

INTEROFFICE COMMUNICATION

TO: Andrew Moreland, P.E., District Geotechnical Engineer, District 10
FROM: Andrew Jalbrzikowski, Office of Geotechnical Engineering
Paul Painter, Office of Geotechnical Engineering
DATE: December 8, 2023
SUBJECT: WAS-77-9.58 PID 113235 Existing Culvert Geophysical Exploration Summary

Pursuant to your request, the Office of Geotechnical Engineering (OGE) has completed two electrical resistivity (ER) surveys and one induced polarization (IP) survey for the subject project. This exploration effort follows a geophysical and conventional exploration completed by OGE in November and December of 2022. These previous explorations focused on the subsurface conditions present along the roadway and eastern side of the embankment fill. The results of those exploration efforts are detailed in an IOC dated January 10, 2023.

In July 2023, three additional borings were completed by HDR and Central Star Drilling. Borings B-005-0-23, B-006-0-23, and B-007-0-23 were completed from July 12 to July 17, 2023. Claystone bedrock was encountered at elevation 810.2 in B-005-0-23, at elevation 804.8 in B-006-0-23, and at elevation 814.7 in B-007-0-23. The claystone was described as highly to severely weathered and very weak. Moisture testing indicates the claystone and overlying soils have similar moisture content.

In October 2023, district personnel requested additional geophysical testing to confirm the location of the existing corrugated steel culvert. The exact alignment of the culvert is unknown but is believed to have been constructed as a straight run from the east side inlet through much of the embankment. Mid-slope on the western side of the embankment the pipe makes a bend allowing it to discharge further to the south. The following is a discussion of the field exploration and results of the geophysical exploration. The latitude, longitude, and elevation values used to create the ER and IP profiles are from a Trimble R6 Receiver and TSC3 data collector utilizing the ODOT VRS network. The geophysical field work was completed on November 14, 2023.

The ER data was collected with an Advanced Geosciences Inc. (AGI) SuperSting R8 control unit. For each ER survey, twenty-eight electrodes were spaced approximately 5 feet apart. The second ER survey was completed below the suspected location of a joint and change of angle in the culvert. The suspected location of the joint was marked in the field by district survey personnel. The third ER and IP survey was completed above the joint. The electrodes of both survey lines were used to measure the potential field with Dipole-Dipole and Strong Gradient Arrays. For the third survey, chargeability was measured one second after the measurement of the potential field. The data was processed, and surface elevation corrected using AGI's EarthImager 2D software. Inverted resistivity sections for both survey lines and the induced potential section for survey line three are attached.

The locations of the survey lines and the existing alignment from the survey basemap are shown on the attached exploration plan. ER survey line 2 indicates two localized low resistivity areas south of the existing culvert alignment, but at a much shallower depth than what was expected for the culvert. ER survey line 3 indicates one localized low resistivity area south of the existing culvert alignment, also at shallower depth than expected. The induced potential section shows a higher chargeability zone in the same low resistivity area, but it is not localized.


Attached are a site plan, resistivity sections, and IP section.


If you have any questions, please feel free to contact me at 614-275-1305.

