

VDOT NATURAL BRIDGE STUDIES

SEPTEMBER 17, 2018

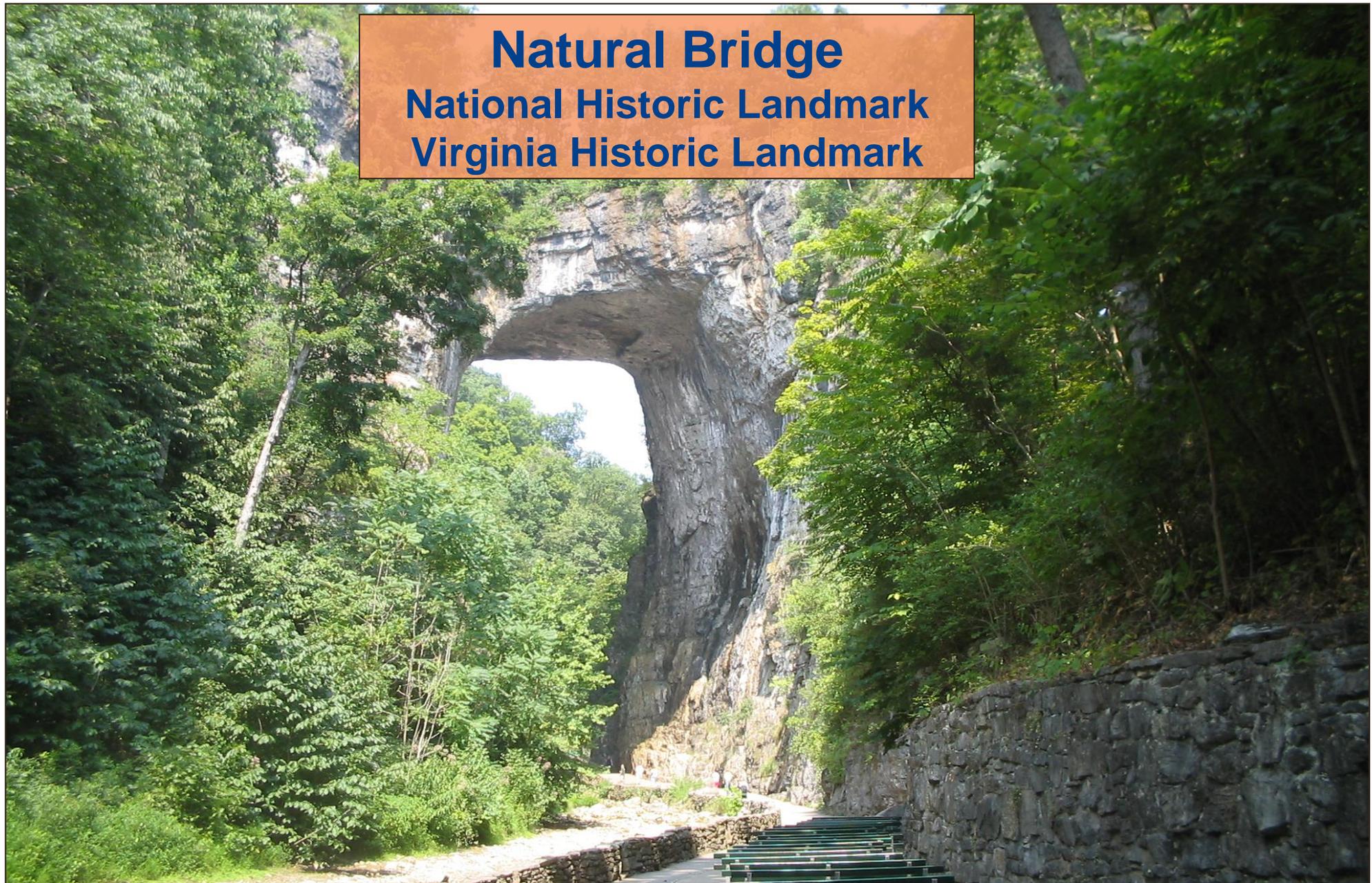
- Natural Bridge Geological Investigation
- Route 11 Alignment Study at Natural Bridge State Park

