

Consulting  
Engineers and  
Scientists

July 1, 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. 5 (June 1, 2024, through June 30, 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 Northwest 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 June 1, 2024, and June 30, 2024.

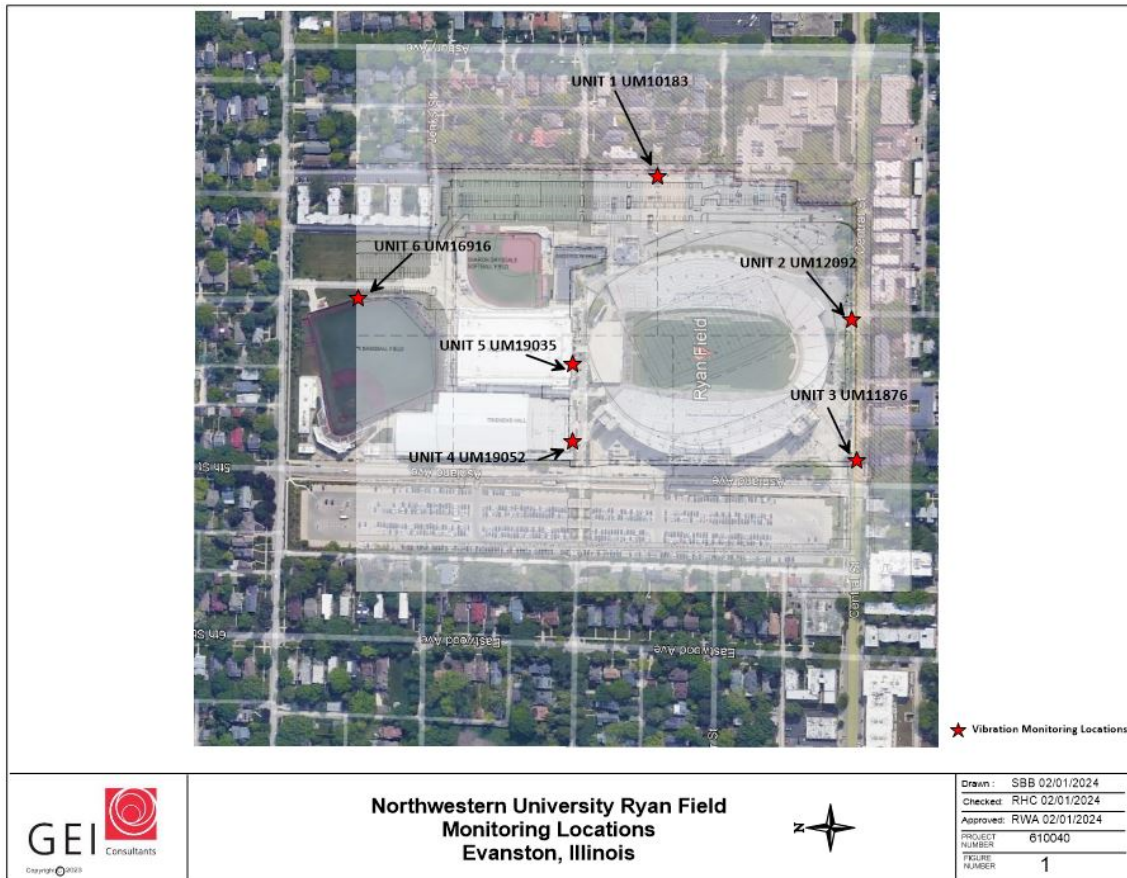
## Project Background

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 21<sup>st</sup> and 24<sup>th</sup>, 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:

<b>Monitor No.</b>	<b>Location</b>
VM-1 UM 10183	East Property Line
VM-2 UM 12092	North Property Line
VM-3 UM 11876	West Property Line
VM-4 UM 19052	Welsh Ryan Arena Mechanical Room
VM-5 UM 19035	Anderson Hall 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 June 1, 2024, and June 30, 2024, the maximum daily vibration levels recorded were as follows:

<b>Vibration Monitor Locations</b>	<b>Maximum Daily Vibration Level Range</b>
VM-1 East Property Line RVM No. UM 10183	0.010 to 0.414 in/sec.
VM-2 South Property Line RVM No. UM 12092	0.010 to 0.144 in/sec.
VM-3 West Property Line RVM No. UM 11876	0.010 to 0.466 in/sec.
VM-4 Welsh Ryan Arena RVM No. UM 19052	0.010 to 0.109 in/sec.
VM-5 Anderson Hall RVM No. UM 19035	0.010 to 0.067 in/sec.
VM-6 North Property Line near Ballfield RVM No. UM 16916	0.010 to 0.216 in/sec.

The vibration levels recorded by the vibration monitors were all below the established project threshold of 0.35 in/sec.

One event at VM-2, six events at VM-3, three events at VM-4, and three events at VM-6 were recorded that were not related to construction activity after the geophone was disturbed during material handling, demobilization preparation, and lawn maintenance near the ballfield. These single triggered events were excluded from the vibration summary for the period of June 1<sup>st</sup> thru June 30<sup>th</sup>, 2024, report.

The vibration data is graphically summarized for the monitoring period between June 1, 2024, and June 30, 2024, in the appendix of this report.

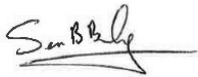
## Conclusion

Based on the 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.

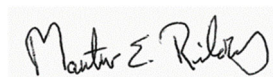
If you have any questions regarding the contents of this report, please do not hesitate to contact Sean Brady at (312) 304-6586.