Thank you,


AMJ


Attachments: Site plan & geophysical exploration results


 OGE 2022 Borings

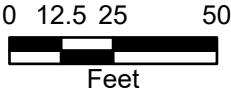
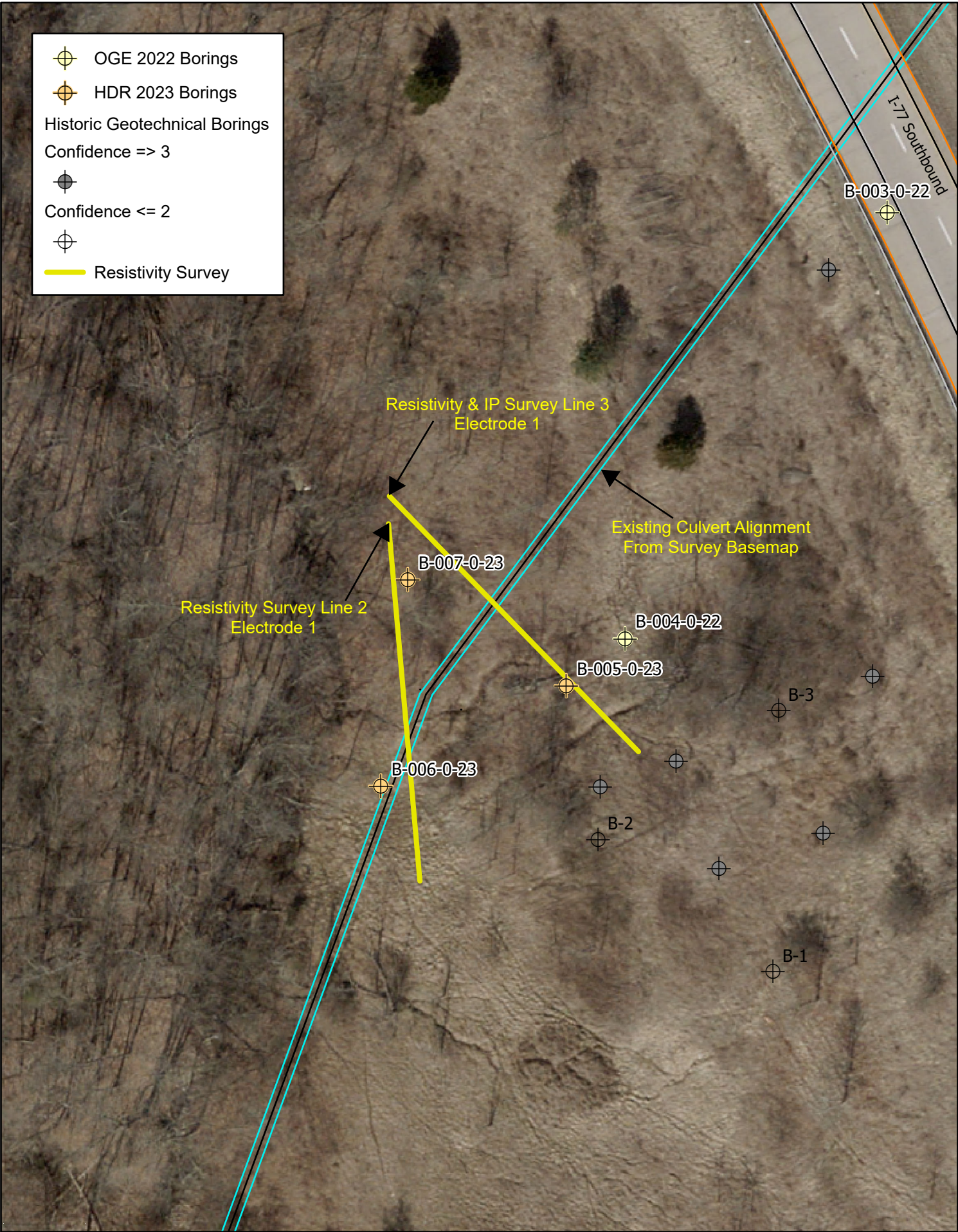
 HDR 2023 Borings