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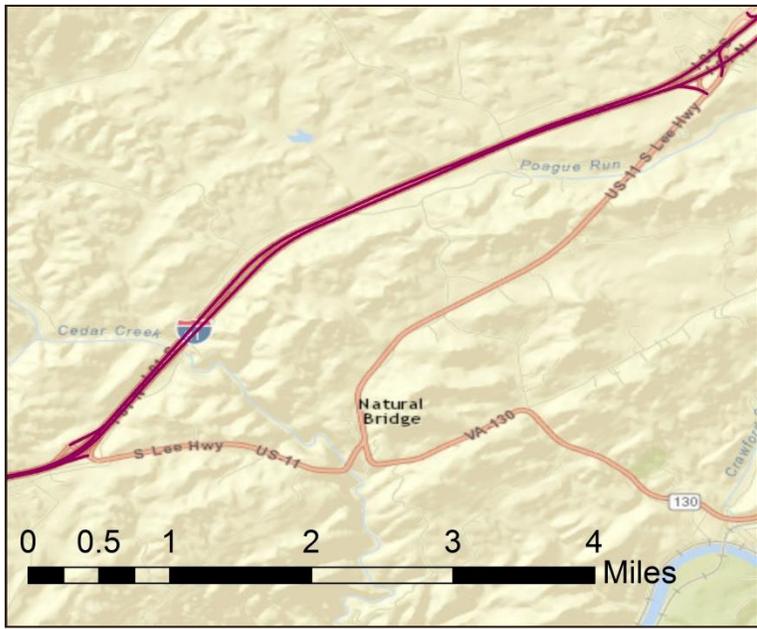
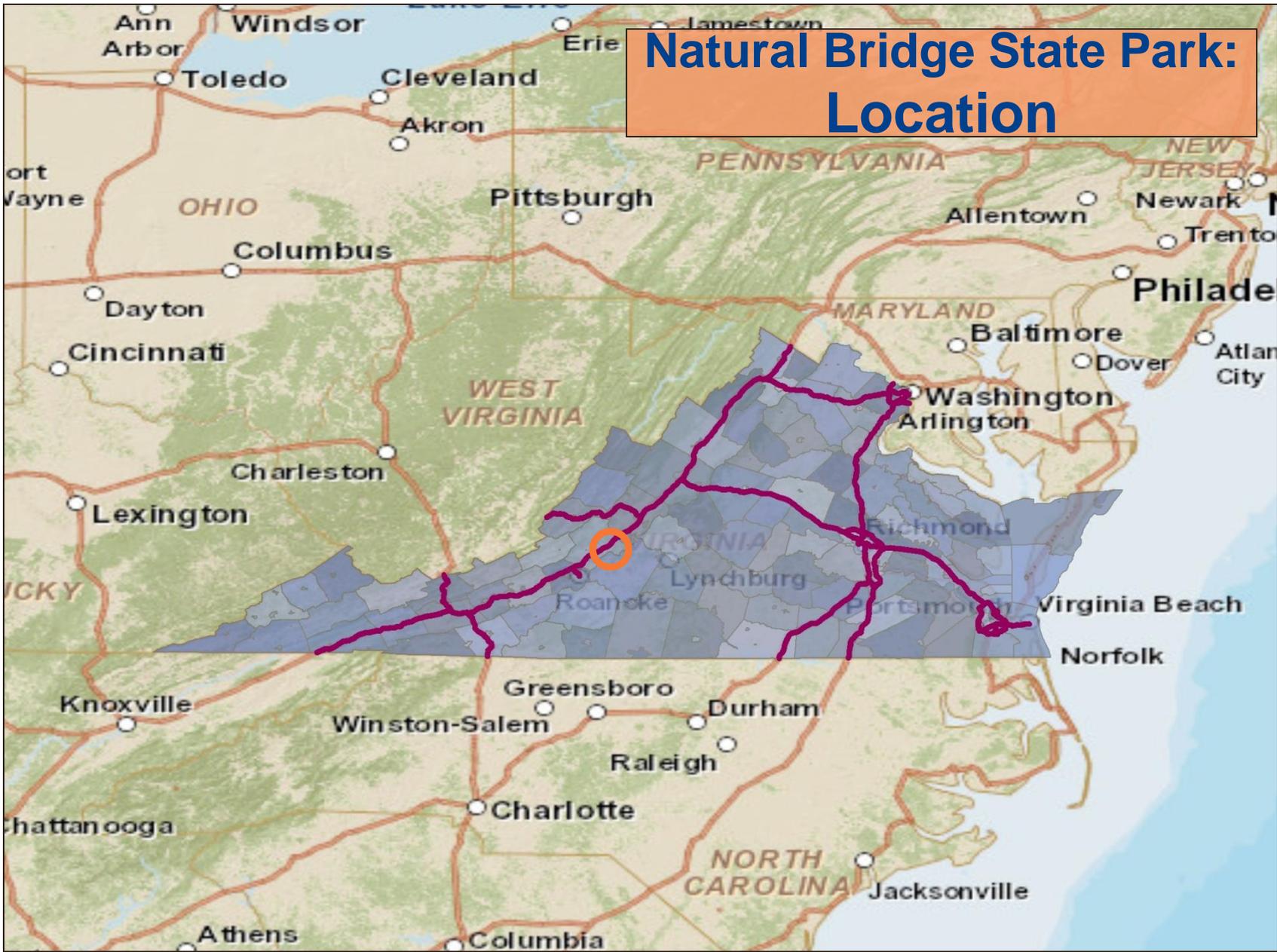
NATURAL BRIDGE GEOLOGICAL INVESTIGATION