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**

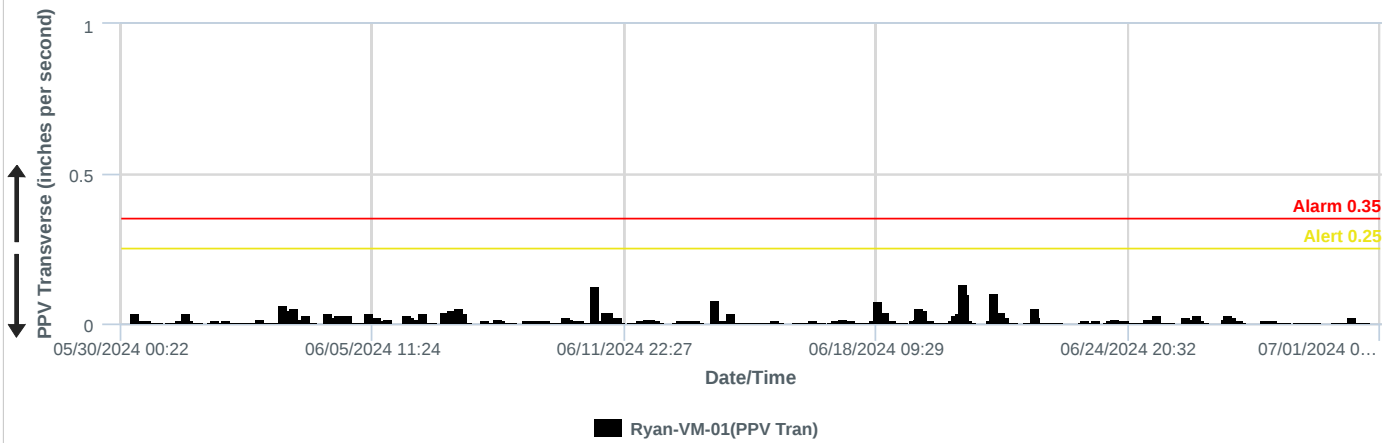
### **Report No. 5**

**June 1, 2024, through June 30, 2024**

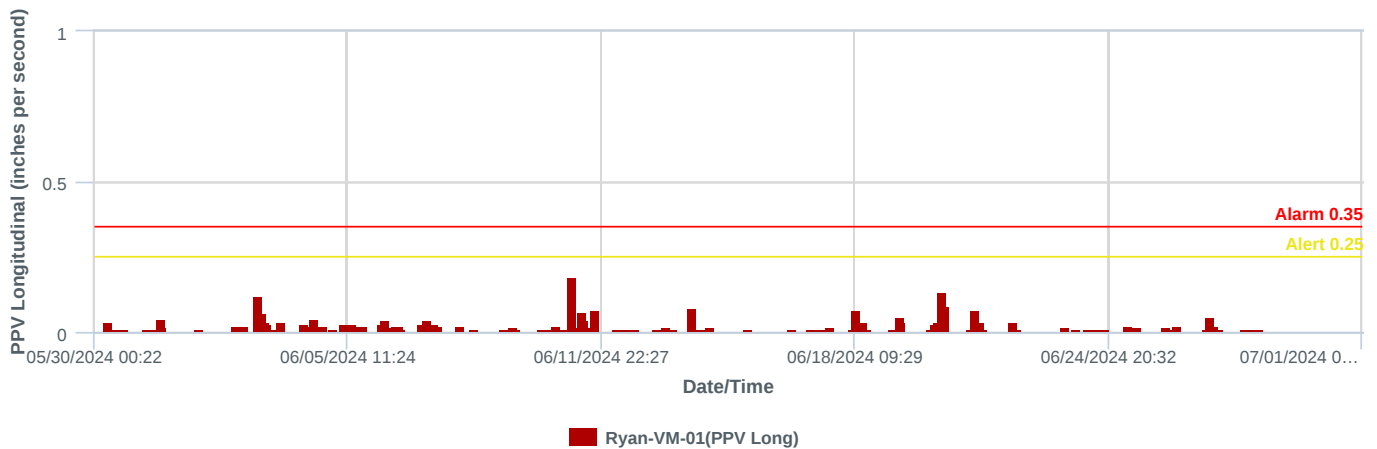
**Northwestern University Ryan Field  
Evanston, Illinois**

Report Title : Ryan Field - VMs  
Report based on : Selected Date range - Last 1 Month from 07/01/2024 00:00

