

# **71st Highway Geology Symposium (HGS 2022)**

**Better Highways Through Applied Geology**

**Asheville, North Carolina, USA  
23 - 25 May 2022**

**ISBN: 978-1-7138-5552-1**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2022) by Highway Geology Symposium (HGS)  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact Highway Geology Symposium (HGS)  
at the address below.

Highway Geology Symposium (HGS)  
C/O John Pilipchuk  
1589 Mail Service Center  
Raleigh, NC, 27699-1589

Phone: (919) 707-6851  
Fax: (919) 250-4237

[jpilipchuk@ncdot.gov](mailto:jpilipchuk@ncdot.gov)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# **71st ANNUAL**

# **HIGHWAY GEOLOGY SYMPOSIUM**

## **Table of Contents**

Dedication .....	2
At-A-Glance Schedule of Events.....	4
Transportation Research Board Technical Session: “Improving Resiliency through Geotechnical Asset and Performance Management Approaches” .....	12
Highway Geology Symposium: History, Organization, and Function .....	15
Young Author Award Winners .....	20
Medallion Award Recipients .....	21
Emeritus Members of the Steering Committee.....	22
National Steering Committee Officers and Members.....	23
Previous, Present, and Future Symposium Contact List.....	26
Sponsors.....	27
Exhibitors.....	38
Abstracts & Papers.....	43



## 71<sup>st</sup> ANNUAL HIGHWAY GEOLOGY SYMPOSIUM

### Abstracts & Papers

**Monday, May 23, 2022**

1. 1:45 PM – 2:05 PM  
Young Author Presentation: *Using Geophysics to Evaluate the Results of a Grouting Program in Karstic Geology*  
Authors: Mayer, Sheehan, Painter, Brown, and McInnes..... 47
2. 2:05 PM – 2:25 PM  
Young Author Presentation: *Efficient Rock Slope Design during Construction of a State Highway Safety Enhancement Project State Highway 55, Idaho*  
Authors: Ferguson and Guzek ..... 67
3. 2:25 PM – 2:45 PM  
Young Author Presentation: *Evolution of Midslope Rockfall Attenuator on Federal Lands Transportation Projects*  
Author: Farny ..... 81
4. 2:45 PM – 3:05 PM  
Young Author Presentation: *Utilizing Cellular Concrete for Geohazard Mitigation Solutions*  
Author: LuQuin..... 101

## **Monday, May 23, 2022 (Continued)**

3:05 PM – 3:35 PM	
Afternoon Coffee Break	
5. 3:35 PM – 3:55 PM	
Young Author Presentation: <i>Use of Smart Rocks to Improve Rock Slope Design</i>	
Authors: Souza and Benoît.....	119
6. 3:55 PM – 4:15 PM	
Young Author Presentation: <i>Geosynthetic-Reinforced Soil (GRS) vs. Mechanically-Stabilized Earth (MSE); An Overview of Practical Applications of GRS</i>	
Author: Stallings .....	139
7. 4:15 PM – 4:35 PM	
Young Author Presentation <i>Flood Repairs Along the SR 187 Corridor</i>	
Author: Gardner.....	157
4:35 PM – 4:45 PM	
Highway Geology Symposium Field Trip Preview	
Presenter: Jody Kuhne	

## **Wednesday, May 25, 2022**

8. 8:00 AM – 8:20 AM	
<i>Evaluation of Mine Subsidence Conditions using Borings and Downhole Investigation Techniques</i>	
Authors: Knott, Gray, Lea and Streater .....	179
9. 8:20 AM – 8:40 AM	
<i>Unstable Slope Inventory along the Blue Ridge Parkway, NC</i>	
Authors: Banks, Bauer, Abdelhadi and Ramey .....	202
10. 8:40 AM – 9:00 AM	
<i>Rock Slope Rockfall Risk Reduction – Little River Road (Forest Highway #69) Douglas County, Oregon</i>	
Authors: Black, Garich, and Koslofsky .....	228
11. 9:00 AM – 9:20 AM	
<i>Potential Applications of Steel Fin Piles in Highway Transportation Infrastructure</i>	
Authors: McInnes, Hubler, LaRegina and Iezzoni .....	246
12. 9:20 AM – 9:40 AM	
<i>Experience in the Face of Unknowns Bridge Foundation Alternatives for the Leesport Bridge, Pennsylvania</i>	
Authors: Shelly, McInnes and Rai.....	258
9:40 AM – 10:10 AM	
Morning Coffee Break	