 Brian Bruckno, PhD., P.G. - Engineering Geologist

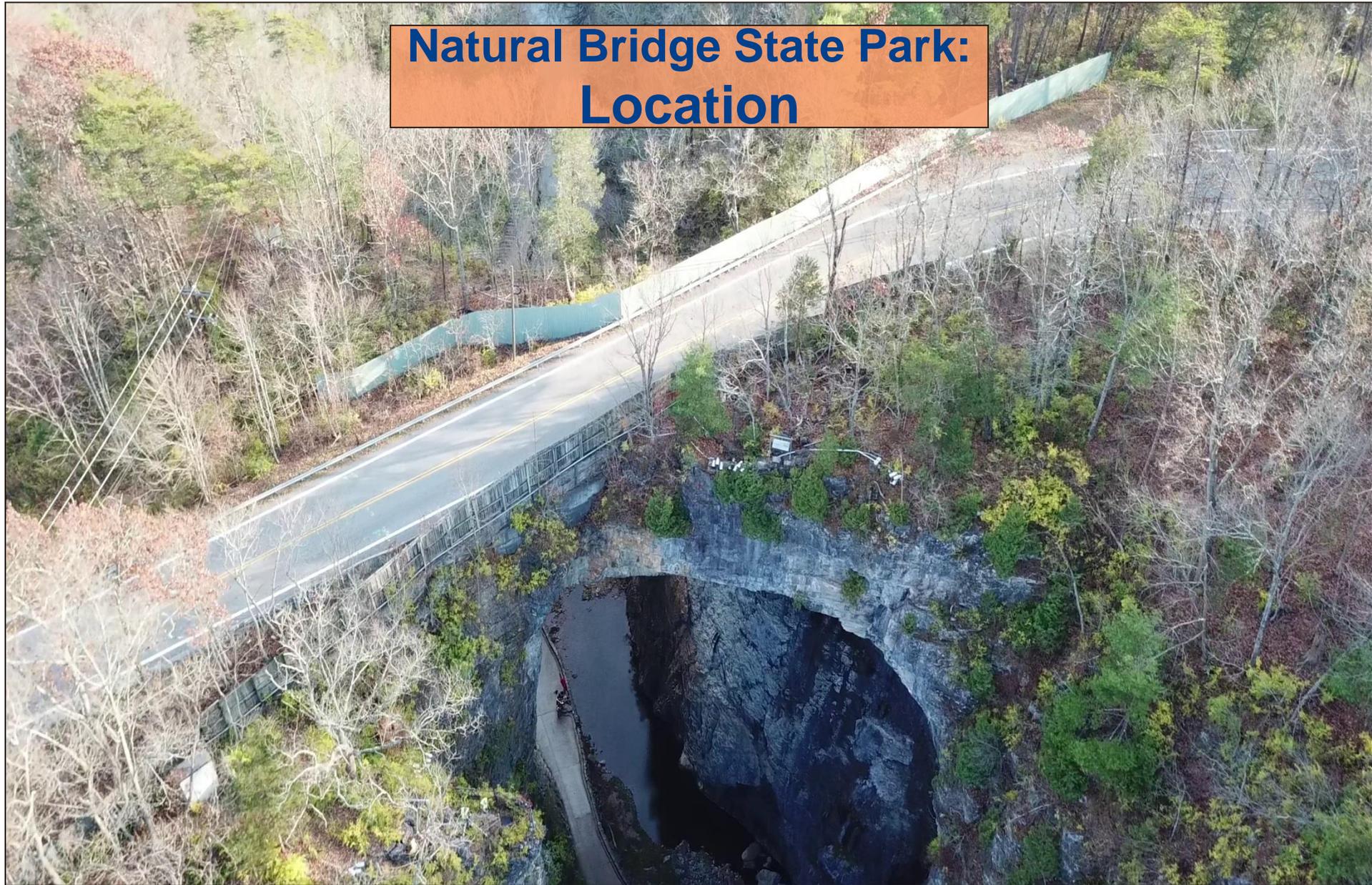
Natural Bridge
National Historic Landmark
Virginia Historic Landmark



Natural Bridge State Park: Location



Natural Bridge State Park: Location



Natural Bridge State Park: Executive Summary

- **Analyses of the data suggest that the rock span is suitable for vehicular travel.**
- **The investigation has revealed geological weathering within the rock mass.**
- **Vibrations from traffic, along with other human influences, such as water infiltration, will accelerate natural weathering.**
- **VDOT and DCR plan to ensure that this unique resource is protected for the enjoyment of future generations, therefore, it is recommended that vehicular traffic be eventually removed from Natural Bridge.**

Natural Bridge State Park: Testing Methods

- **Electrical Resistivity**
- **Seismics**
- **Ground Penetrating Radar**
- **Unmanned Aerial Systems (UAS)**
- **GigaPan Imaging**
- **LiDAR**
- **Manual Mapping**
- **Vibration Monitoring**

