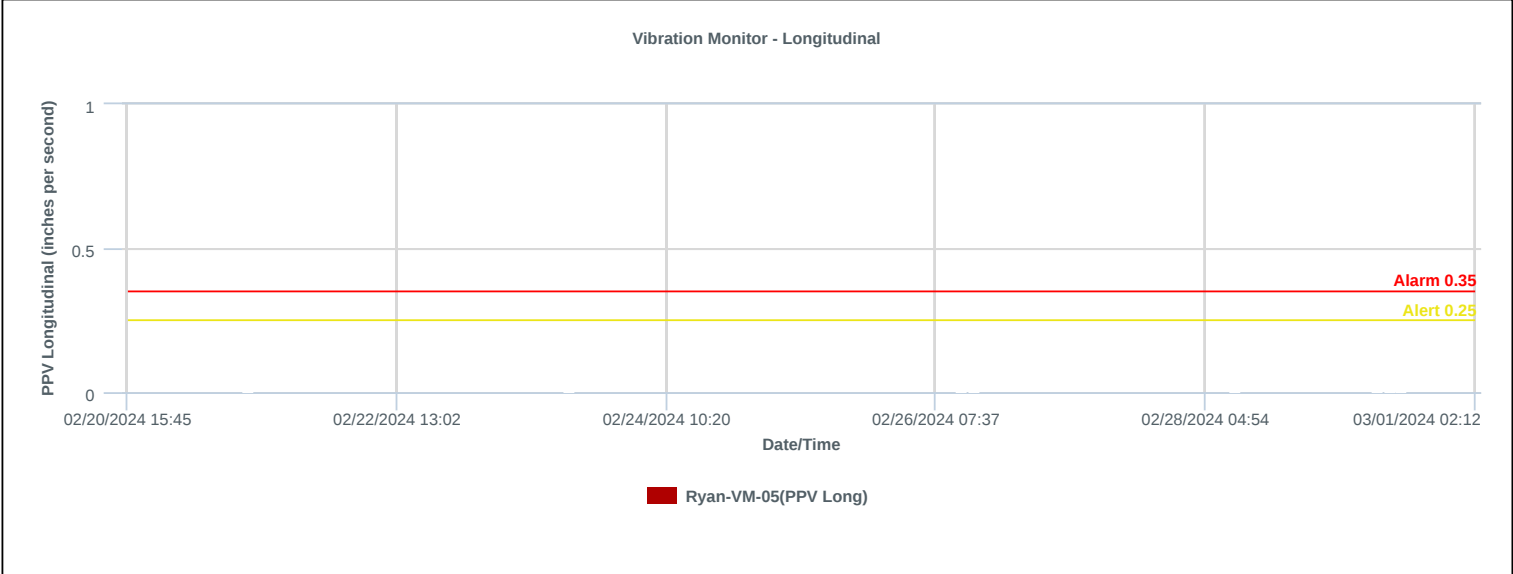
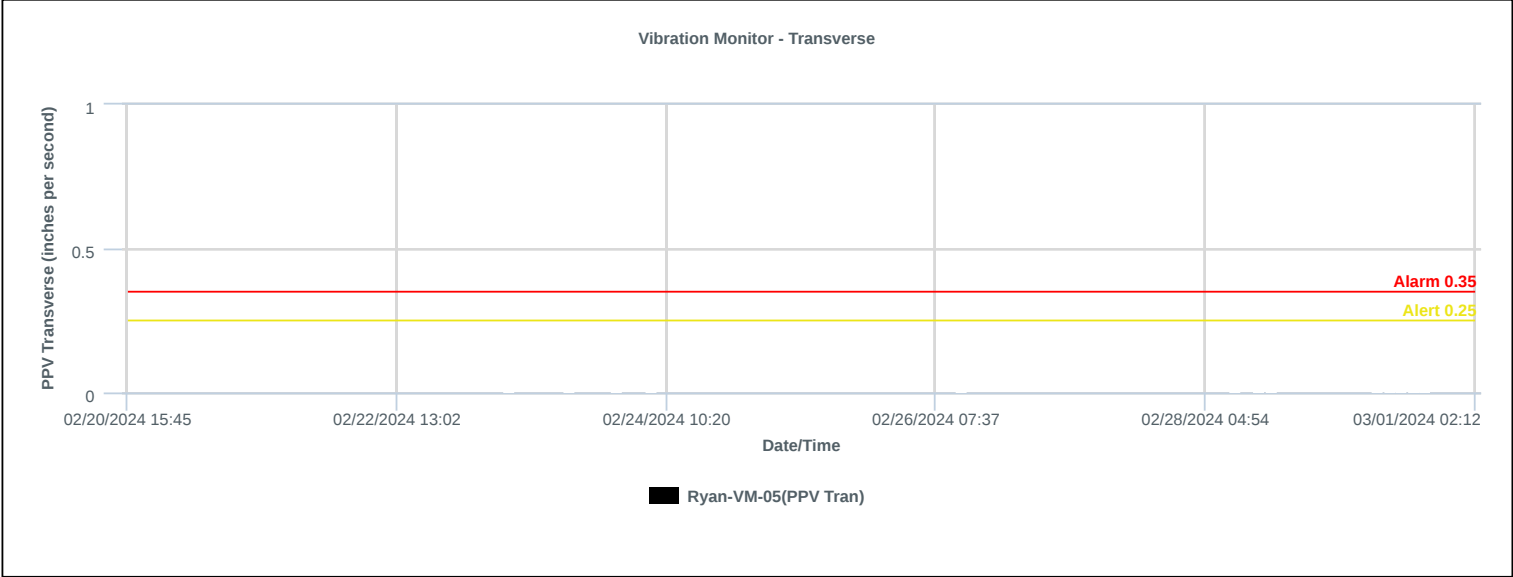
Ryan Field - VM-03



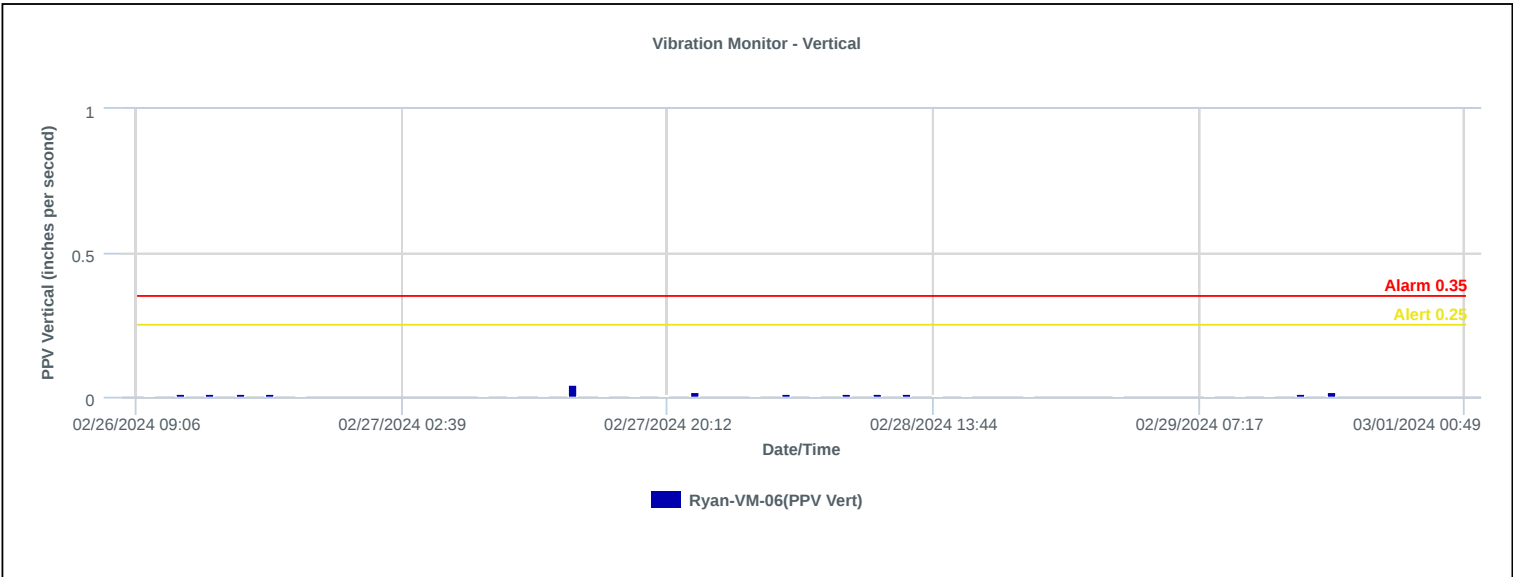