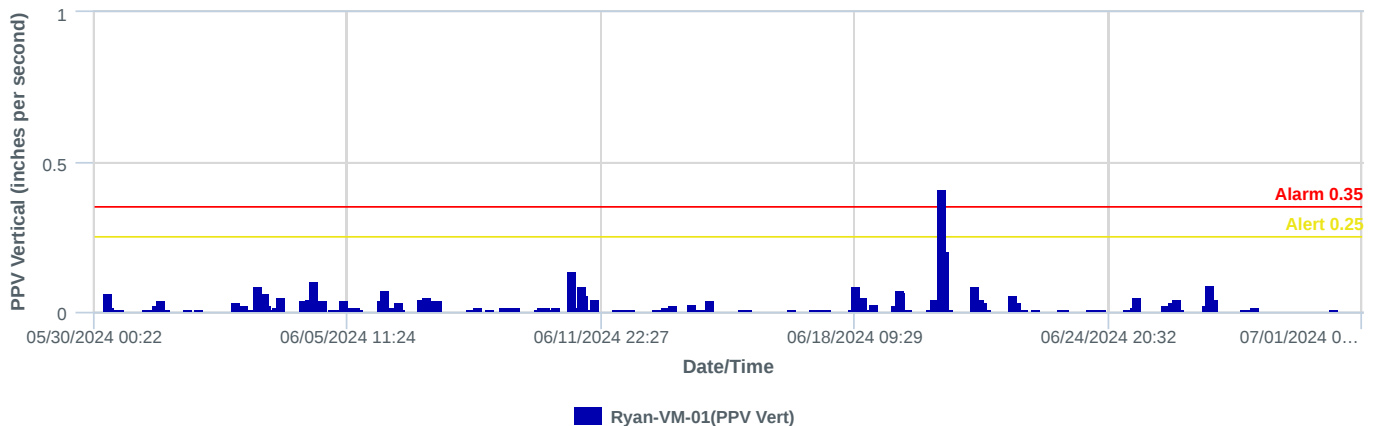
Vibration Monitor - Transverse



Vibration Monitor - Longitudinal

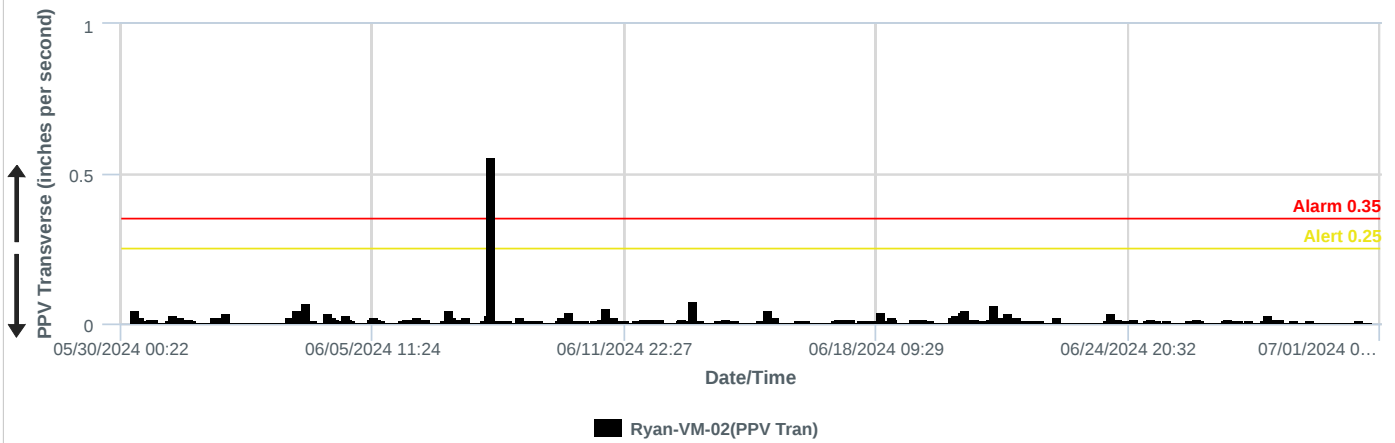


Vibration Monitor - Vertical

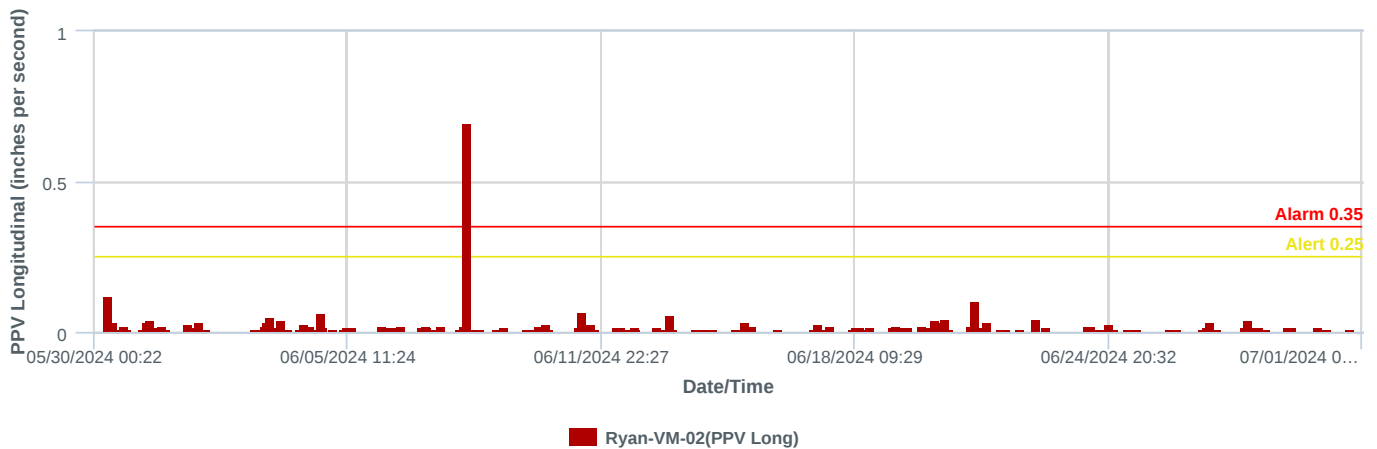


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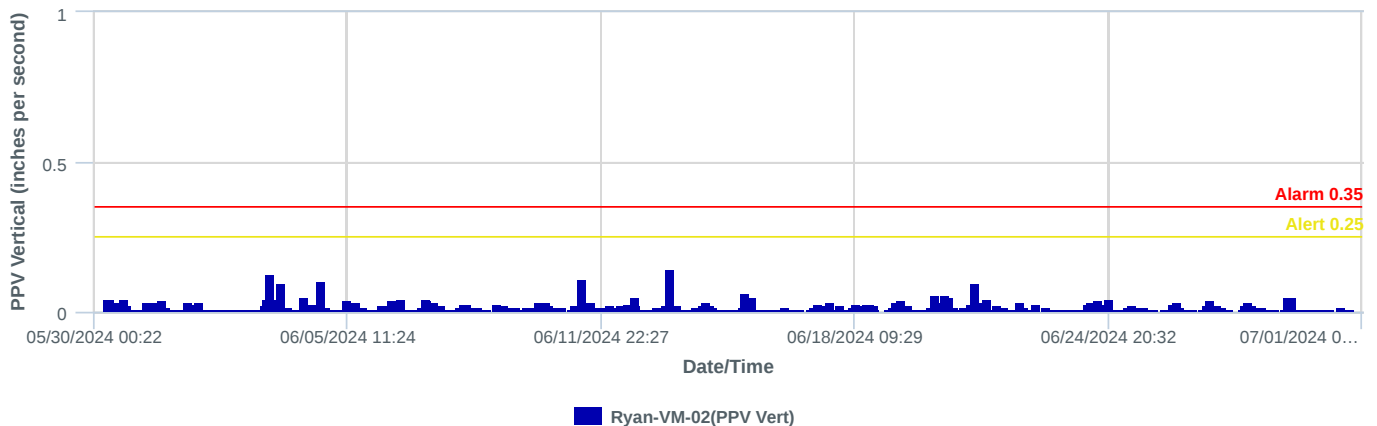
Vibration Monitor - Transverse



Vibration Monitor - Longitudinal

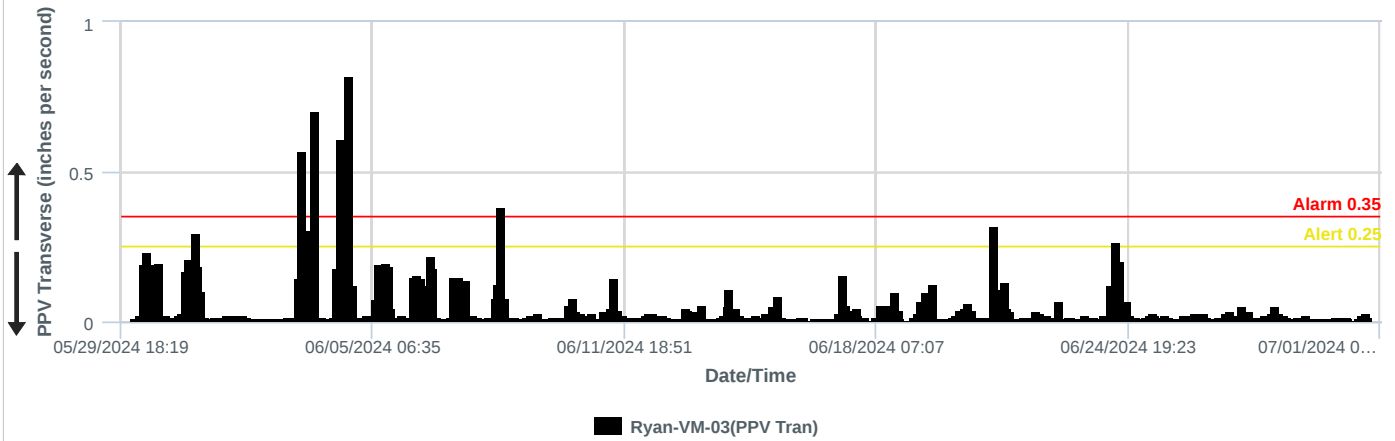


Vibration Monitor - Vertical

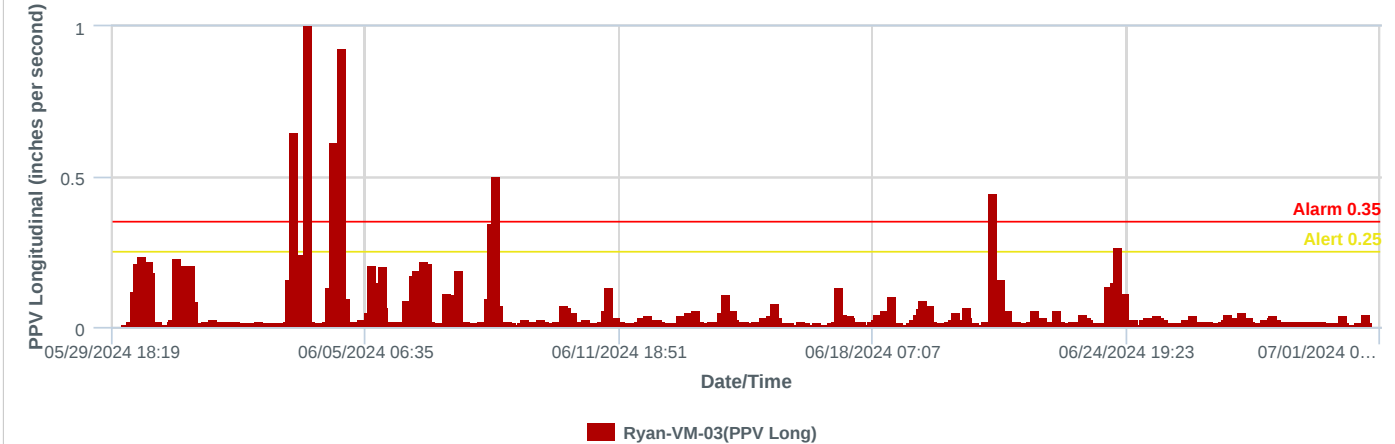


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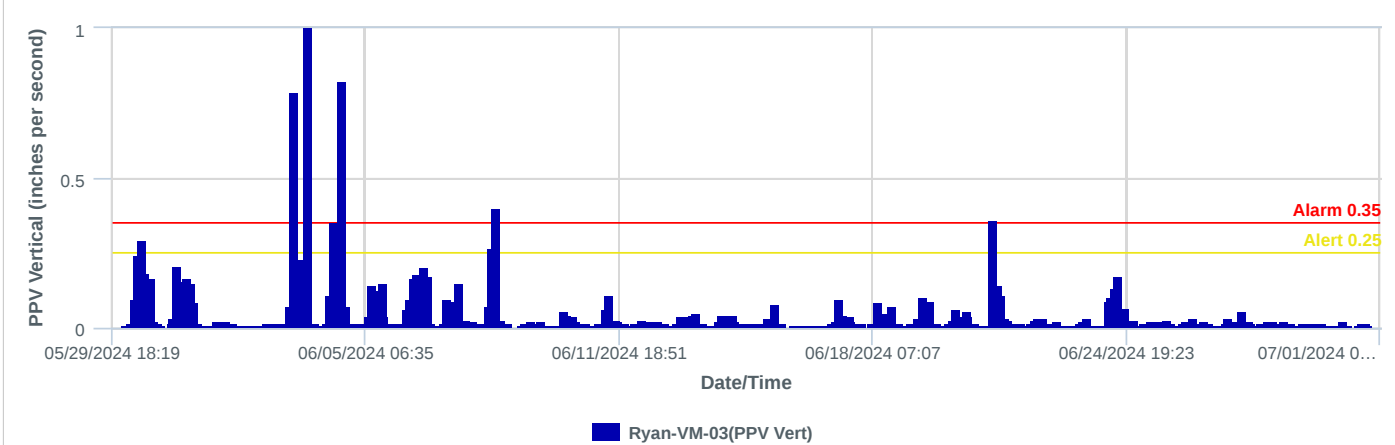
Vibration Monitor - Transverse