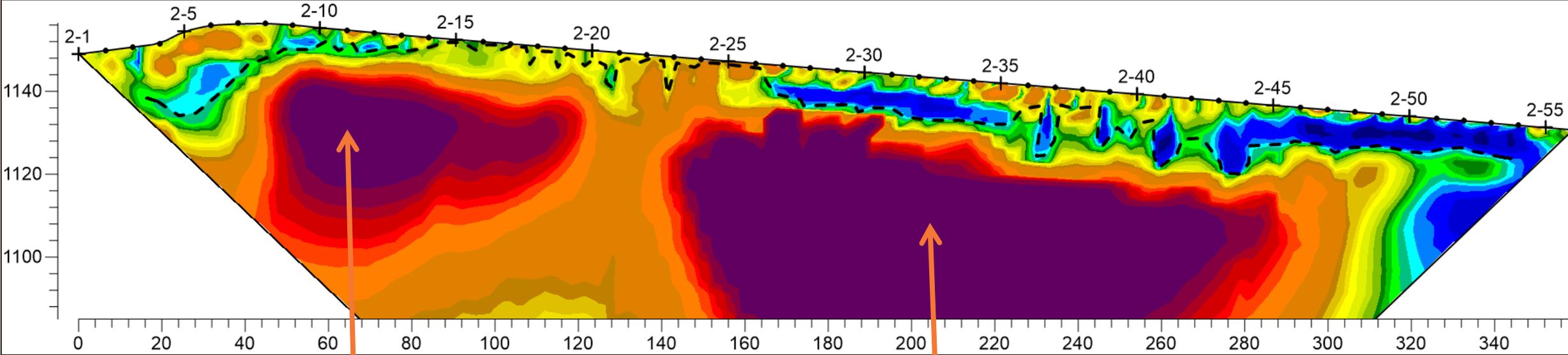
Natural Bridge State Park: Testing Methods



Natural Bridge State Park: Findings

- **Voids at both northern and southern ends of the arch.**
- **Well-developed joint system.**
- **Blocks/masses sensitive to natural and human-induced weathering.**
- **Water migration throughout the mass.**
- **Areas susceptible to rockfall.**
- **Traffic and light-and-sound show vibrations detected in the rock mass.**