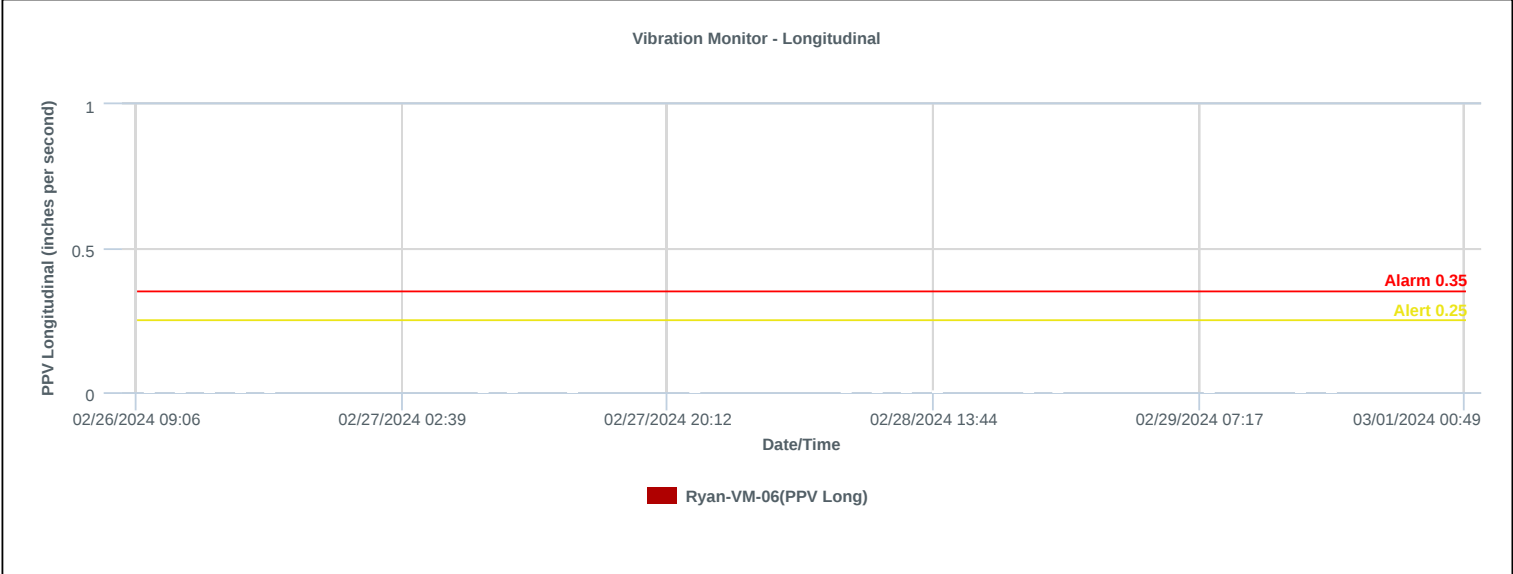
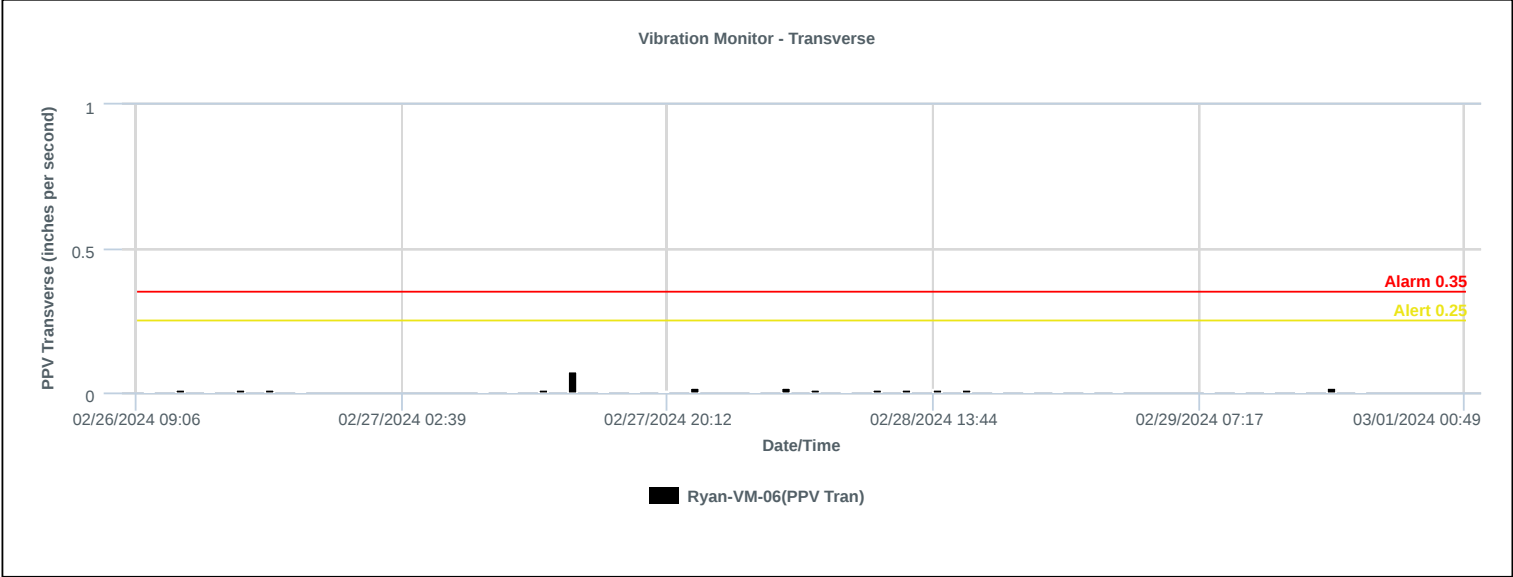
Ryan Field - VM-04



