PID: 120992 ERI SR 0060 02.27 BI 2026

SCOPE OF SERVICE

PID: 120992 **Project Name: ERI SR 0060 02.27** **State Job Number: 430416**

Work Categories: Preservation- Geotechnical

Project Termini: ERI-60-2.27

Project Description: Instrumentation Maintenance and Monitoring

Project Manager: Kent Kapustar **Legislation Needed:** None

Plan Development Classification: Path 1

Instrumentation Monitoring at the ERI-60-0227 (SFN 2202476) Bridge:

Bridge Number ERI-60-0227 is a two-lane bridge built on SR 60 in 2002 in Florence Township, Erie County, Ohio. The alignment of the bridge required the construction of an 1138-foot long bridge to span the Vermilion River and the pre-existing unstable south slope. The design included 12-foot diameter heavily reinforced drilled shafts socketed 40 feet into rock to top of the shaft to prevent lateral movement of the shaft. With the very large diameter reinforced concrete drilled shafts and high capacity rock anchors; and the uncertainties of design assumptions utilized to predict the factor of safety for the slope stabilization design, ODOT decided to instrument, test, and monitor the behavior of Piers 1 and 2. Details of the instrumentation installed in Piers 1 and 2 are listed in Table 1.

All original earth inclinometers were destroyed or went off range during the initial phase of construction. Any slope movement could no longer be tracked. With this, several additional earth inclinometers were installed to monitor the unstable slope and allow for study of the influence of the movement in the slope on the bridge foundations. Four inclinometers were installed in 2004. The locations of the earth inclinometers are shown in Figure 1. The earth inclinometers were monitored by a consultant as part of a Phase II monitoring contract during the period from December 2004 to May 2006.

Additional monitoring was performed over a 24-month timeframe starting in 2014.The project provided instrumentation check, as-needed maintenance and monitoring of pier movements. A similar contract was executed in 2017 and again in 2023.

The PID 120992 project will be similar to previous contracts and will include the following work:

- Check instrumentation and monitoring devices.

  This task will include visiting the site and checking all the existing instruments and data collection devices. Perform required maintenance. Test the monitoring equipment, and repair, replace and restore equipment and power supply as needed and authorized to make the equipment operational. Work may require providing temporary data logger if repairs are needed to the existing.

- Perform Survey of Existing Pins

  This task will include visiting the site and performing independent survey of the existing pins installed on the substructure units. Consult with ODOT District 3 surveyors to establish the base survey. Perform two surveys, one at the start of the project and one at the end of the 24 months. Survey results report will be submitted to ODOT District 3 within three weeks of the completion of the second survey.

- Data Collection from Existing Instrumentation

  This task will include visiting the site and checking all the existing instruments and data collection devices, replacing the batteries, and collecting data from the data logger. The data logger will be set to collect the data at 2-hour intervals.

  To determine if any movement took place in Piers 1 and 2 or within the ground surrounding the substructure units from the point in time when the last monitoring readings were recorded, an inclinometer reading will be taken using the same devices that were used during construction. Perform sets of readings from each inclinometer after 6 months, 12 months, 18 months, and 24 months from the start of the project. Collect the data from the data logger every 3 months. Specific readings include:

  - Read and collect data for Slope Inclinometers B-6, B-7 and B-8.
  - Read and collect data for the two Inclinometers installed in each of Pier #1 and Pier#2 shafts at. Four total.
  - Collect data for the Vibrating wire Strain Gages located in Pier #1 shaft.
  - Collect Load Cell data and Tiltmeters data for Pier#1.

- Data Reduction and Processing

  This task will include reducing the collected data after every collection of data from the data logger and after each set of readings from the inclinometers. The data will be processed, and progress plots will be prepared to show the variation of measurements during the period collected.

  At the end of the contract, provide ODOT electronic files of the various plots (preferably Excel format) for incorporation into future maintenance contracts.

- Data Interpretation and Report Preparation

  An annual report including the plots and a summary of the findings from the first year of monitoring will be submitted to ODOT three weeks after the data is collected after the one-year reading. It will include the plots of the data for the first year and will include the first-year data combined with the data from the end of the original construction to present. The report narrative will include a discussion/summary of the data/findings, recommendations, and the newly collected data. Two hard copies of the report and an electronic copy will be submitted to ODOT District 3.

A final report will be prepared at the end of the monitoring to document the findings of the monitoring and to provide a summary of the results. The report will include the plots of the data for the 24 months and updated plots including the data at the end of construction. Detailed engineering analyses will be included in the report to show the variation of the forces and movements. The report will discuss observed trends in the collected data. Recommendations will be included to direct future efforts for monitoring. Two hard copies of the report and an electronic copy will be submitted to ODOT District 3.

Reports shall be prepared in a manner similar to the previously published monitoring reports.