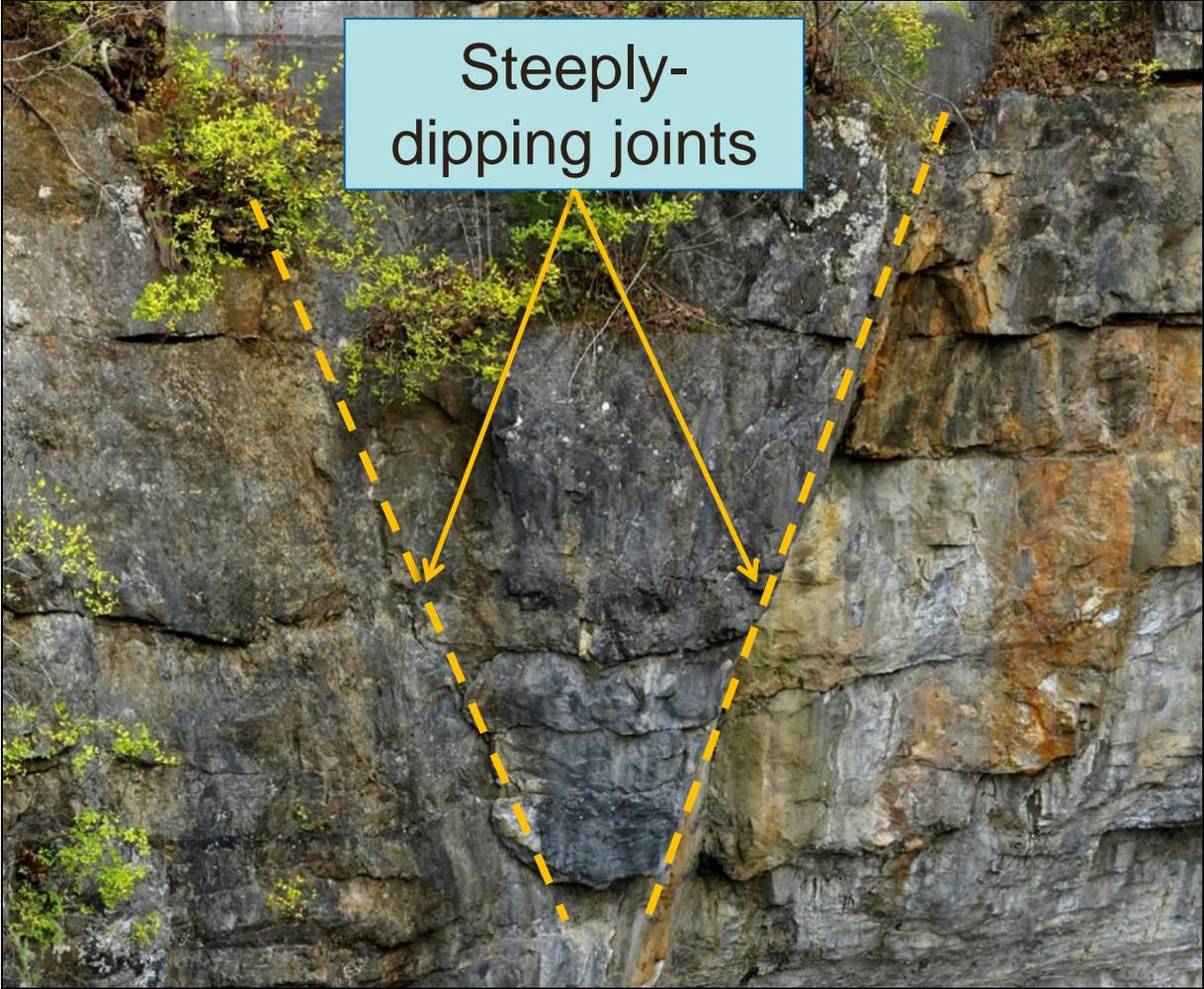
Natural Bridge State Park: Voids



Void

Arch Zone

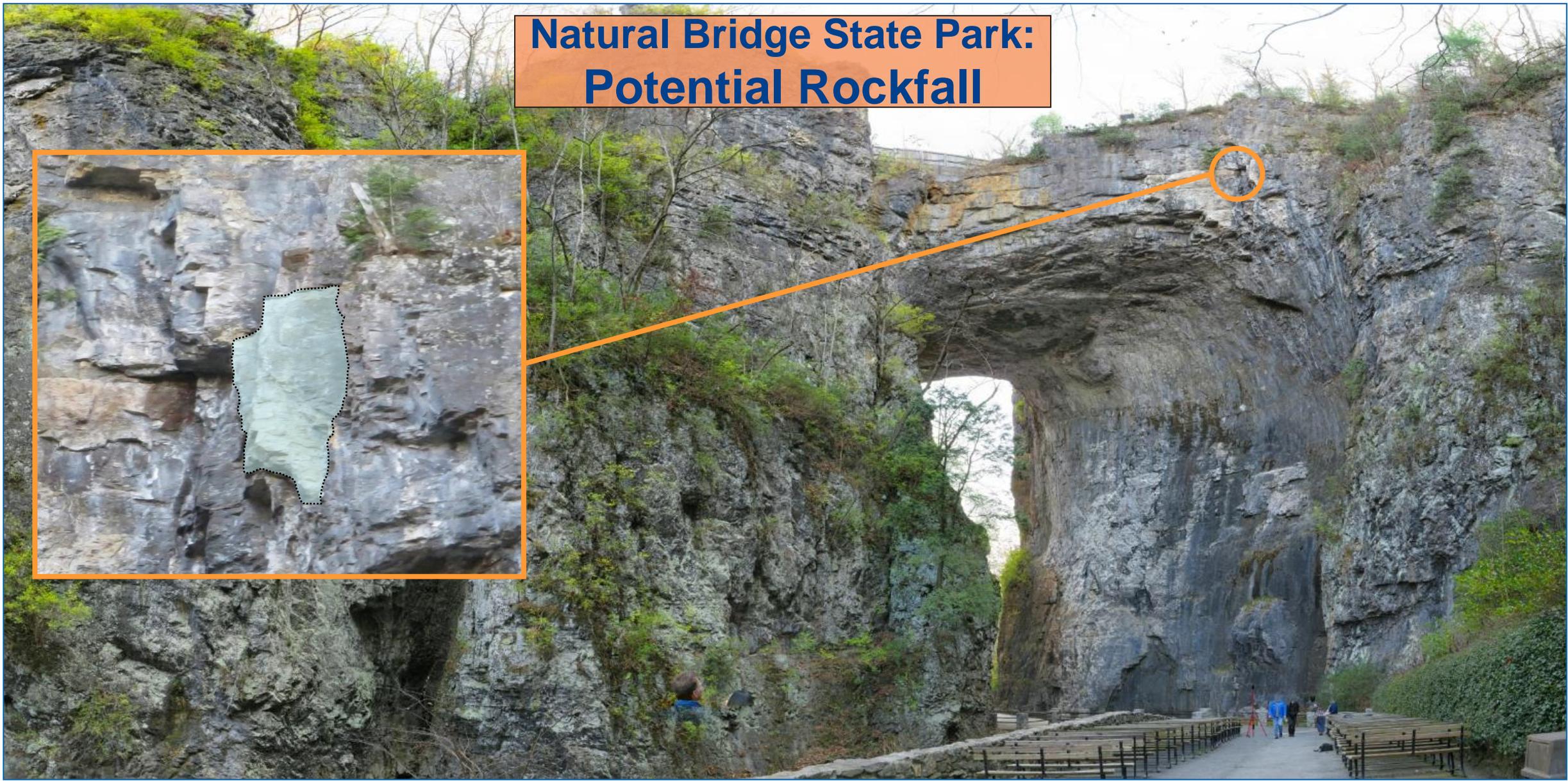
Natural Bridge State Park: Joints



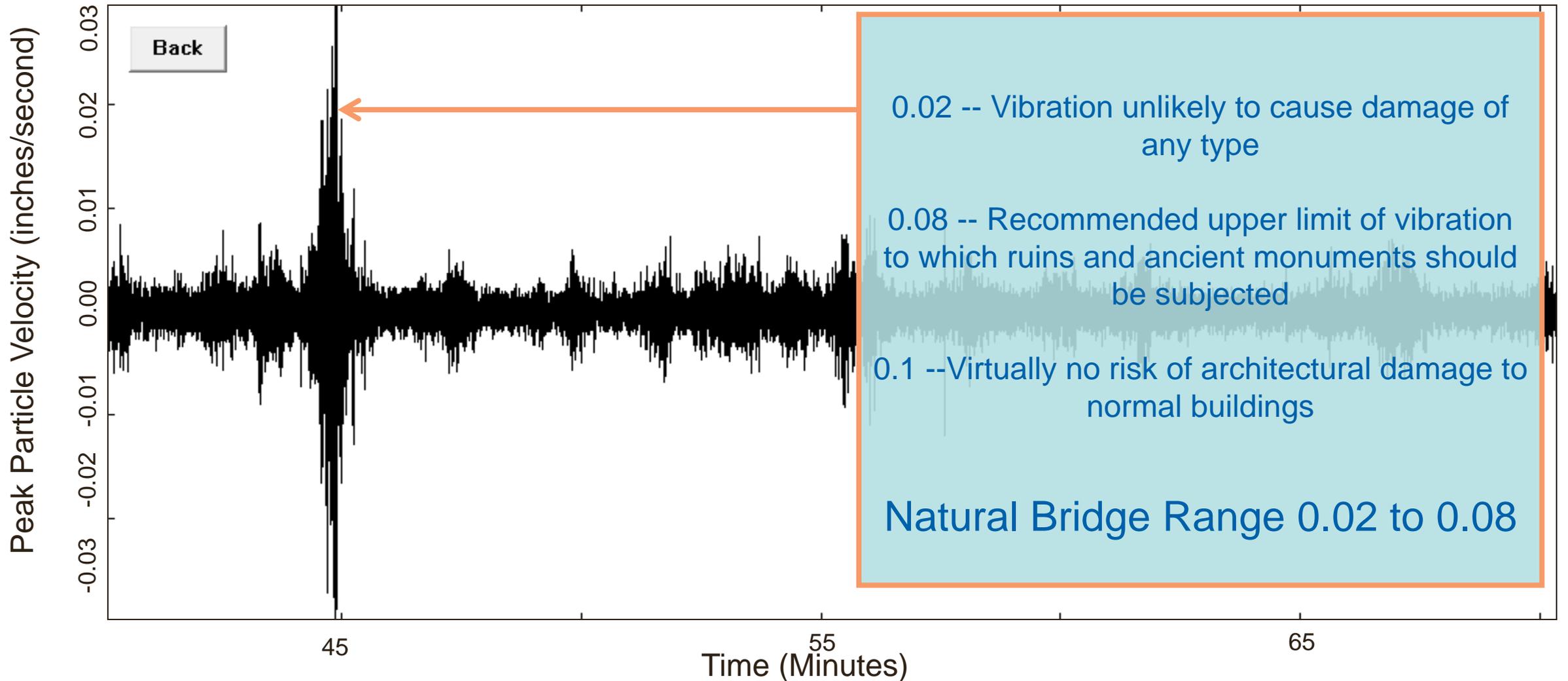
Natural Bridge State Park: Water Migration



Natural Bridge State Park: Potential Rockfall



Natural Bridge State Park: Vibration



Natural Bridge State Park: Geological Recommendations

- The arch is currently suitable for vehicle traffic.