Vibration Monitor - Longitudinal

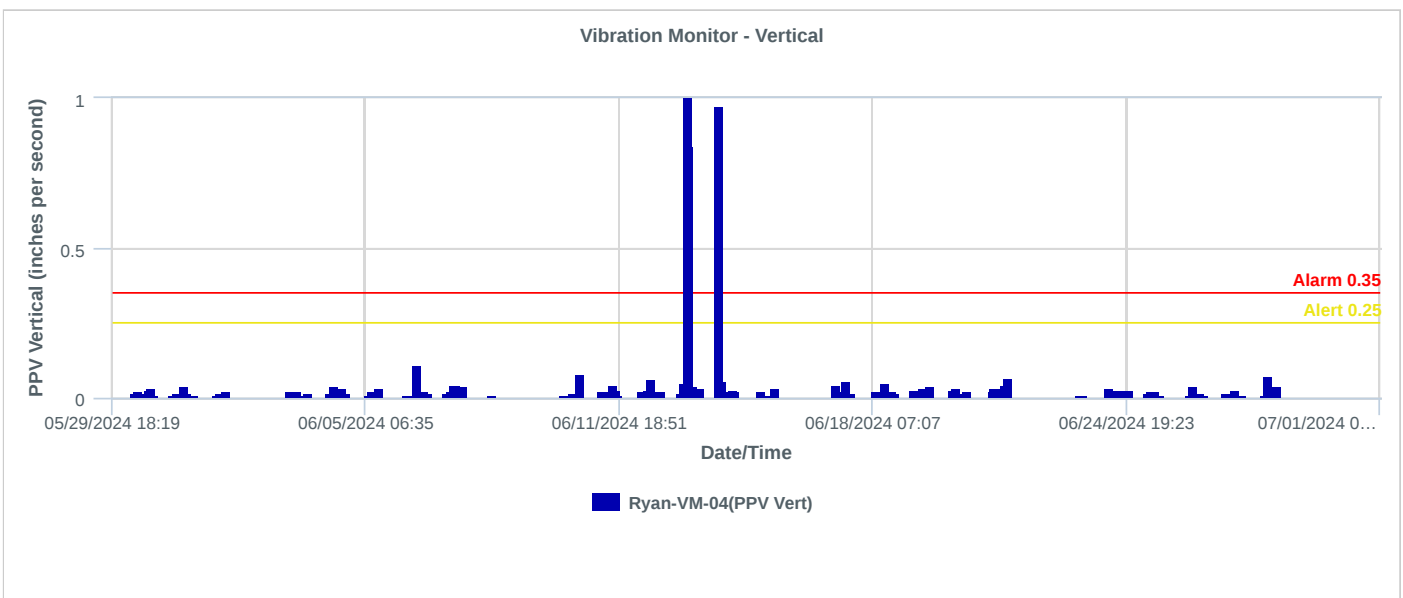
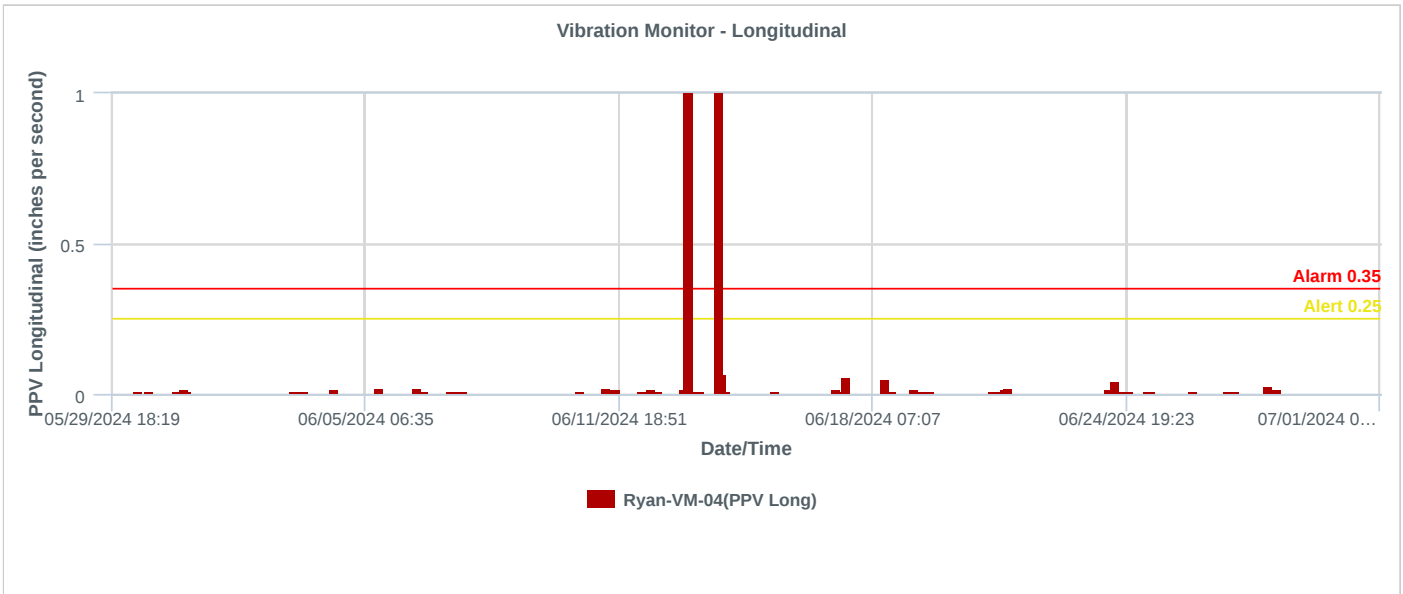
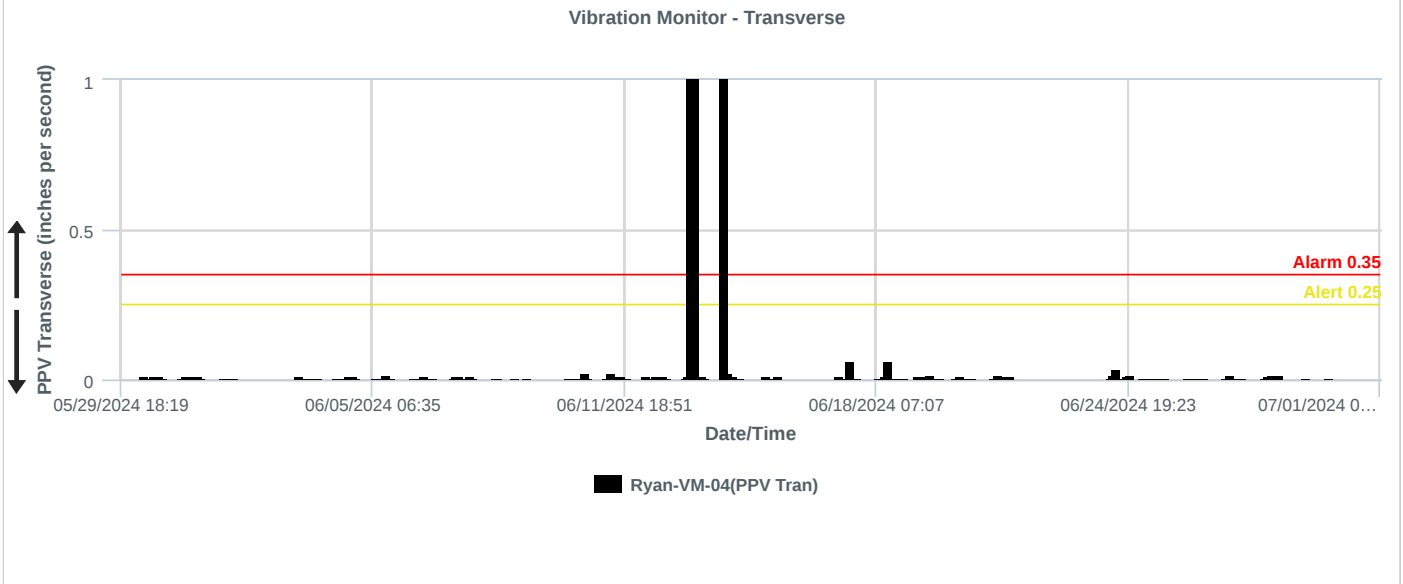