Project Schedule:

The Department anticipates the project duration to be 25 months. After notice to proceed, perform the initial existing instrumentation verification, perform repairs as-needed, and collect data. Consultant will check the data logger and collect the data every 3 months. Six months after the start of monitoring, and every six months after, the consultant will perform a set of inclinometer readings. An interim report will be submitted within three weeks after the end of first year data is collected. A final report will be submitted one month after the 24-month reading is performed. Work shall not begin until October, 2026.

Table 1: Existing Instrumentation used at ERI-60-0227 Bridge

Sensor Model	Quantity
Vibrating wire Sister Bar strain gage Geokon 4911 25 gages each with 75' cable length 25 gages each with 120' cable length	50
Load cell Geokon 4900 Cable length = 40'	3
Bi-axial Tiltmeter Geokon 6350 Cable length = 40'	1
8 Inclinometer Geokon 6500 with bottom and top caps: 2 installed in Pier 1 (88' deep each) 2 installed in Pier 2 (82' deep each) B-5 and B-6 installed by Rear Abutment (138' deep each) B-7 installed by Pier 1 (96' deep each) B-8 installed by Pier 2 (98' deep each)	B-5 thru B-8 are earth inclinometers installed close to the substructure units
Data Acquisition System, Geokon 8020	1
Multiplexer, Geokon 8032	5
12-Volt Marine Battery for Data Acquisition Power	2
Control Box to House Datalogger and Multiplexers	1

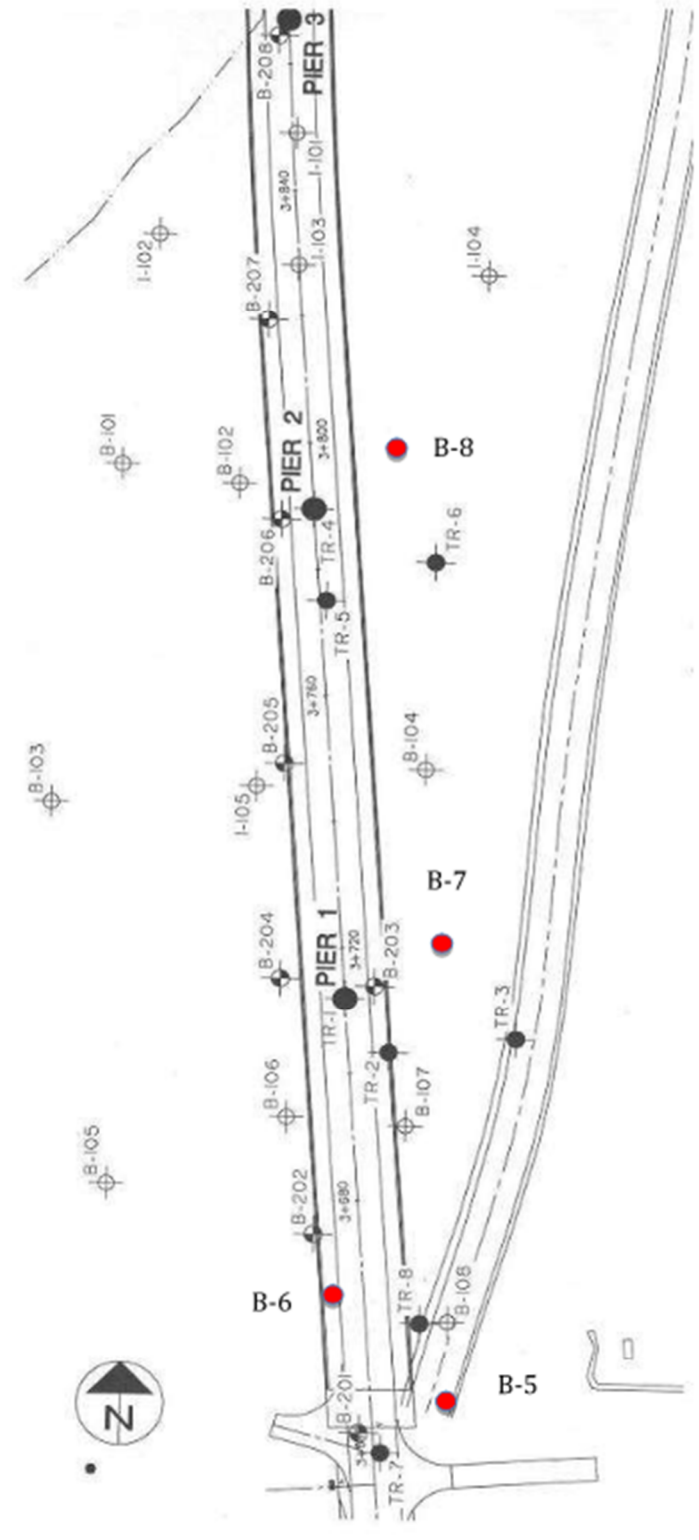

Figure 1: Locations of Existing Earth Inclinometers Installed (Red Circles)