- Natural weathering and human activities will reduce that suitability over time.
- Minimizing water infiltration may reduce weathering.
- Data and reports have been shared with DCR for park operations.
- It is recommended that vehicular traffic be eventually removed from Natural Bridge.

VDOT NATURAL BRIDGE STUDIES

US 11 NATURAL BRIDGE ALTERNATIVES STUDY

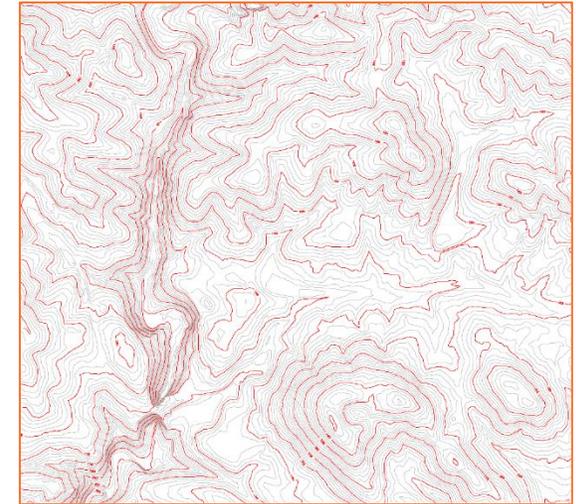
| Terry R. Short, Jr. – Staunton District Planning Manager