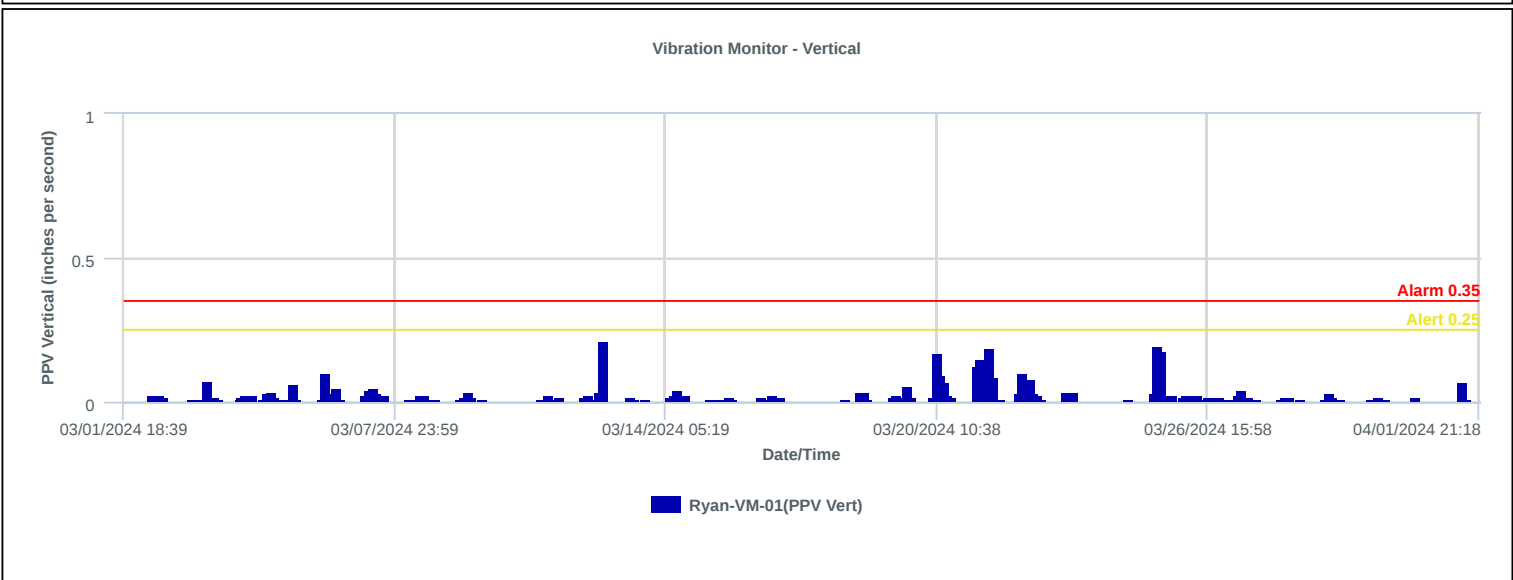
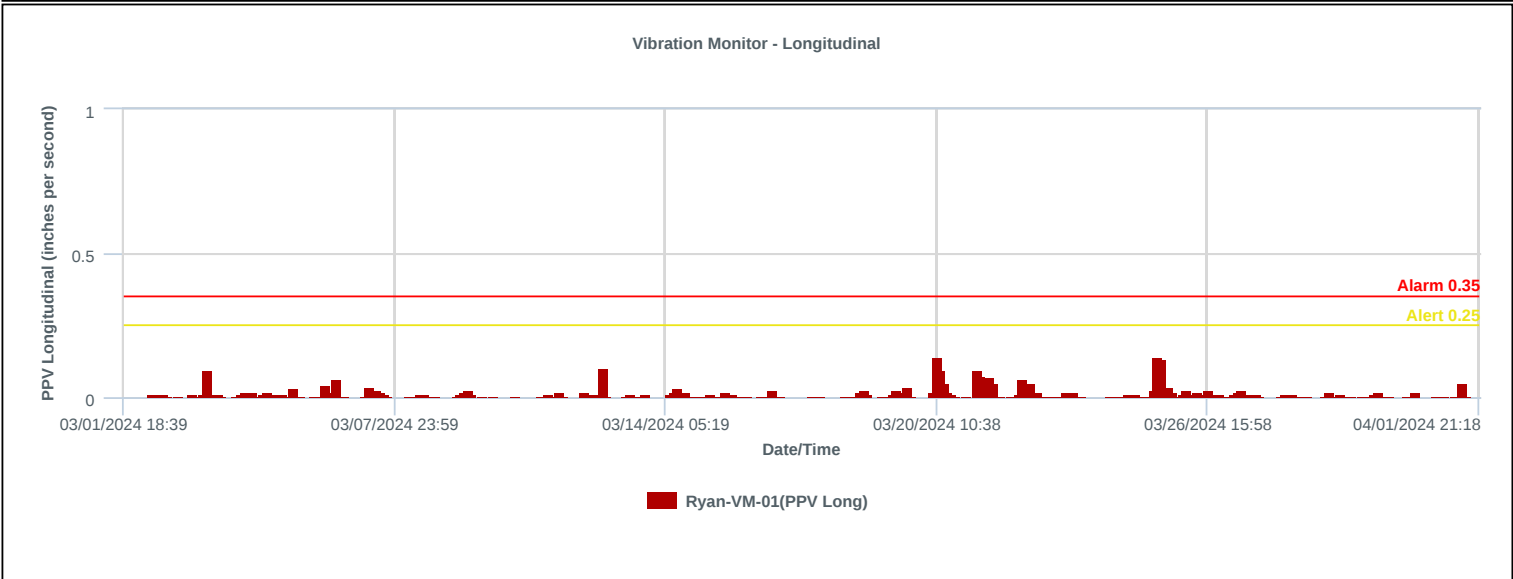
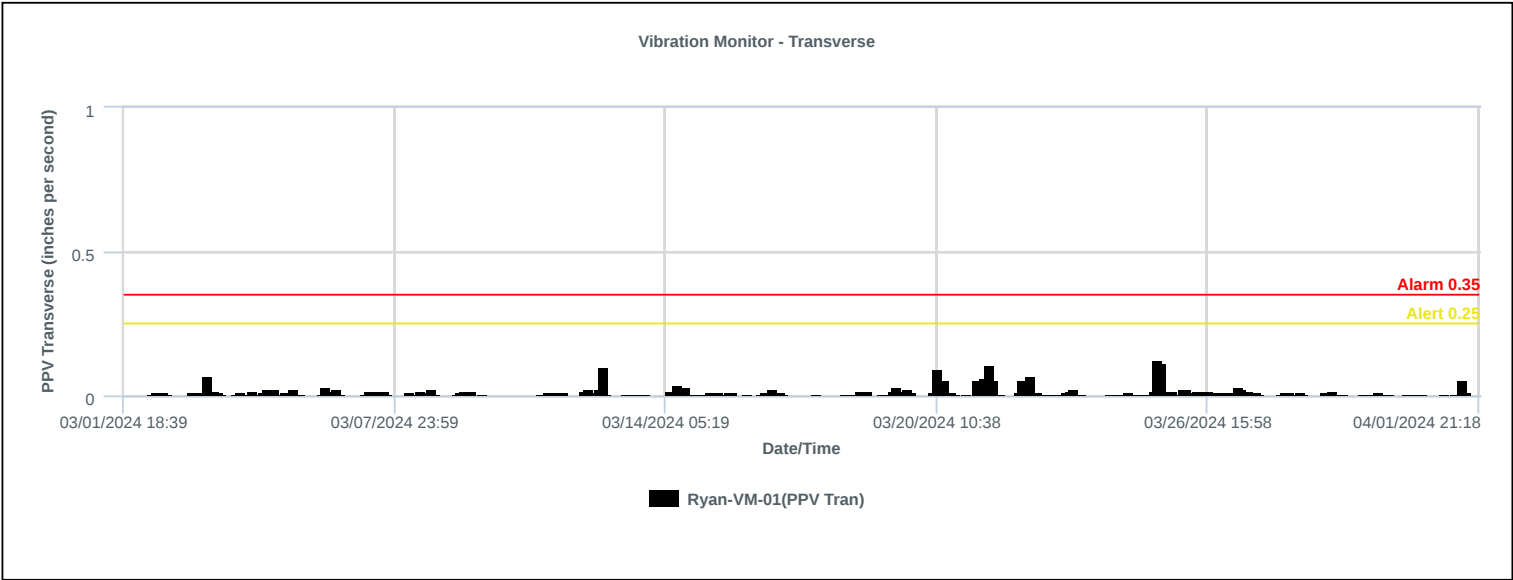
Ryan Field - VM-05



