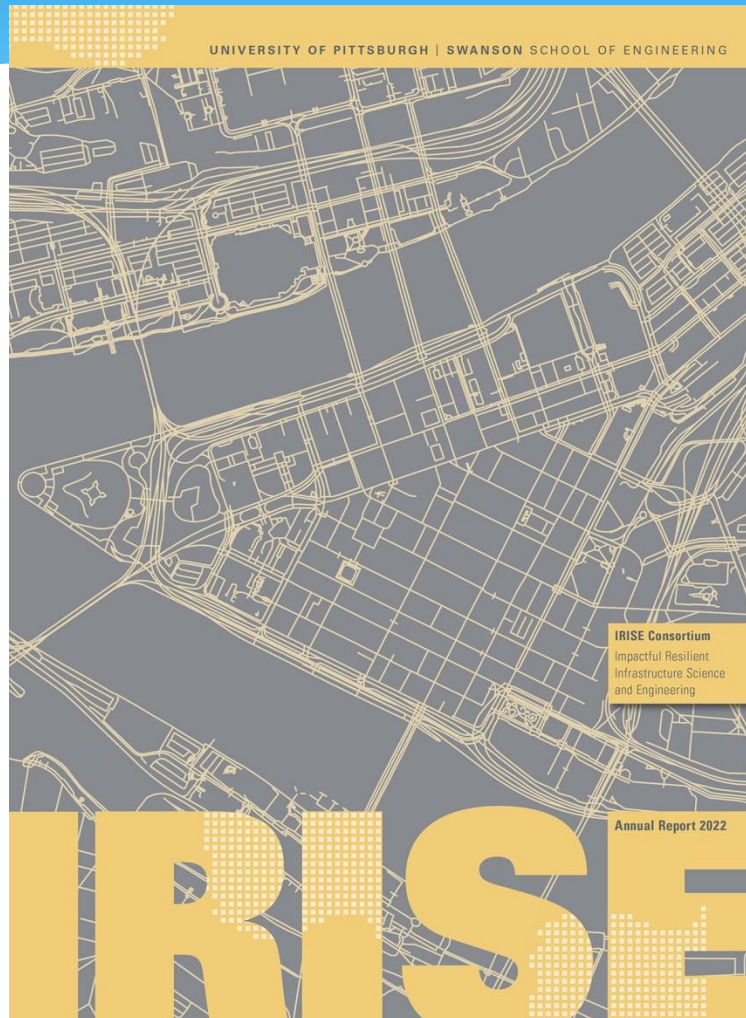


# IRISE 2022 ANNUAL REPORT



Presenter: Joe Szczur, Director

# IMPACTFUL RESILIENT INFRASTRUCTURE SCIENCE AND ENGINEERING (IRISE)

- ❑ Developing sustainable, resilient, engineering solutions
- ❑ Improving worker safety



# UNIQUE APPROACH



## MISSION: Implementable solutions

- Identify a deficiency/challenging issue
- Develop impactful technology
- Benefit seen by all parties (buy-in)

## Approach...

- Get all parties involved early in the process
- Maintain their involvement throughout the process



# WE ARE INDEBTED TO OUR MEMBERS

 - Denotes Founding Members



 **ALLEGHENY COUNTY**  
ALWAYS INSPIRING



**CDR | MAGUIRE ENGINEERING**





# WE ESPECIALLY THANK OUR STEERING COMMITTEE

- **Rich Barcaskey**, CAWP
- **Dan Cessna**, CDR Maguire
- **Chuck Niederriter**, Golden Triangle Construction
- **Michael Schultz**, Pennsylvania Turnpike (*Edward Skorpinski*)
- **Stephen Shanley**, Allegheny County
- **Brian Wall**, PennDOT
- **Tom Zagorski**, Michael Baker International
- **Yathi Yatheepan**, FHWA (ex officio)