US 11 Natural Bridge Alternatives Study

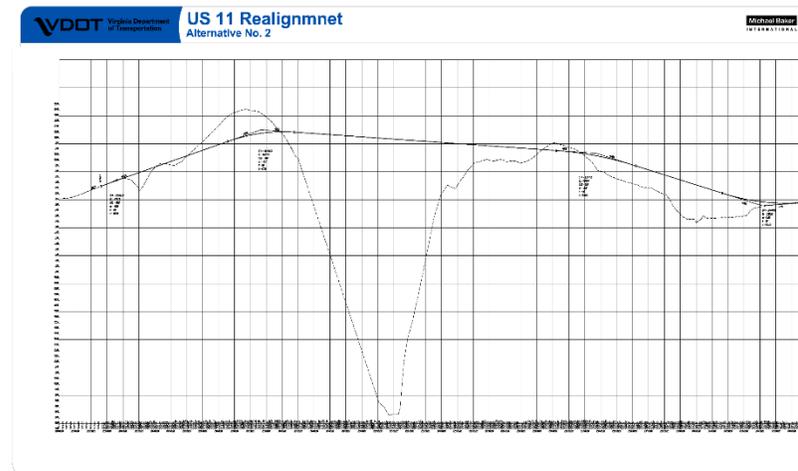
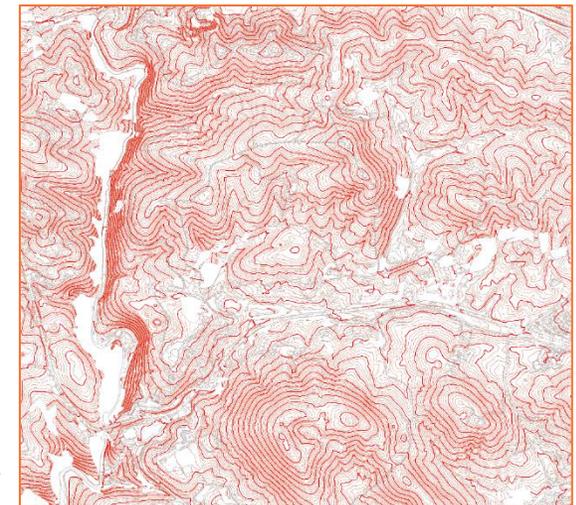
- VDOT funded study for the US 11 Roadway in partnership with DCR
- Evaluation of options to conceptually relocate Route 11 off of the Natural Bridge formation, located within Natural Bridge State Park
- Conducted enhanced survey work to support alignment evaluations
- Assembled comprehensive Stakeholder Committee



Original Survey Detail

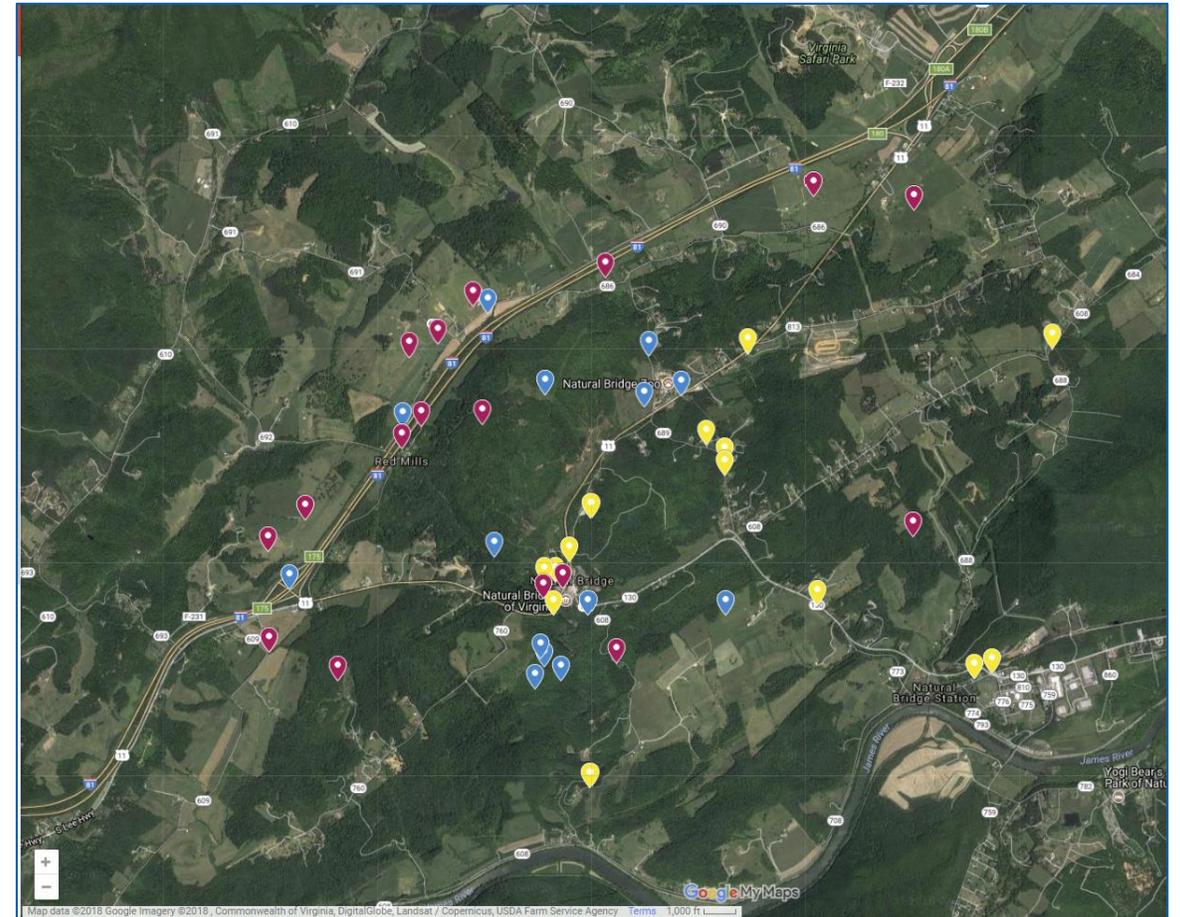


Updated Survey Detail



US 11 Natural Bridge Alternatives Study

- **Evaluating options using a customized scoring/weighting criteria**
 - Environmental Impacts, Community Impacts, Right-of-way Impacts, Safety and Travel Time, State Park Context
- **Extensive planning evaluation of environmental, historic and surface and subsurface geological assets**
- **Developing 2-3 preferred alternatives to advance for future engineering evaluation**
- **Presentation of alternatives and preferred concepts for public input in October**
- **Final Report in November to include:**
 - 2 or 3 preferred alternatives
 - Planning level cost estimates