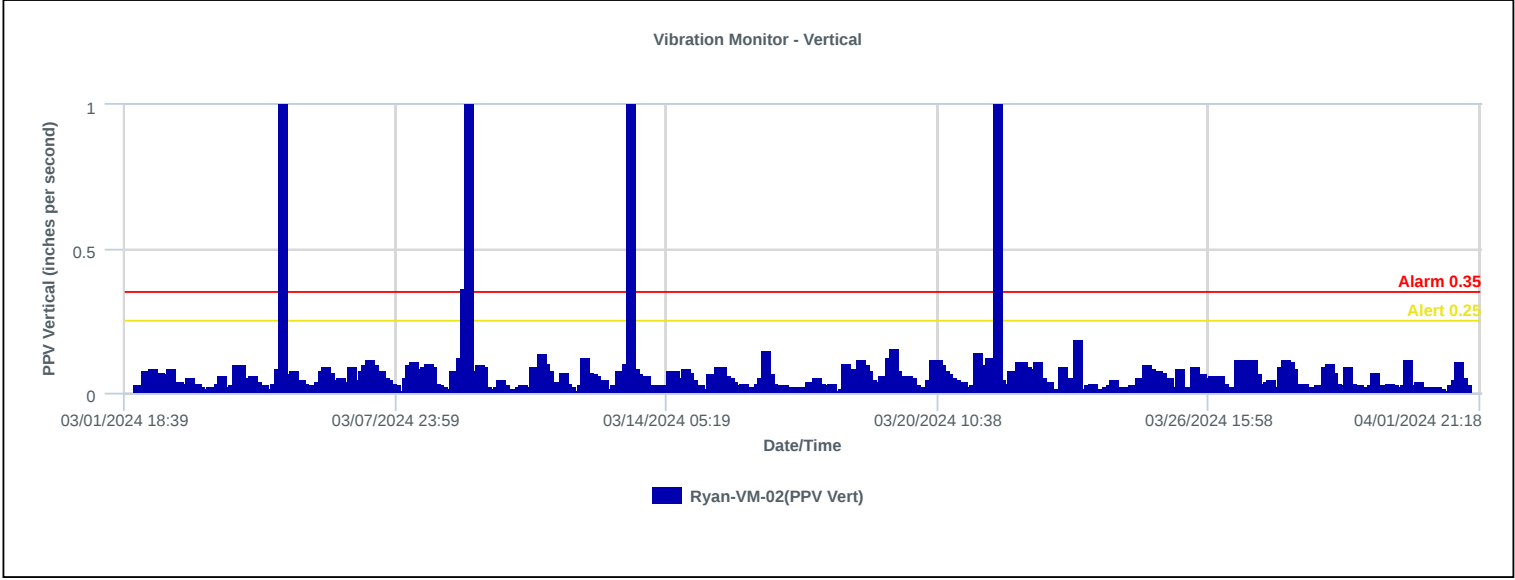
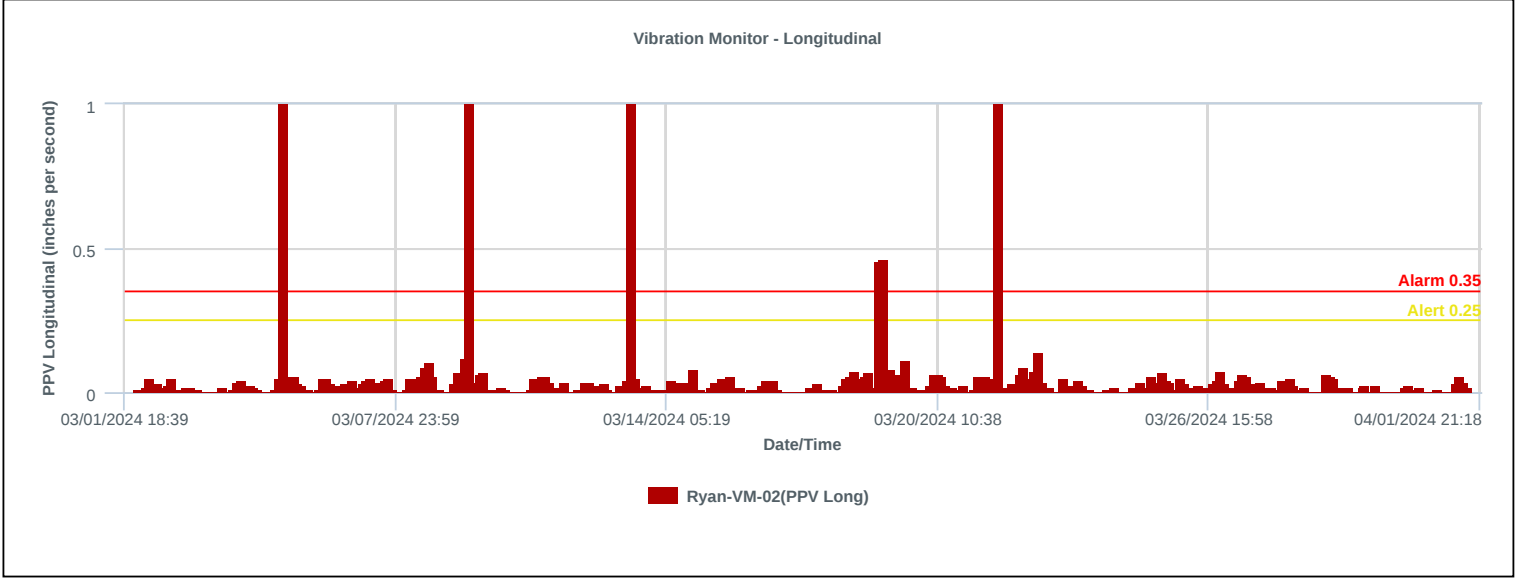
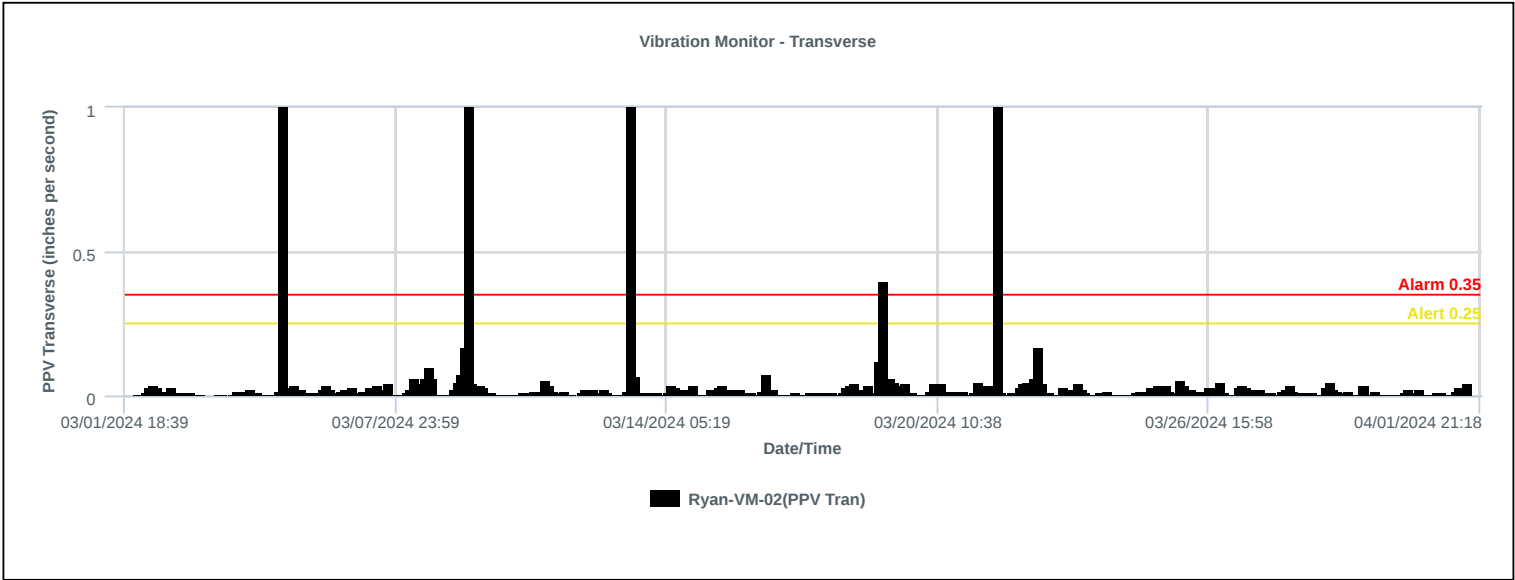