## **Wednesday, May 25, 2022 (Continued)**

13. 10:10 AM – 10:30 AM  
*Geological assessment of the Westbound I-40 Slope Failure, Rockwood, Tennessee*  
Authors: Hannam and Kath ..... 278
14. 10:30 AM – 10:50 AM  
*Accelerated Geotechnical Investigation of the Sterling Highway Realignment – Cooper Landing, Alaska*  
Authors: Koslofsky, Allender, Beckstrand, and Nutter ..... 301
15. 10:50 AM – 11:10 AM 2:40 PM – 3:00 PM  
*Potential Liability Associated with Unstable Slope Management Programs*  
Author: Wyatt ..... 309
16. 11:10 AM – 11:30 AM  
*Advancements in Investigating, Testing, and Treatment of Acid Producing Rock – SR 15 Section 088, Central Susquehanna Valley Thruway, Snyder County Pennsylvania*  
Authors: Smithmyer and Gardner ..... 329
17. 11:30 AM – 11:50 AM  
*Investigation, Design, and Construction of a Debris Flow Barrier System for a Repetitively Failing Slope Along I-40 Near the Buncombe/McDowell County Line in North Carolina*  
Authors: Landon, Smerekanicz, Ingraham, Mullen, Kuhne, and Moore ..... 346
- 11:50 AM – 1:00 PM  
Lunch — Sponsored by Nector Natural Hazard Protection Systems  
Guest Speaker: AEG Jahns Lecturer Rick Wooten  
*2018-2020: Two Years, Eight Storms, 320+ landslides, and an Earthquake (What does it mean, and what do we do now?)*
18. 1:00 PM – 1:20 PM  
*Geographic Information System (GIS) and Interpretation of Relative Geologic Risk Susceptibility For Proposed Roadway Alignments through Gates of the Arctic National Park, Alaska*  
Authors: George and Anderson ..... 363
19. 1:20 PM – 1:40 PM  
*Shallow Foundation Load-Settlement Behavior Assessed from Surface Geophysical Data*  
Authors: Norris, Elfass, and Yang ..... 383
20. 1:40 PM – 2:00 PM  
*Back Calculation from a Plate Load Test on Cohesionless Soil*  
Authors: Yang, Norris, and Elfass ..... 402
21. 2:00 PM – 2:20 PM  
*Reliability Models for Roads Crossing Slow-Moving Landslides*  
Authors: Porter, Anderson, Vessely, and Devonald ..... 423

**Wednesday, May 25, 2022 (Continued)**

22. 2:20 PM – 2:40 PM  
*Challenges in Rock Slope Stabilization – SR 209, Section RSM, Rock Slope Stabilization Project, Jim Thorpe, Pennsylvania*  
Authors: Krupansky, Smithmyer, and Cressman .....444
- 2:40 PM – 3:10 PM  
Afternoon Break— Sponsored by HDR, Inc.
23. 3:10 PM – 3:30 PM  
*Geophysical Applications for Highway Wall Design*  
Author: Billington and Pastrana .....464
24. 3:30 PM – 3:50 PM  
*GUARD - making flexible geohazard protection systems SMART*  
Authors: Shevlin, and Lanter .....484
25. 3:50 PM – 4:10 PM  
*S.R. 0081 Rock Slope Stabilization, Lackawanna County, Pennsylvania*  
Author: Martt and Lobo-Guerrero .....501
26. 4:10 PM – 4:30 PM  
*Advancements and Unknowns in the Design of Flexible Facings for Slope Improvement*  
Authors: Blanchard, Duffy, and Finegan.....521
27. 4:30 PM – 4:50 PM  
*Migrating Mud Pot - Emergency Responses to Protect Critical Transportation Infrastructure*  
Authors: Bailey and Deane .....542