Vibration Monitor - Vertical



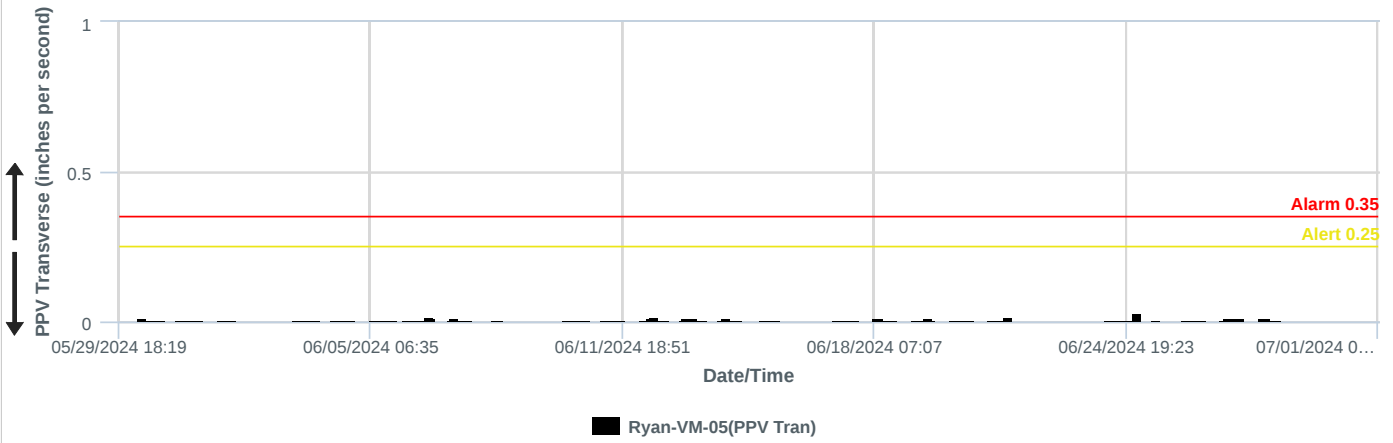


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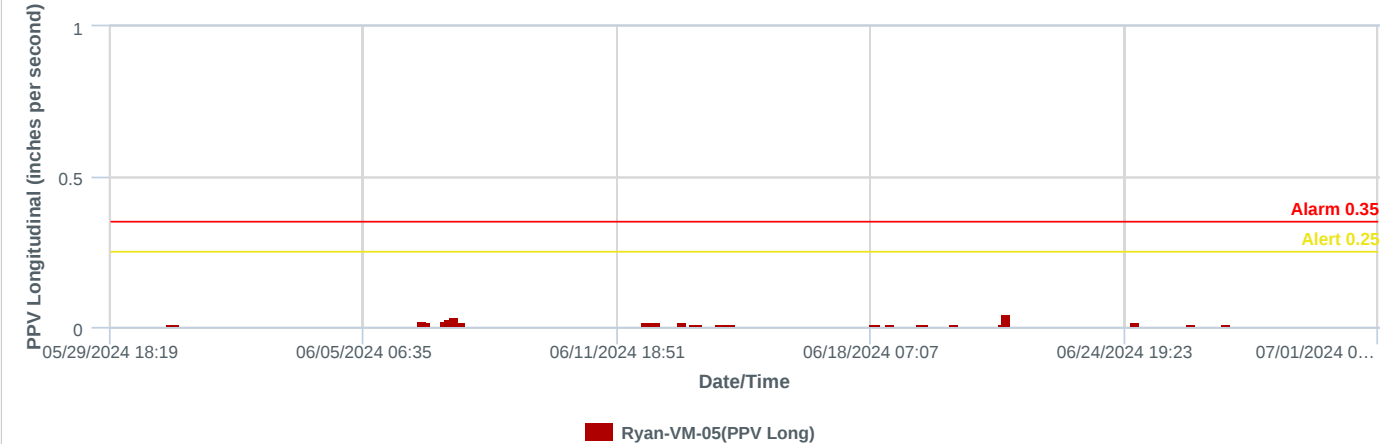


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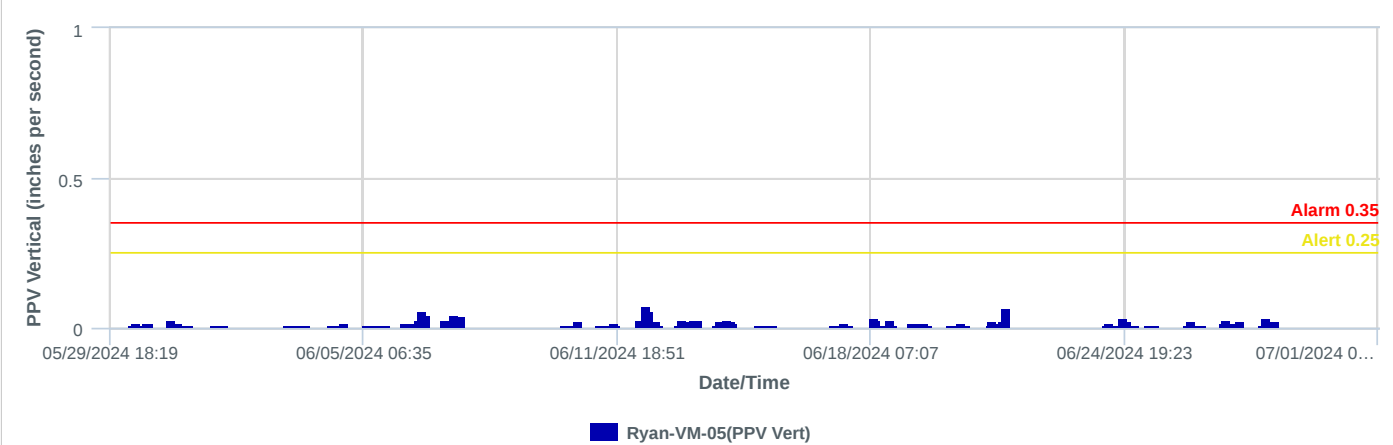
Vibration Monitor - Transverse