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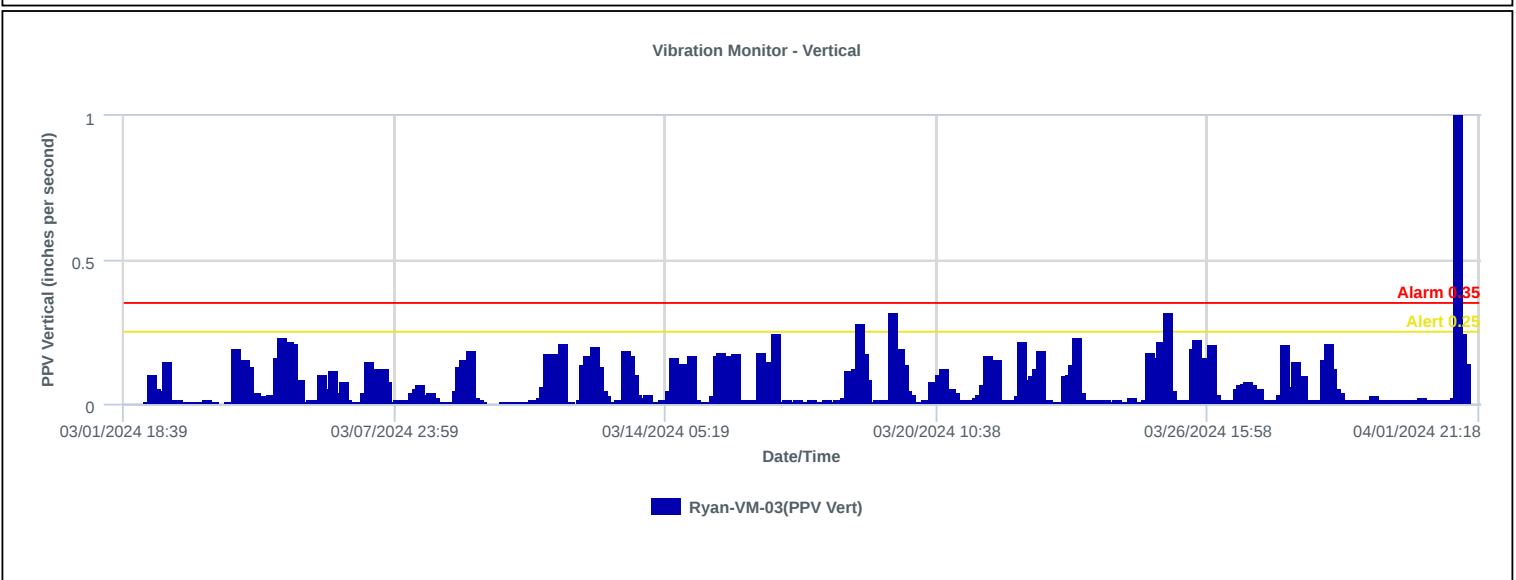
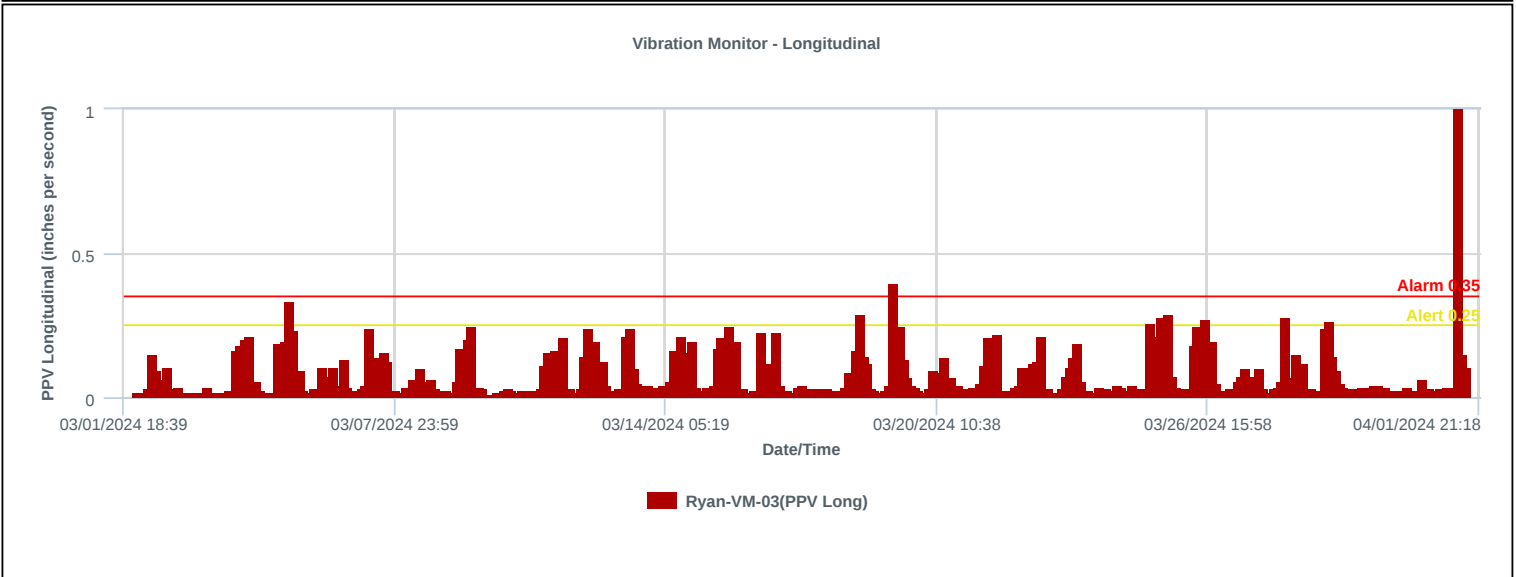