Example of stakeholder feedback documentation

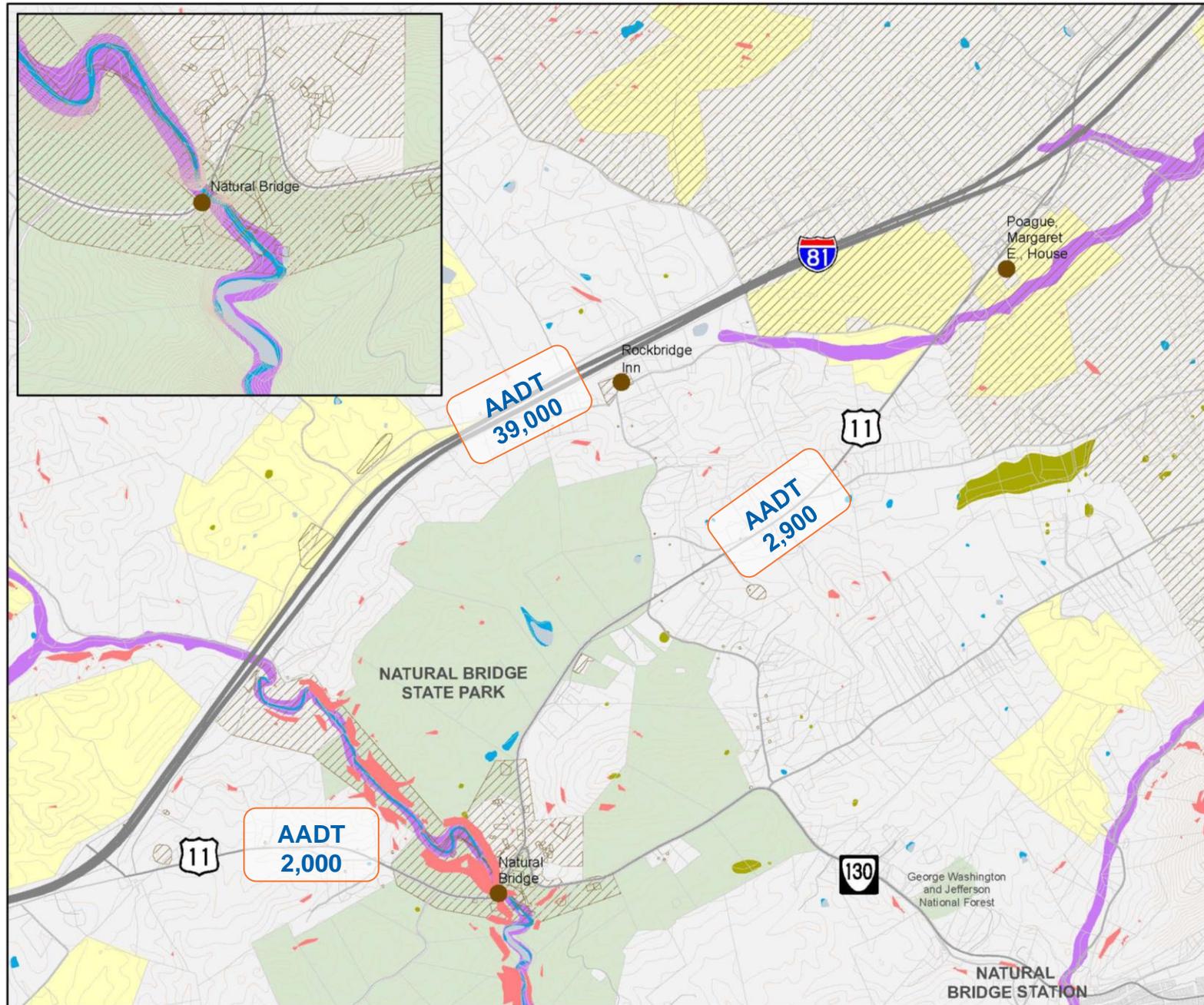
US 11 Natural Bridge Alternatives Study - Stakeholders

- Friends of Natural Bridge
- Monacan Indian Nation
- National Park Service
- Natural Bridge Advisory Committee
- Natural Bridge Fire and Rescue
- Natural Bridge Hotel and Conference Center
- Rockbridge County
- Rockbridge Regional Tourism
- Virginia Conservation Legacy Fund
- Virginia Department of Conservation and Recreation
- Virginia Department of Historic Resources
- Virginia Outdoors Foundation



US 11 Alignment Alternatives Study

Constraints



US 11 Natural Bridge Alternatives Study - 2018

Task	January	February	March	April	May	June	July	August	September	October	November
Data Collection and Field Review	■	■									
Alternative Alignment Development and Evaluation		■	■ ★	■	■ ★						
Development of Preferred Alternative Alignments						■	■	■ ★	■		
Report Preparation									■	■ +	■
Submit Draft Report											■



Stakeholder Meeting



Public Meeting

