

Bedrock Elevation of the Berne, Domestic, Geneva, and Willshire 7.5-Minute Quadrangles, Indiana-OHIO

TODD A. THOMPSON, STATE GEOLOGIST

By

Robin F. Rupp, Donald C. Tripp, José Luis Antinao, Henry M. Loope, and Matthew R. Johnson
 Indiana Geological and Water Survey
 Thomas A. Nash and Tyler A. Norris
 Ohio Department of Natural Resources, Division of Geological Survey

2021

EXPLANATION

This map provides updated bedrock topography for the eastern extent of the Lafayette Bedrock Valley System in Indiana (Bruns and others, 1985a, b, c; Bleuer, 1989, 1991; Bruns and others 1985; Bruns and Steen, 2003). The map was generated by combining new horizontal-to-vertical spectral ratio (HVSRR) passive seismic measurements with archived data sets housed at the Indiana Geological and Water Survey (oil and gas records, seismic refraction data, and gamma logs) and the Indiana Department of Natural Resources (water-well data). Data from the Ohio portion of the Willshire 7.5-minute quadrangle are housed with the Ohio Geological Survey and include new HVSRR data and archived water-well, geotechnical borehole, and oil- and gas-well data.

Using three MoBo Tronine 3G tomograph units, we collected HVSRR data (n=253) to supplement 903 archived depth to bedrock data points across the Berne, Domestic, Geneva, and Willshire 7.5-minute quadrangles. Collection time was between 16 and 20 minutes with a 128 Hz sampling window at each site, and the peak resonant frequency (Hz) was calculated using Grilla software (v. 8.0, MoBo). Criteria delineated in SESAME (2004) were used to screen the quality of HVSRR data points. Twenty-two calibration sites were used to create a calibration curve, where a correlation was made between peak resonant frequency (Hz) and depth to bedrock from sites where depth to bedrock is known from archived data sources (mainly oil and gas wells and water wells). Bedrock contours (50-ft interval) were manually drawn in ArcGIS based on all available data points and geological knowledge.

This mapping product was a collaborative effort between the Indiana Geological and Water Survey and the Ohio Department of Natural Resources, Division of Geological Survey. This map was funded in part by the Great Lakes Geologic Mapping Coalition program supported by the U.S. Geological Survey under Cooperative Agreement No. G19AC00321.

REFERENCES

- Brunn, N. K., 1989, Historical and geomorphic concepts of the Lafayette Bedrock Valley System (so-called Teays Valley) in Indiana: Indiana Geological Survey Special Report 46, 11 p.
- Brunn, T. M., Logan, S. M., and Steen, W. J., 1985b, Map showing bedrock topography of the Teays Valley, central part, north-central Indiana: Indiana Geological Survey Miscellaneous Map 43, scale 1:100,000.
- Brunn, T. M., Logan, S. M., and Steen, W. J., 1985c, Map showing bedrock topography of the Teays Valley, eastern part, north-central Indiana: Indiana Geological Survey Miscellaneous Map 42, scale 1:100,000.
- Nash, A., and Norris, T., 2020, BT_CONTOURS_OH.SHP: Bedrock contours created in Ohio: 1:24,000 line shapefile, Ohio Department of Natural Resources, Division of Geological Survey.
- SESAME Team, 2004, Guidelines for the implementation of the H/V spectral ratio technique on ambient vibrations—measurements, processing, and interpretation: SESAME European Research Project, WP12 – Deliverable D23.12, European Commission – Research General Directorate Project No. EVG1-CT-2000-00026.