# ONGOING RESEARCH

## 17 On-going Projects During 2022, 5 Now Completed

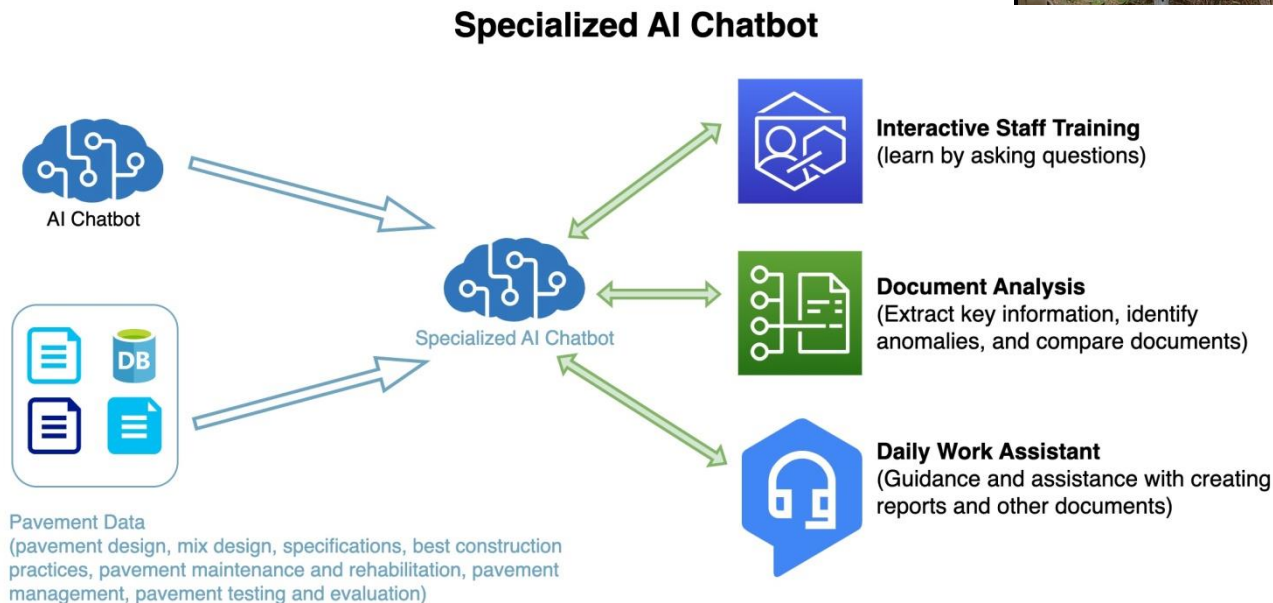
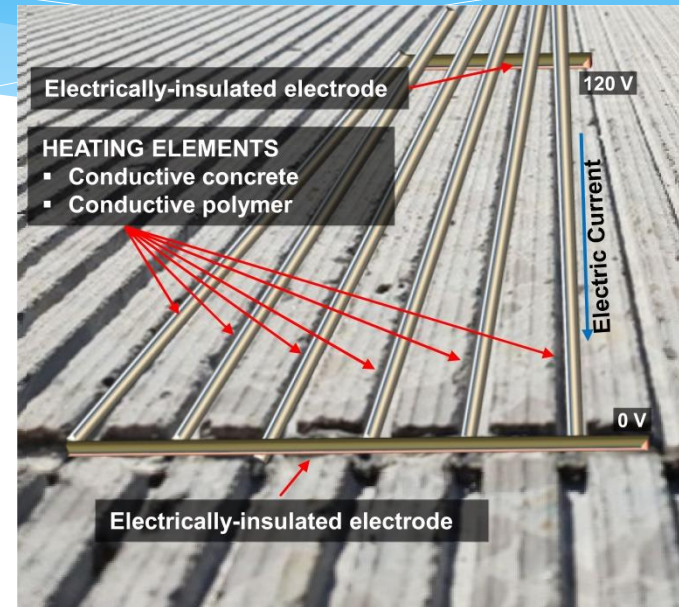
- **Benefits Analysis**  
(Completed)
- **Bridges**
  - Additive Manufacturing and ABC
  - Bridge Deck Corrosion
- **Geotech/Stormwater**
  - Best Practices (Completed)
  - Data Inventory
  - Stormwater Seminars
- **Worker Safety**
  - Tech Innovations (Completed)
  - Utility Location (Completed)
  - Construction Safety Data Analysis
  - VR Platform for Worker Training
- **Pavements and Materials**
  - Distresses Under Pavement Markings (Completed)
  - Concrete Compaction/Vibration
  - Joint Sealing/Design Optimization
  - Material Compatible Repair Field Assessment
  - Dowel Corrosion
  - Metamaterial Lightweight Concrete
  - Sealcoat Best Practices
  - Two-Lift Pavement Construction



# YEAR 6 WORK PROGRAM TOPICS

## 3 New Projects

- **Bridges:** load rating analysis
- **Environmental:** self-heating pavements
- **Pavements:** AI language model (RoboChat)





# IRISE RESEARCH DIRECTION

## Year 1

- **Material compatible repair**
- Corrosion
- Microbes
- Pitt Rigid

## Year 2

- Bridge assessments
- Early opening
- Landslide workshop
- Landslide seminars

## Year 3

- Benefit analysis
- JPCP Jt Design Opt.
- Landslide best practices
- AC pavement markings
- Safer pave. construction
- MCR Implementation