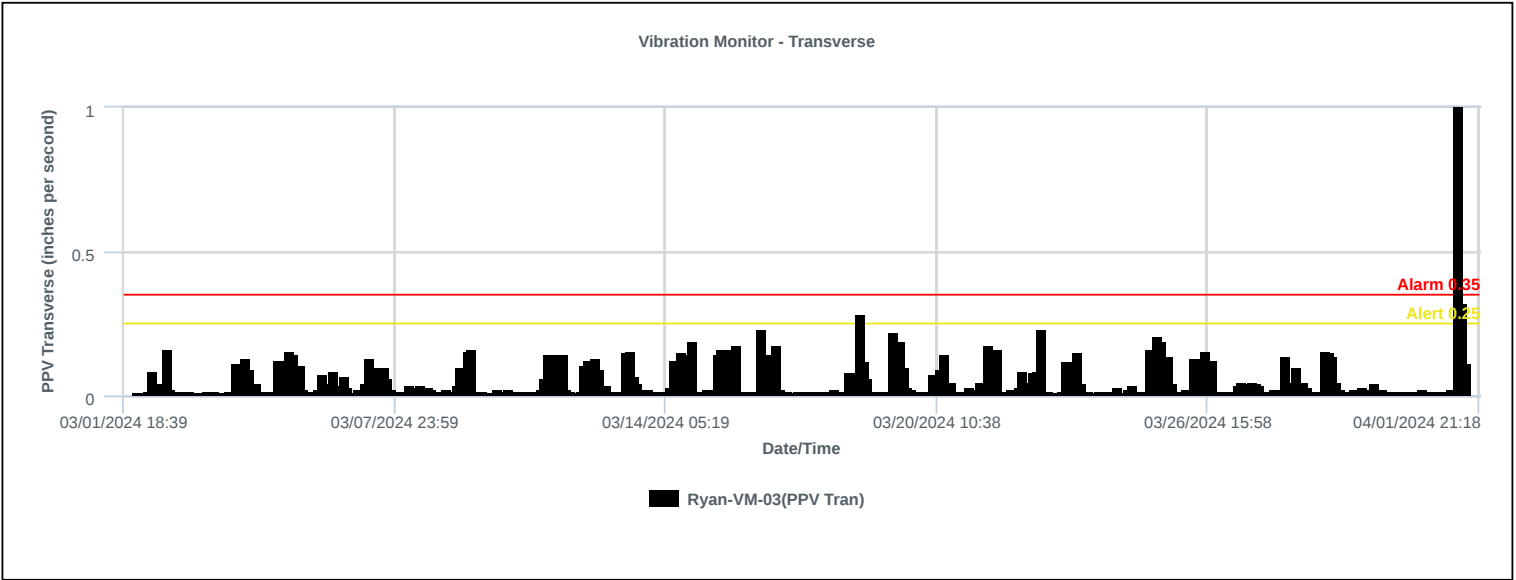
Ryan Field - VM-01



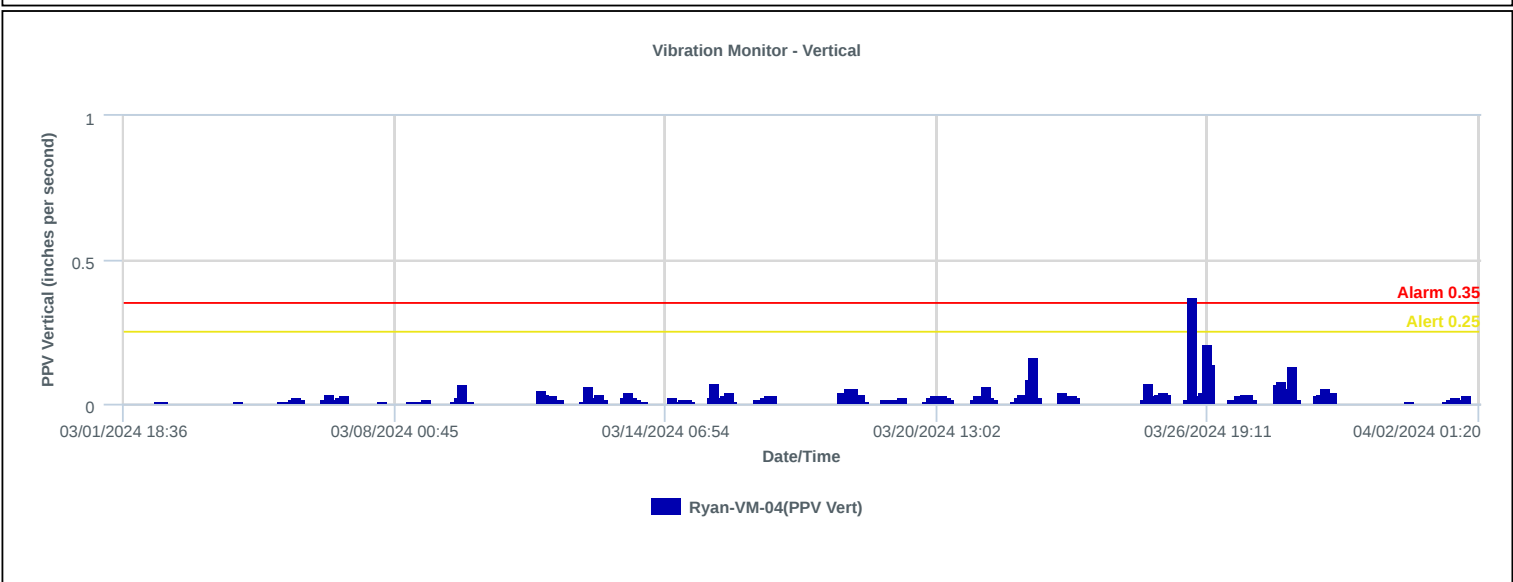
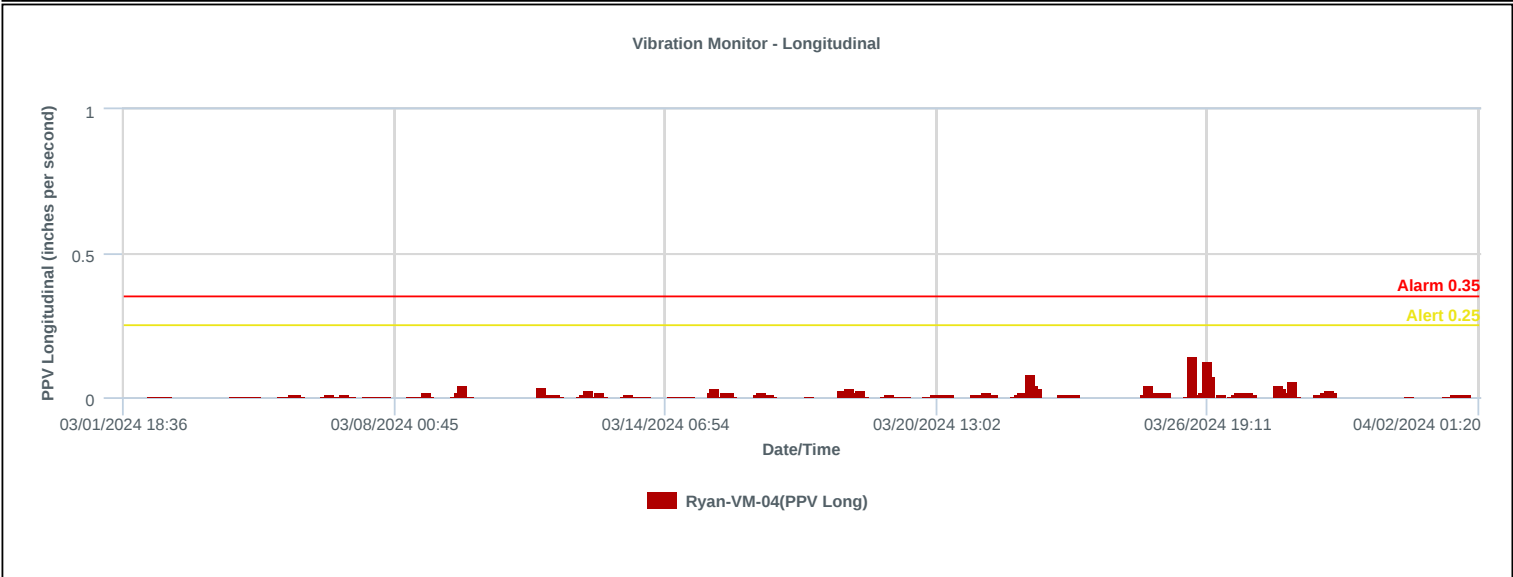