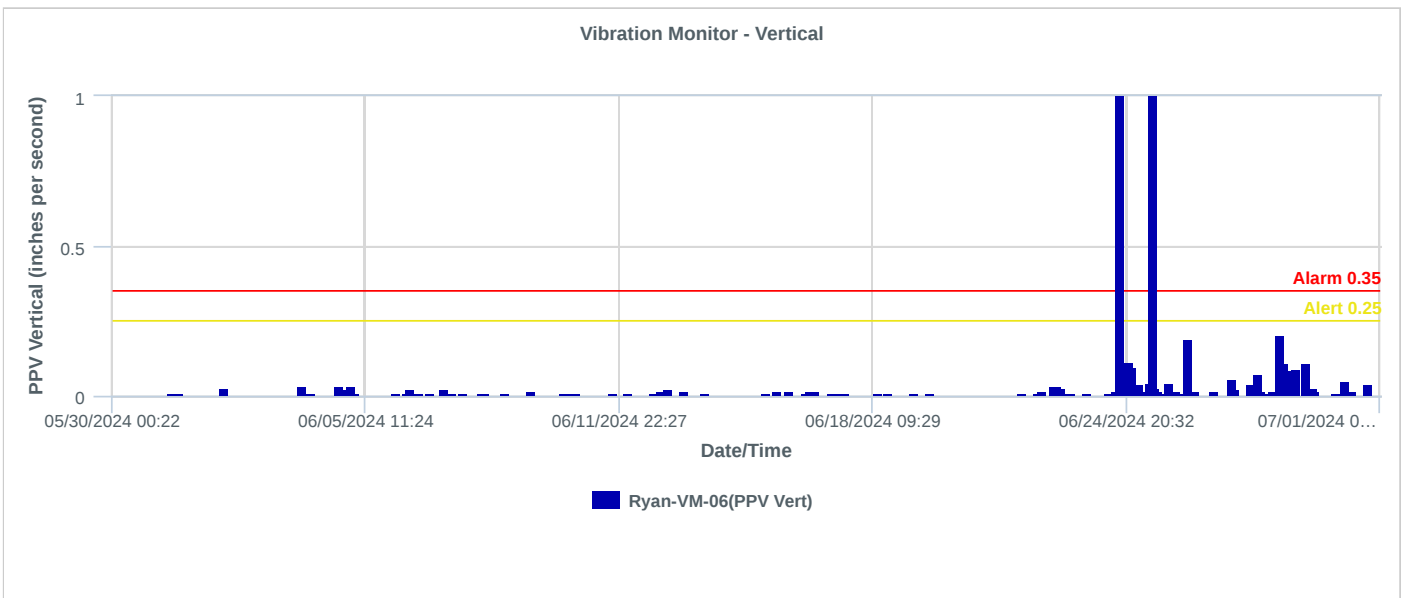
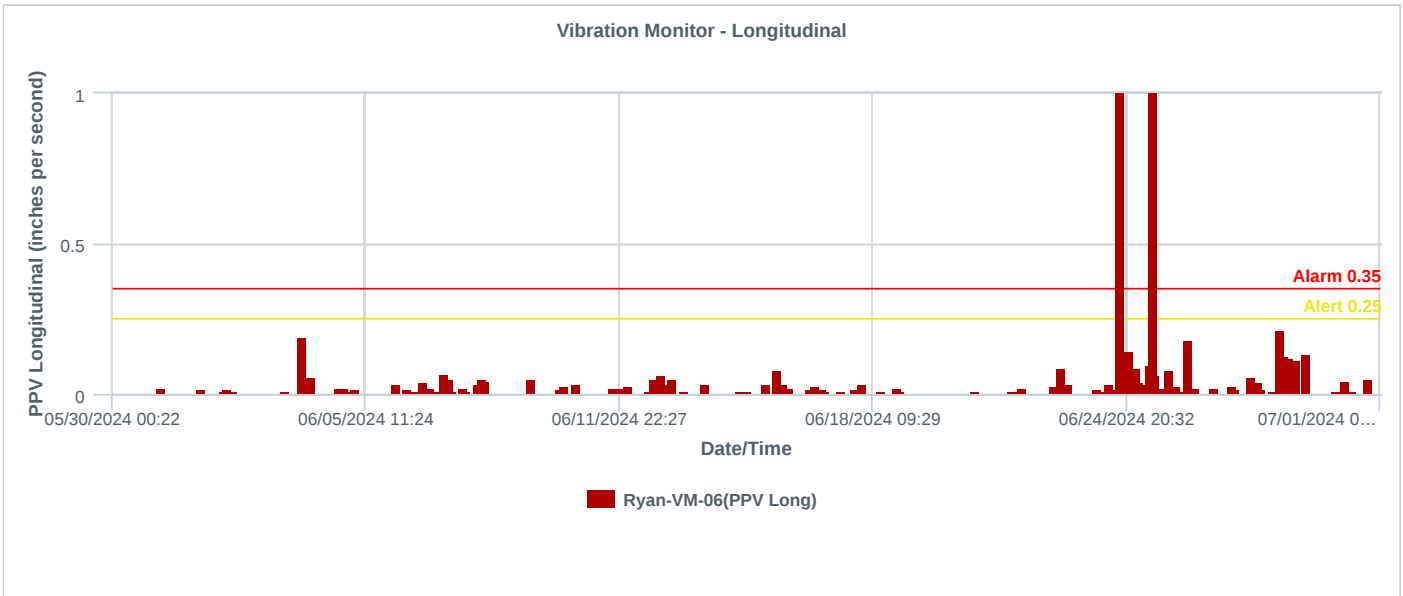
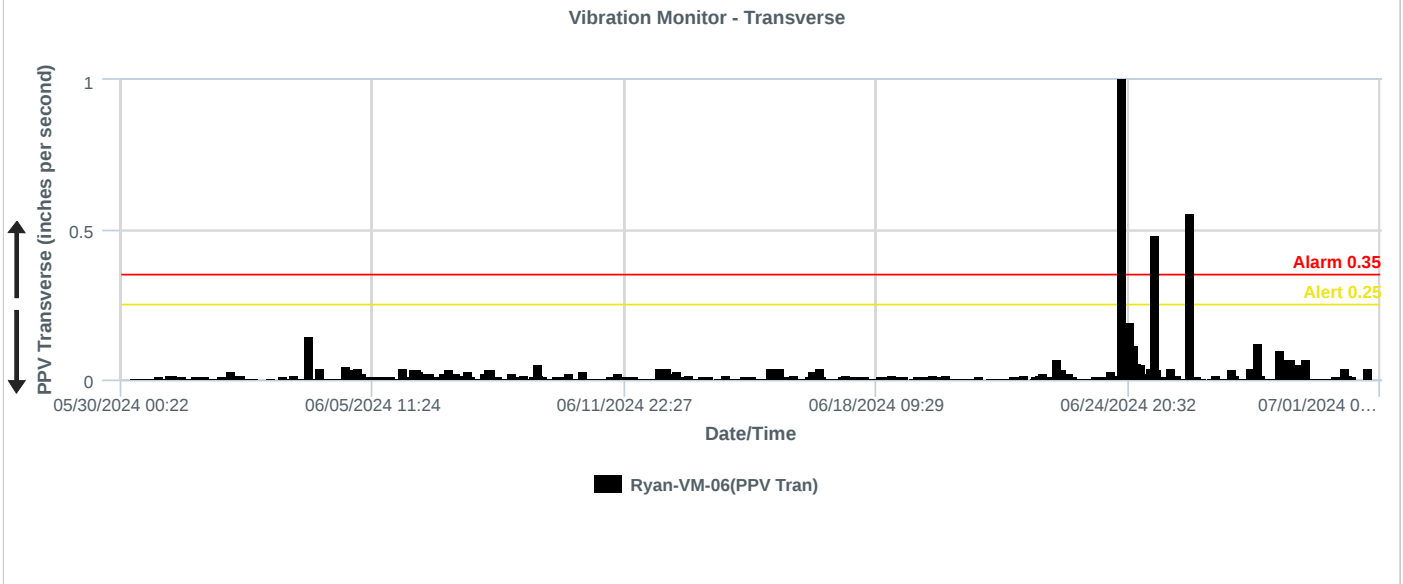
Vibration Monitor - Longitudinal