## Year 4

- ABC Construction
- Construction safety
- Landslide inventory
- Utility location
- Vibration compaction



## Year 5

- **Bridge deck corrosion**
- Dowel corrosion
- LWC Metamaterials
- Seal coat best practices
- Stormwater seminars
- Two-lift paving
- VR safety



# HIGHER RISK/REWARD RESEARCH

## Year 1

- Material compatible repair
- Corrosion
- **Microbes**
- Pitt Rigid

## Year 2

- **Bridge assessments**
- Early opening
- Landslide workshop
- Landslide seminars

## Year 3

- Benefit analysis
- JPCP Jt Design Opt.
- Landslide best practices
- AC pavement markings
- Safer pave. construction
- MCR Implementation

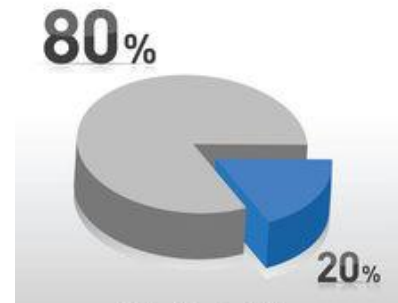
## Year 4

- **ABC Construction**
- Construction safety
- Landslide inventory
- Utility location
- **Vibration compaction**



## Year 5

- Bridge deck corrosion
- Dowel corrosion
- **LWC Metamaterials**
- Seal coat best practices
- Stormwater seminars
- Two-lift paving
- **VR safety**

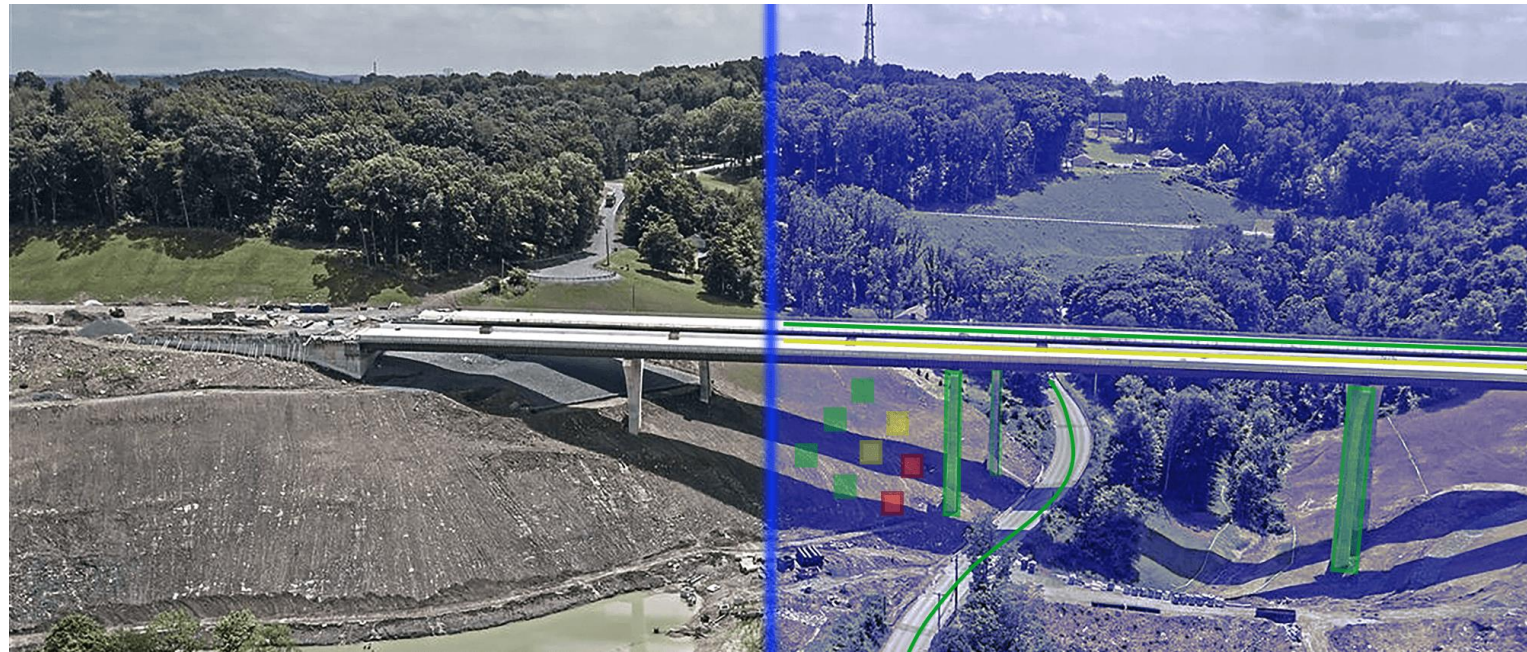


© Can Stock Photo

70% Applied  
 30% High risk/high reward

# PA TURNPIKE: Mon Fayette Test Bed

1. Sound Walls Constructed of Metamaterials
2. Digital Twin of Ecosystem (pavement/bridge/stormwater basin)
3. Electric Vehicle Charging
4. Multi-purpose Assets: Energy Harvesting