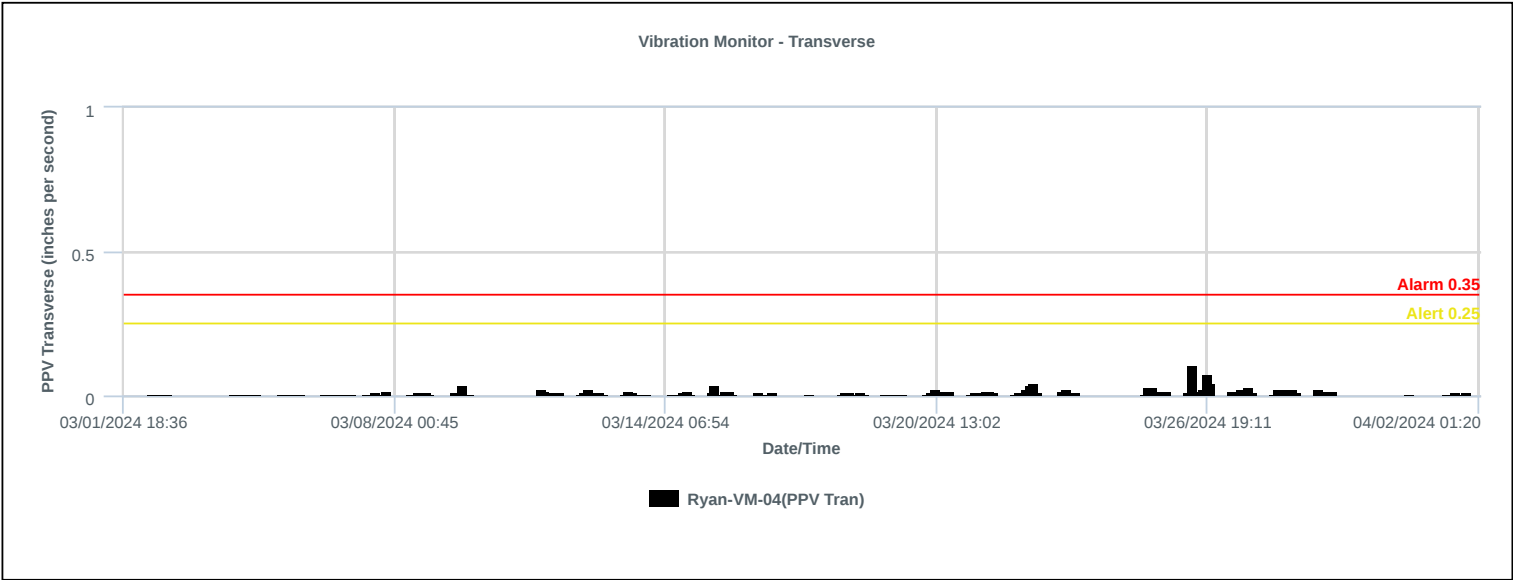
Ryan Field - VM-02



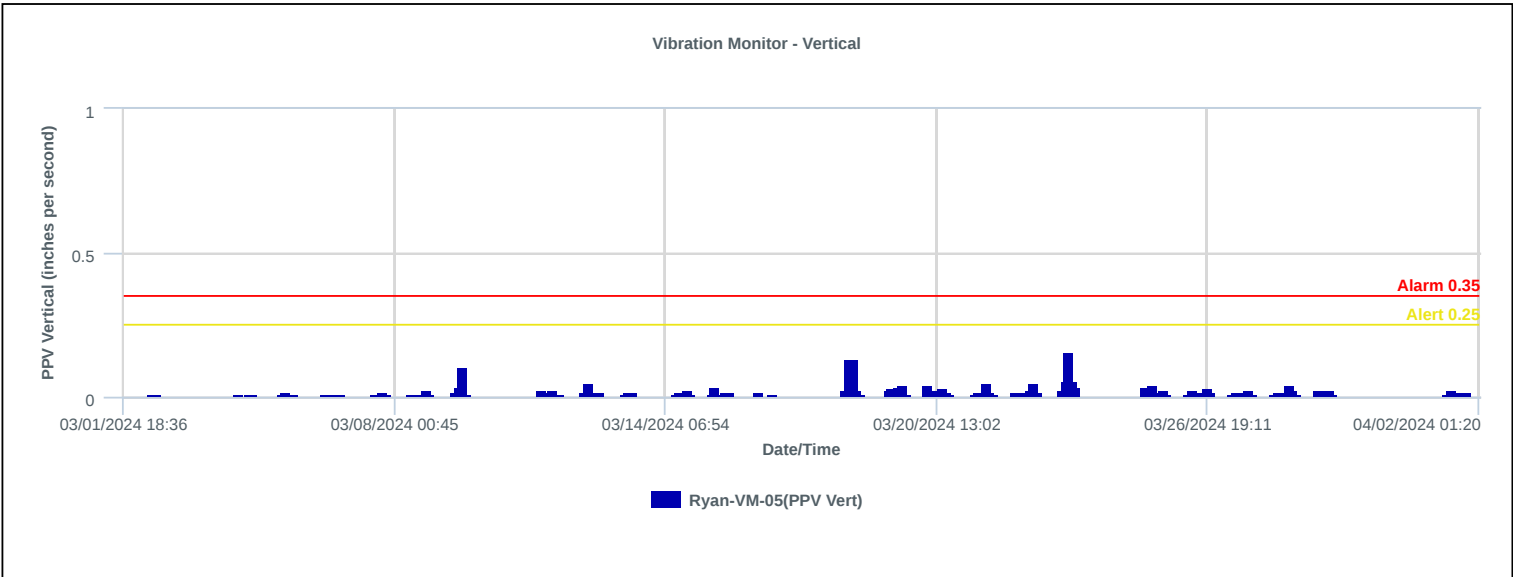
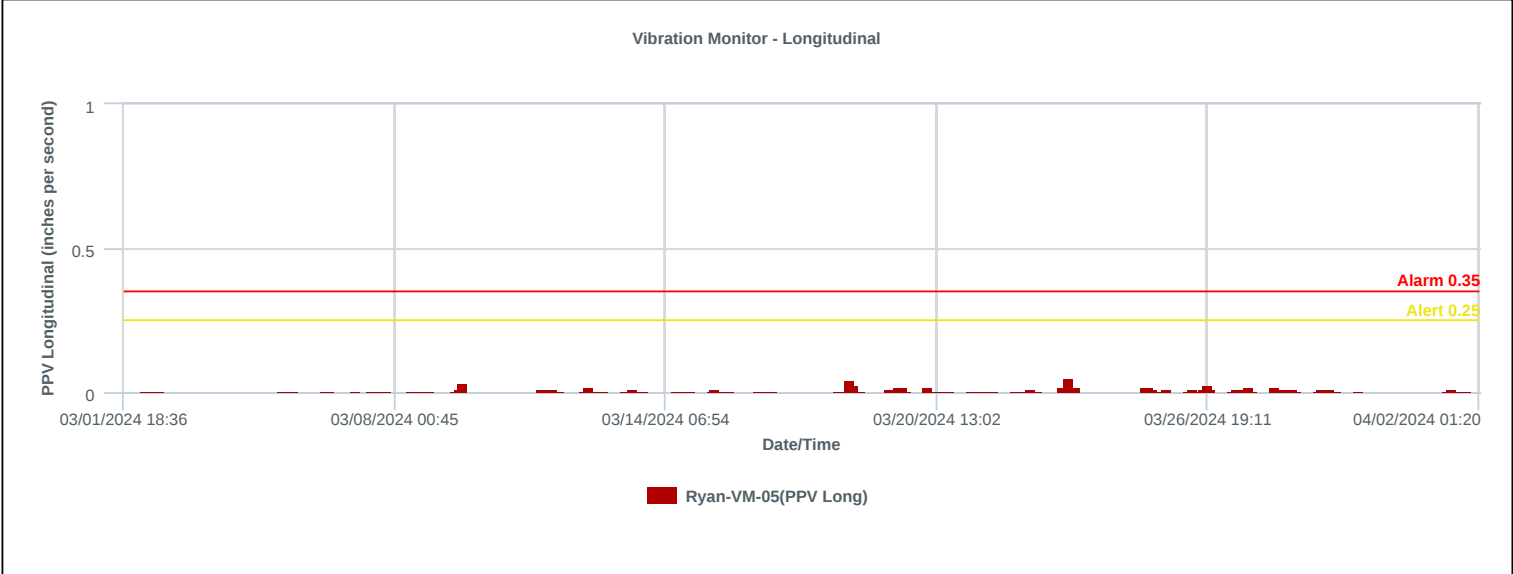