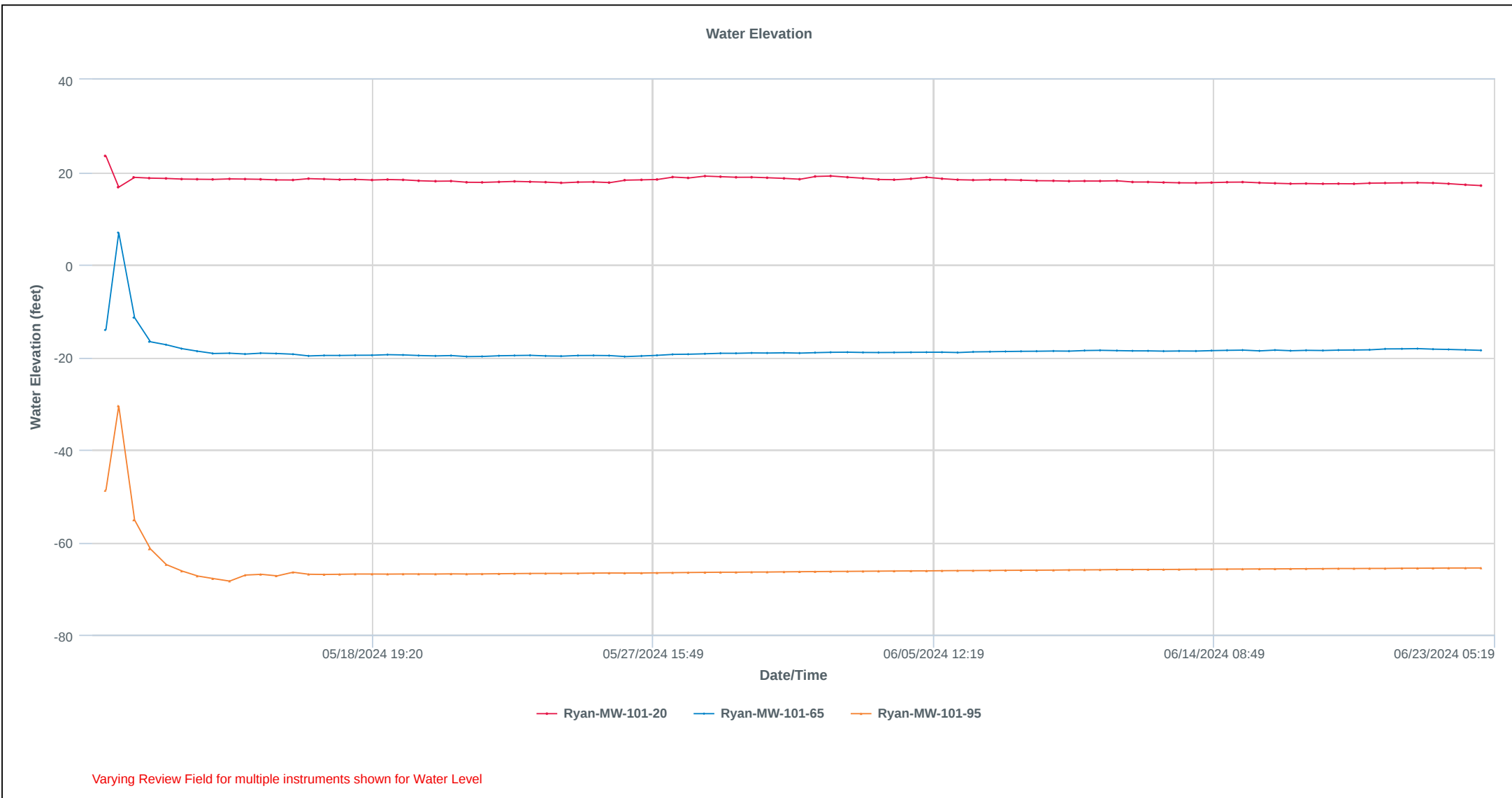
Vibration Monitor - Vertical



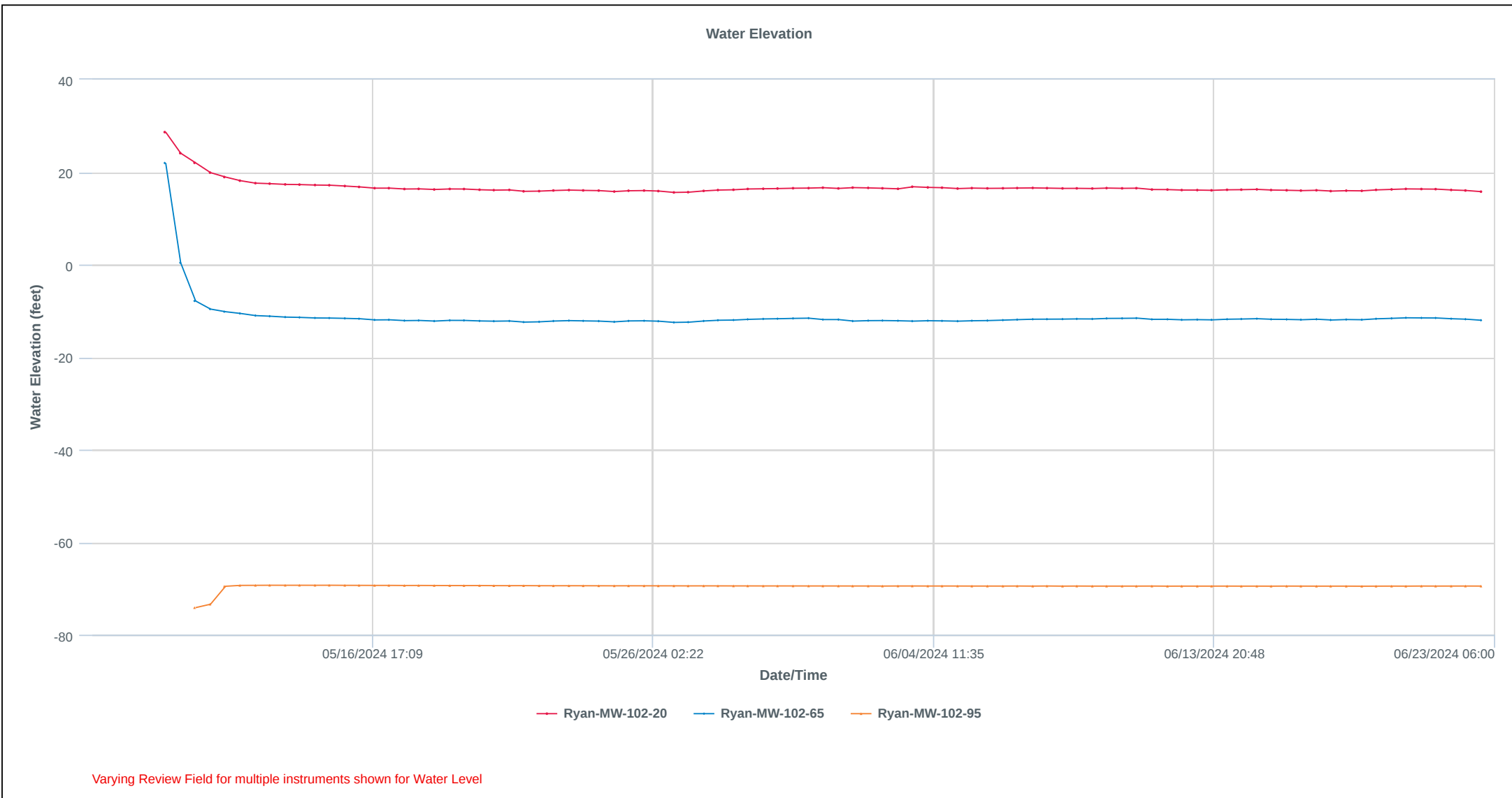
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Ryan Field - MW-101