# STUDENT INVOLVEMENT

- 8 undergraduate students
- 17 graduate students
- 2 post-docs
- Conference presentations
  - ❖ ACPA
  - ❖ TRB
- Class projects/site visits
  - Clemente Bridge
- Coop/internship scholarship program

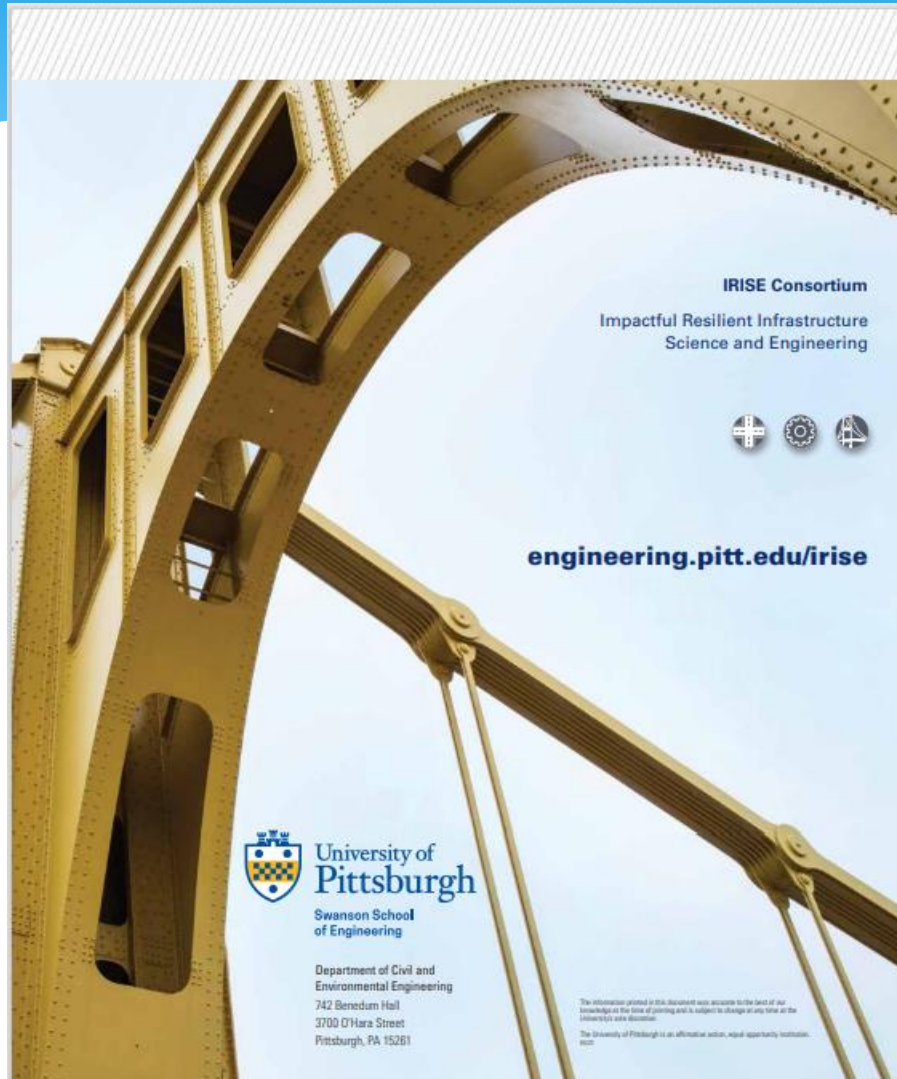




# UNIVERSITY TRANSPORTATION CENTER

- \* SMARTER Center
  - \* Regional UTC
  - \* Led by Morgan State University
  - \* Also includes Howard University and the Universities of Delaware, Maryland, Virginia, Virginia Tech and West Virginia
- \* Focused on sustainable mobility and regional transportation
- \* Expected to provide \$600K per year in research funding for Pitt, including PennDOT contribution, focused on civil infrastructure

# Questions



Additional details can be found at...



<https://www.engineering.pitt.edu/Irise/>  
Or Google “Pitt IRISE”

**Thank you for all your contributions  
this past year!**