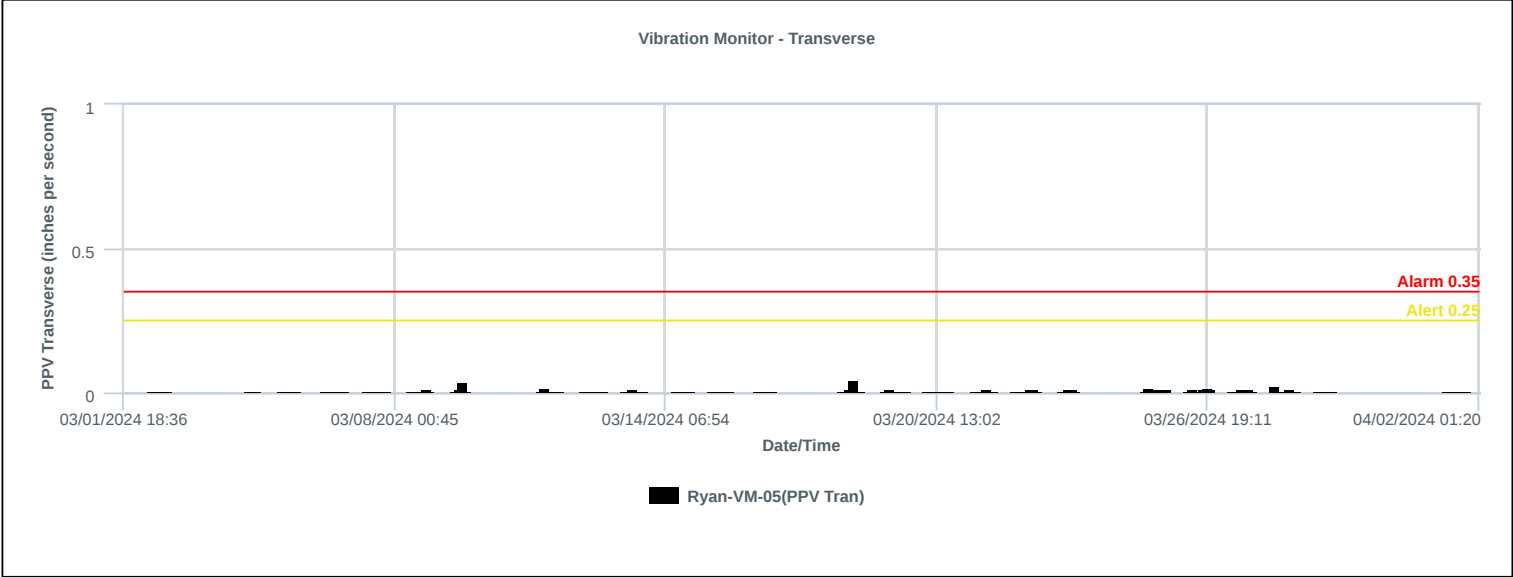
Ryan Field - VM-03



Ryan Field - VM-04



Ryan Field - VM-05



Ryan Field - VM-06