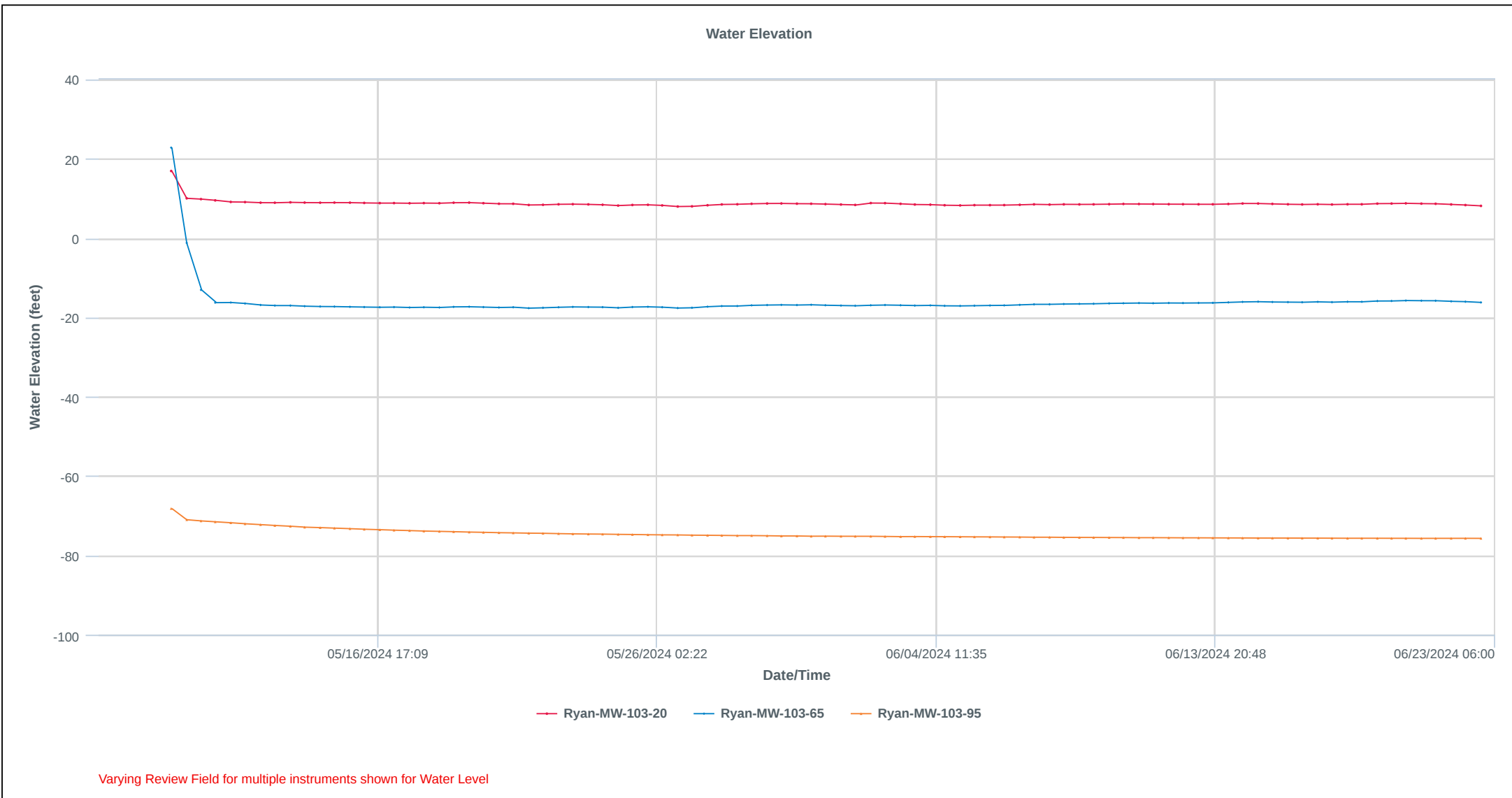


Ryan Field - MW-102

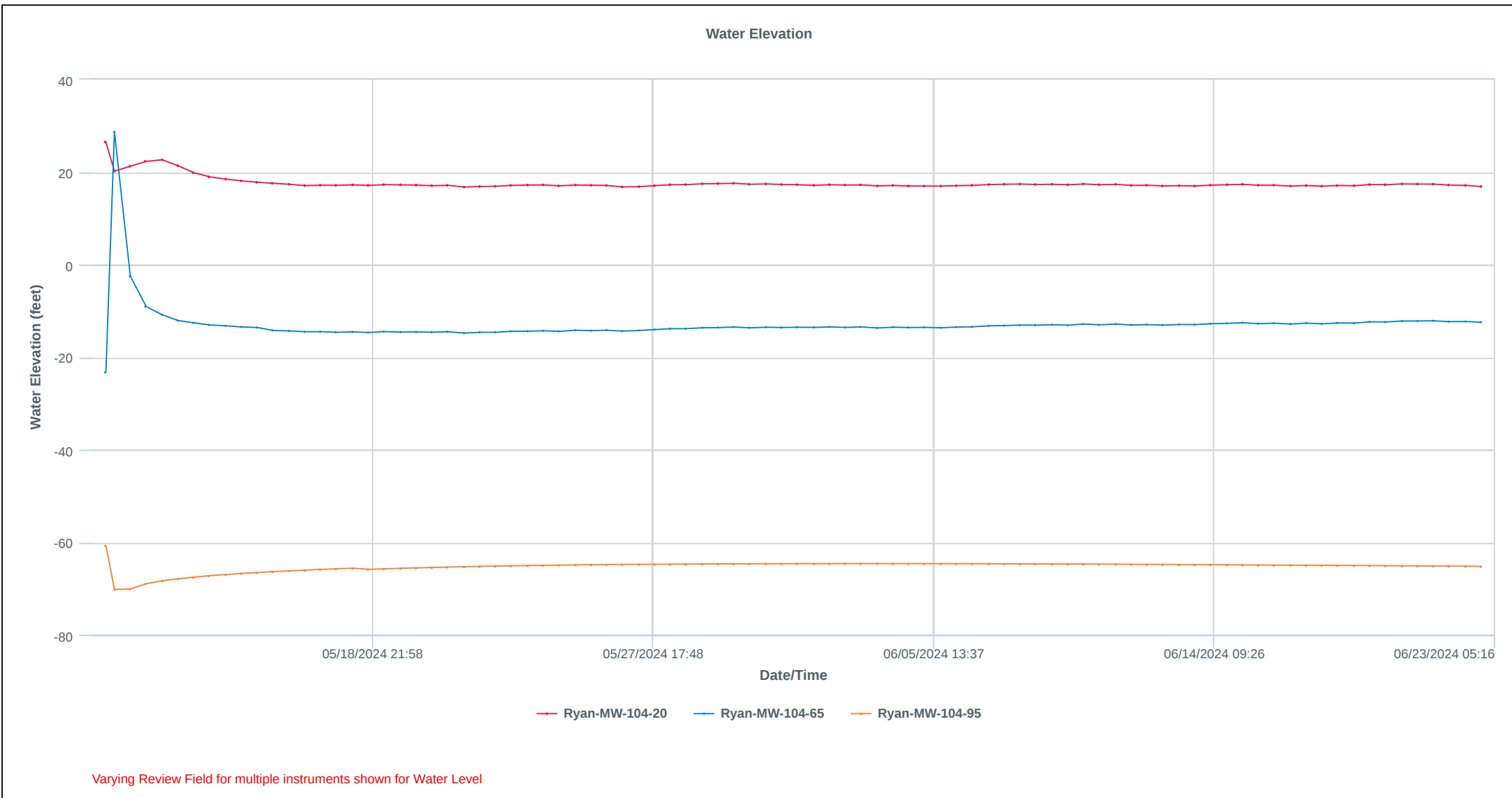


Varying Review Field for multiple instruments shown for Water Level

Ryan Field - MW-103



Ryan Field - MW-104



Ryan Field - MW-105