Historic Geotechnical Borings

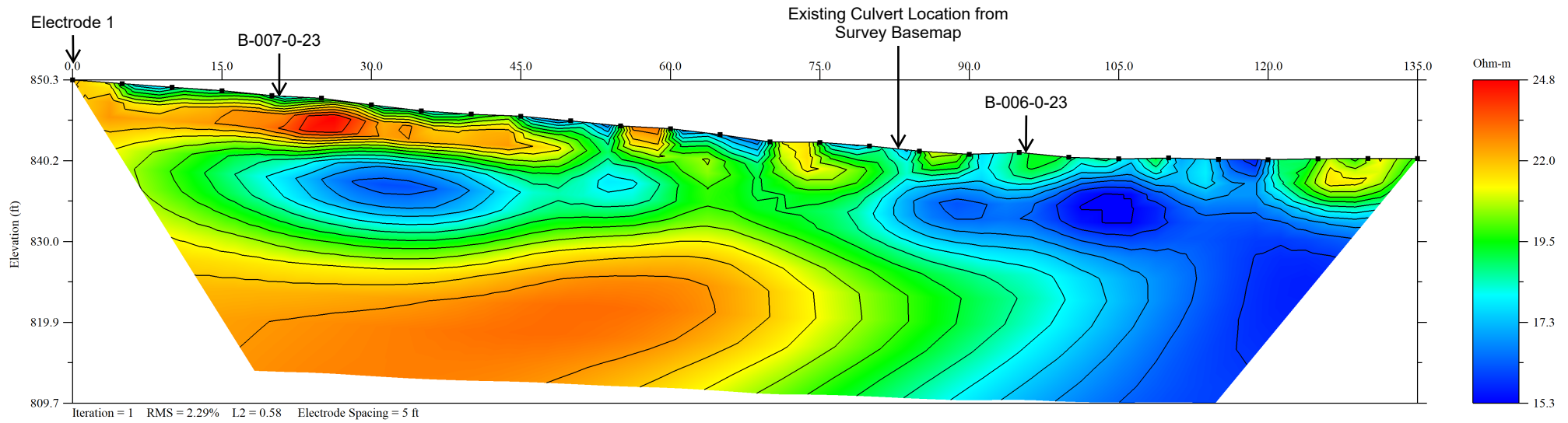
Confidence \Rightarrow 3
 

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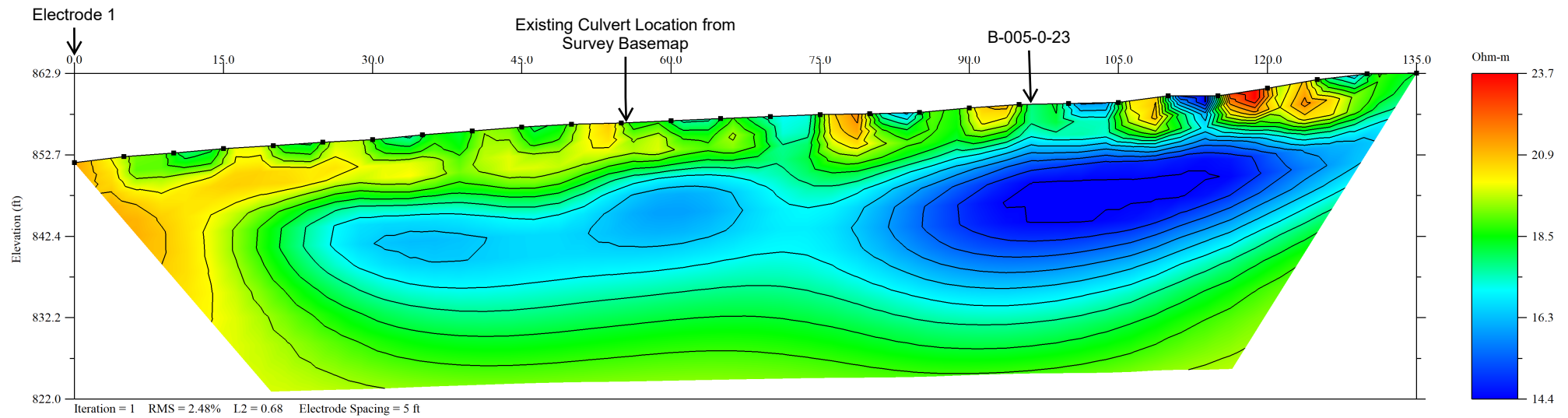
 Resistivity Survey



WAS-77-9.58 ER Survey Line 2 Inverted Resistivity Section



WAS-77-9.58 ER Survey Line 3 Inverted Resistivity Section



WAS-77-9.58 ER Survey Line 3 Induced Polarization Section