Bedrock boreholes (elevations in feet)

- Petroleum record
- Water well

Geophysical data
Horizontal to vertical spectral ratio seismic data

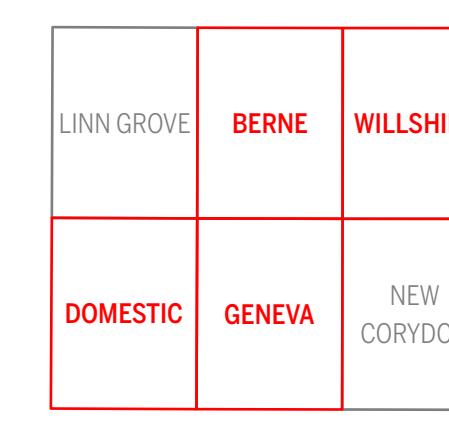
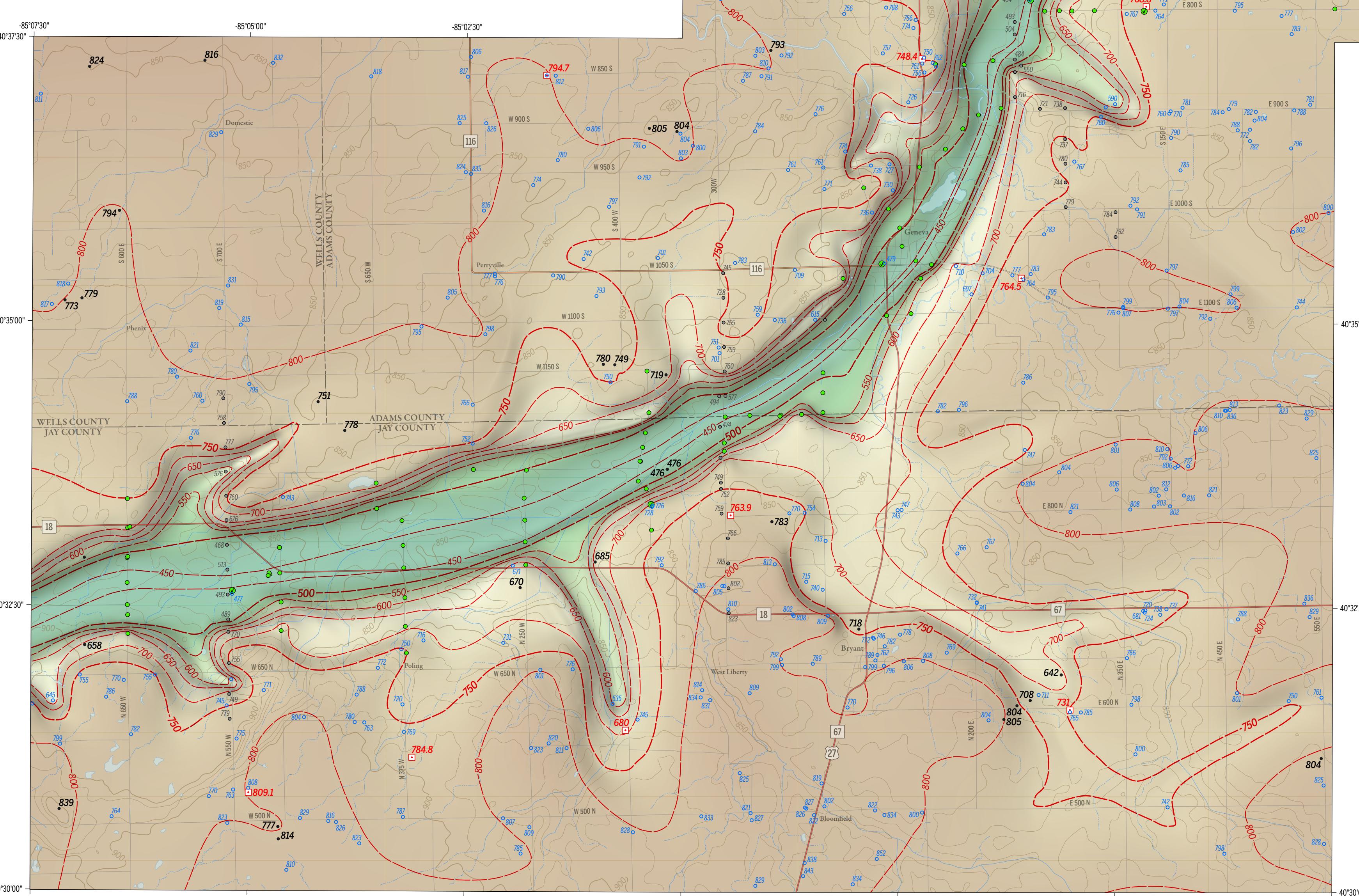
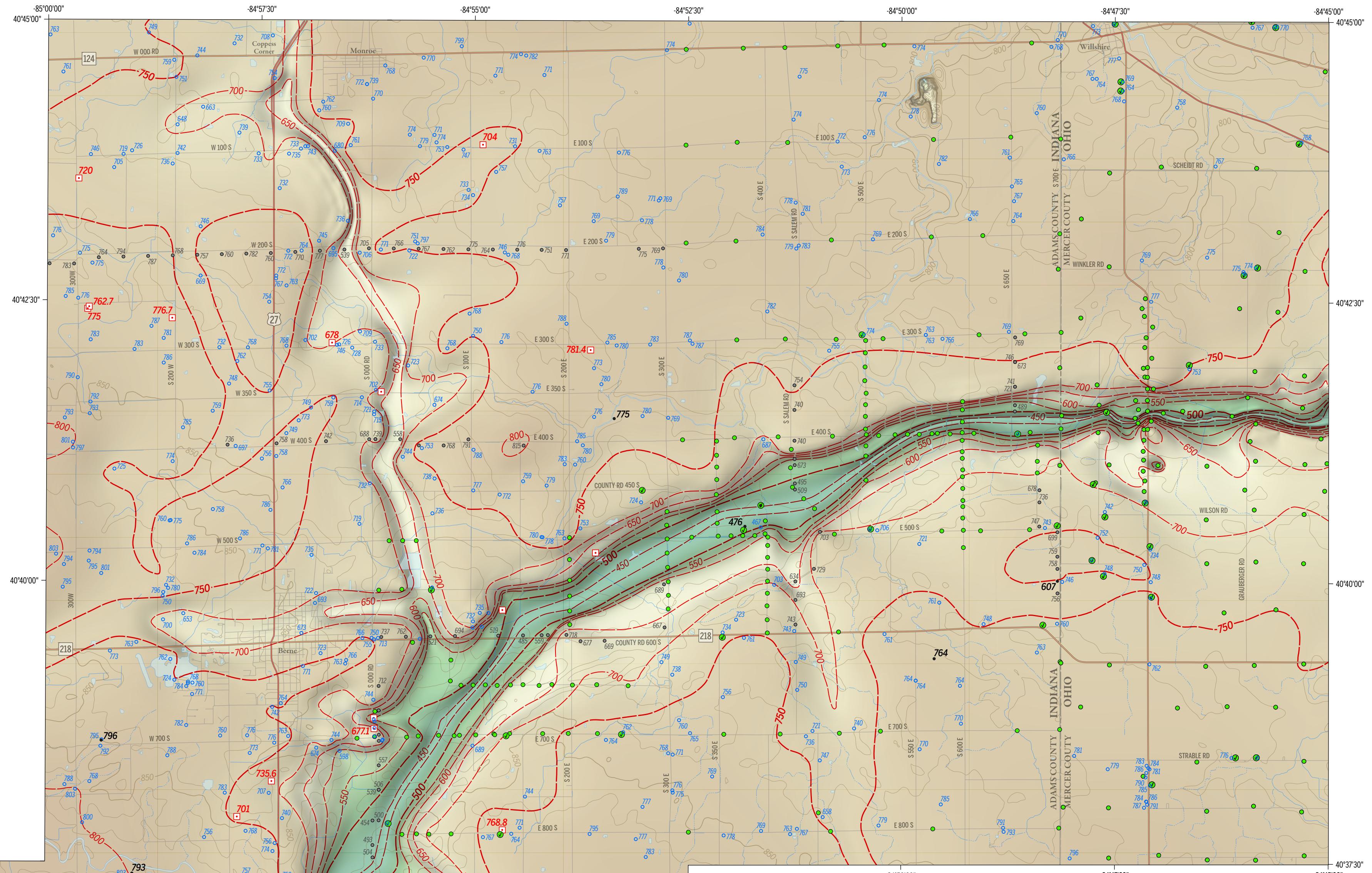
- Calibration point
- Data point

Other (elevations in feet)

- Gamma log
- Seismic refraction

Inferred bedrock surface contour (feet above mean sea level)

- Index (interval 250 ft)
- Intermediate (interval 50 ft)


 7.5-MINUTE QUADRANGLES
IN STUDY AREA

ACKNOWLEDGMENTS AND DISCLAIMER

This geologic map was funded in part by the Great Lakes Geologic Mapping Coalition program supported by the U.S. Geological Survey under Cooperative Agreement No. G19AC00321. The cooperative agreement requires the following statement: "This map and explanatory information is submitted for publication with the understanding that the United States Government is authorized to reproduce and distribute reprints for governmental use," and "the views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government."

This map was compiled by Indiana University, Indiana Geological and Water Survey, using data believed to be accurate; however, a degree of error is inherent in all data. This product is distributed "AS IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use. No attempt has been made in either the design or production of these data to define the limits of jurisdiction of any federal, state, or local government. These data are intended for use only at the published scale or smaller and are for reference purposes only. They are not to be construed as a legal document or survey instrument. A detailed on-the-ground survey and historical analysis of a single site may differ from these data.

LIMITATION OF WARRANTIES AND LIABILITY: Except for the express warranty above, the product is provided "AS IS" without any other warranties or conditions, expressed or implied, including, but not limited to, warranties for product quality, or suitability to a particular purpose or use. The risk or liability resulting from the use of this product is assumed by the user. Indiana University, Indiana Geological and Water Survey shares no liability with product users for indirect, incidental, special, or consequential damages whatsoever, including, but not limited to, loss of revenue or profit, lost or damaged data or other commercial or economic loss. Indiana University, Indiana Geological and Water Survey is not responsible for claims by a third party. The maximum aggregate liability to the original purchaser shall not exceed the amount paid by you for the product.

MAP INFORMATION

Digital cartography and GeMS compilation by Matthew R. Johnson.
 Topographic contours based on Esri World Terrain data (<https://elevation.arcgis.com>).
 Transportation network from OpenStreetMap.org (© OpenStreetMap contributors).
 Hydrography from U.S. Geological Survey National Hydrography Dataset (local resolution).
 Projection: Universal Transverse Mercator (UTM), Zone 16N.
 Horizontal Datum: North American Datum of 1983 (NAD83).
 Indiana Department of Natural Resources, Division of Water, Resource Assessment Section (IDNR), 2019, WATERWELLS_IDNR_IN.SHP: Water well locations in Indiana: 1:24,000, point shapefile.
 Indiana Geological Survey (IGS), 1983, SEISMIC_DATA_IN: Seismic refraction data for Indiana: 1:24,000, point shapefile.
 Indiana Geological Survey (IGS), 2012, GAMMA_RAY_LOGS_IGS_IN: Wells with natural gamma-ray logs or physical samples in unconsolidated sediments in Indiana: 1:100,000, point shapefile.
 Indiana Geological Survey (IGS), 2015, PETROLEUM_WELLS_IGS_IN: Petroleum well locations in Indiana: 1:24,000, point shapefile.
 Indiana Geological Survey (IGS), 2016, BR_Boreholes_250K_IGS_IN.shp: Wells or seismic refraction data with bedrock surface depths in Indiana: 1:250,000, point shapefile.
 Indiana Geological Survey (IGS), 2016, UNC_Boreholes_250K_IGS_IN.shp: Water wells completed in unconsolidated sediments in Indiana: 1:250,000, point shapefile.

Suggested citation: Rupp, R. E., Tripp, D. C., Antinao, J. L., Loope, H. M., Johnson, M. R., Nash, T. A., and Norris, T. A. 2021, Bedrock elevation of the Berne, Domestic, Geneva, and Willshire 7.5-minute quadrangles, Indiana-OHIO: Indiana Geological and Water Survey, Indiana Journal of Earth Sciences, v. 3, scale 1:48,000, DOI 10.14434/ijes.v3i.31742

