CIR Advisory Panel Meeting – Spring 2025

CIR | CENTER FOR Infrastructure Renewal

12:00 pm	Opening Remarks & Introductions	Mr. Greg Baker - CAP Chair
12:03 pm	TEES & TTI Leadership Comments	Dr. Jodie Lutkenhaus (TEES) - Associate Dean, Research Ms. Darlene Goehl (TTI) - Associate Agency Director, Infrastructure Group
12:07 pm	Center Updates	Dr. Anand Puppala - CIR Director Dr. Edith Arámbula-Mercado - CIR Deputy Director
12:15 pm	CAP Member Spotlight	Dr. Rich Szecsy - CEO, Big Town Concrete
12:30 pm	Center Research Highlight	Dr. Navid Jafari - Associate Professor of Civil Engineering TAMU
12:45 pm	Recap of Virtual One on One Meetings & Future CIR Needs	Mr. Greg Baker - CAP Chair
	Research Priorities, AI Modeling Initiatives	Mr. Greg Baker - CAP Chair
	Water Infrastructure	Dr. Anand Puppala - CIR Director
12:54 pm	Q & A Session	Mr. Greg Baker - CAP Chair
12:59 pm	Final Remarks & Meeting Adjourned	Mrs. Pamela Mize - CIR Program Specialist

The meeting will begin at 12:00pm.
Thank you for joining us today!

Please utilize the chat to submit any questions and/or comments during the meeting.

The moderator will ensure that all submitted questions/comments are received by CAP leadership.

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Texas A&M Transportation Institute

TEES | Texas A&M Engineering Experiment Station

CIR Advisory Panel Meeting
Fall 2025

Friday September 26, 2025 | 12:00 pm to 1:00 pm

Lower Cost | Less Time | Longer Life

Opening Remarks & Introductions

Mr. Greg Baker

CAP Chair

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Texas A&M Transportation Institute

TEES | Texas A&M Engineering Experiment Station

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TEES & TTI Leadership Remarks

Dr. Jodie Lutkenhaus (TEES)

Associate Dean - Research

Ms. Darlene Goehl (TTI)

Associate Agency Director Infrastructure Group

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Center Updates - TEES

Dr. Anand Puppala

CIR Director

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CIR | CENTER FOR Infrastructure Renewal

Vision to be a leader in the development of transformative infrastructure solutions for Texas, the nation, and global partners

CIR focuses on development of transformative infrastructure solutions

CIR innovations lead to:

- > Safer, and Longer Lasting Infrastructure
- > Faster and Efficient Construction
- > Lower Lifecycle Costs
- > Impact Measured In $Billions

14 Laboratories | 30+ Researchers | 125+ Students

TEES | Texas A&M Engineering Experiment Station

Director: Anand J Puppala

anandp@tamu.edu & cir.tamu.edu

Texas A&M Transportation Institute

CIR Competencies & Marketplaces

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Competencies	Marketplace
Materials & Construction	Mega Infrastructure
Novel, Smart & Durable Materials	Transportation Infrastructure
Advanced Construction Methods	Energy Infrastructure
Artificial Intelligence & Machine Learning	Infrastructure for Austere Enviornments
Digital Twinning, Visualization, AR & VR Interfacing	Resilient, Healthy & Sustainable Civil Infrastructure
Testing, Sensing & Modeling	
Life Cycle Sustainability, Cost Studies & Asset Management	
Intrusive, Non-Intrusive & Non-Destructive Lab & Field Studies (Full Scale Model Testing)	
Remote Sensing (Satellites) & UAV Studies	
Predictive Infrastructure Performance Modeling	
Smart, Secure, Connected & Autonomous Technologies	
Technology Transfer	
Workforce Training & Development	
Entrepreneurship & Commercialization	

Our Research & Facilities

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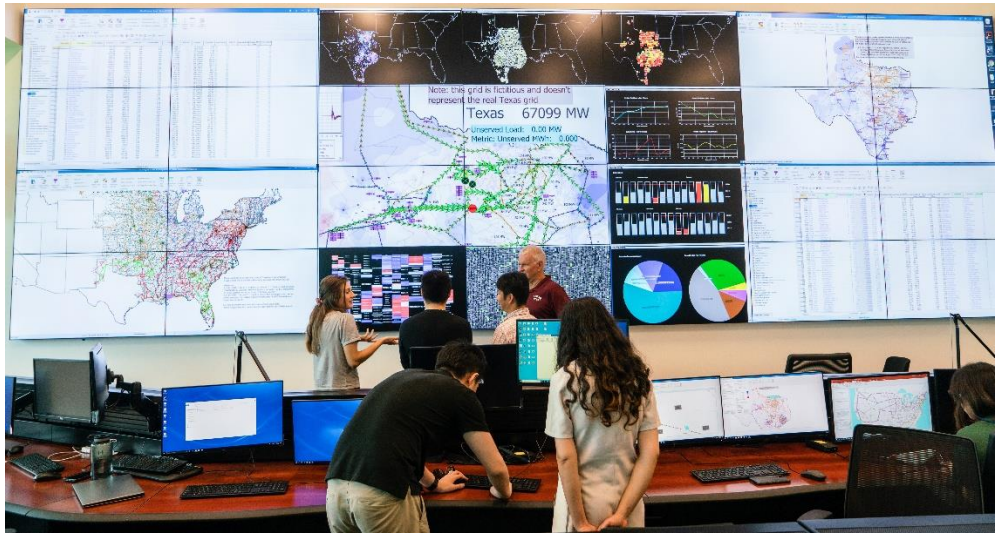
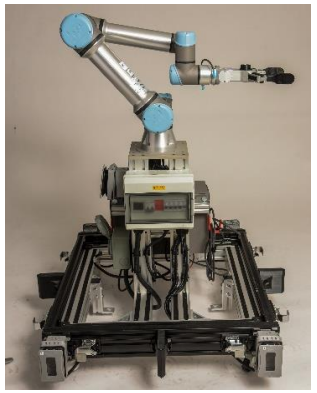
Collaborations Across TTI, and Multiple TAMU Colleges Including:

- Civil Engineering
- TTI Infrastructure Group
- Mechanical Engineering
- Industrial Engineering
- Materials Science
- Ocean Engineering
- Electrical Engineering
- Computer Science
- Construction Science
- Geosciences
- Architecture
- Veterinary Medicine





14 State of the Art Laboratories at CIR &

Our Research Focuses on Critical Infrastructure Sectors:

- Novel and Durable Materials
- Transportation Infrastructure Systems
- AI & Robotics in Civil Engineering
- Water Conveyance Systems (Dams, Levees, Culverts)
- Additive Manufacturing (3D Printing)
- Smart Grid & Energy

Workforce Development and Training

15 Laboratories

Advanced Characterization Of Infrastructure Materials (ACIM)

Advanced Infrastructure Materials And Manufacturing (AIMM)

Asphalt Innovation Lab (AIL)

Construction 3D Printing Lab (C3DP)

Concrete Innovation Lab (CIL)

Connected Infrastructure Lab (CNIL)

Geotechnical & Unbound Materials Lab (GUML)

High Bay Lab For Structural & Materials Testing (HBL)

Hypervelocity Impact Lab For Infrastructure Protection (HVIL)

Intelligent Infrastructure Assessment Lab (IIAL)

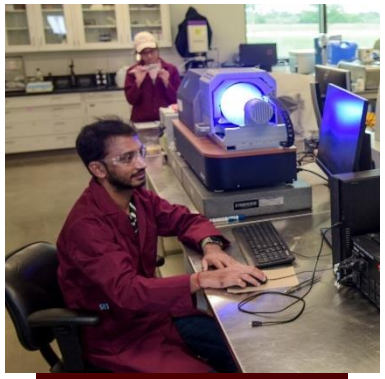
National Corrosion & Materials Reliability Lab (NCMRL)

Nano Micro Characterization Lab (NMCL)

Robotics & Asset Management Lab (RAML)

Smart Grid Center (SGC)

15th Lab TBA!



ACIM

AIMM

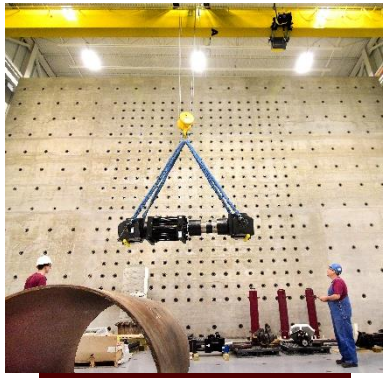
AIL

C3DP

CIL

CNIL

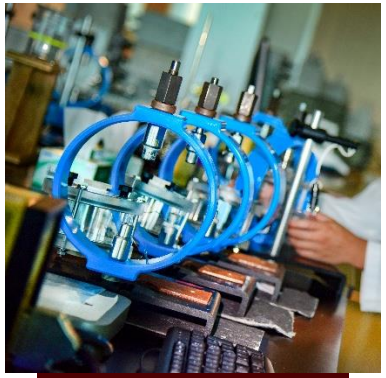
GUML



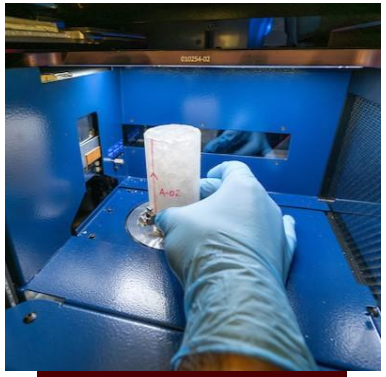
HBL

HVIL

IIAL



NCMRL



NMCL

RAML

SGC

Our 15th lab will be opening in late 2025!

TBA!

Newsletter

CIR | CENTER FOR Infrastructure Renewal

Spring 2025 Edition published in July

Includes:

- Faculty Recognition
- Student Awards & Participation
- Center Activity
- Upcoming Short Courses
- Research Highlights
- & More!

CENTER FOR INFRASTRUCTURE RENEWAL

NEWSLETTER

SPRING 2025

Our center continues to experience remarkable growth in student workforce training and research engagement. Over the past year, students working at CIR have earned numerous scholarships and awards—an inspiring reflection of their dedication and the exceptional mentorship they receive.

In Fall 2023, we proudly hosted 28 student participants in our Student Research Showcase. Due to overwhelming interest, we are now capping the event at 50 students, simply due to space limitations. This surge in participation is a testament to the expanding impact of our programs.

Our research community has also grown significantly. We now include over 35 Laboratory Leads and Principal Investigators (PIs), more than 15 postdoctoral researchers, and over 60 graduate student researchers. This growth spans not only in numbers but also across a wide range of disciplines, broadening our reach and impact.

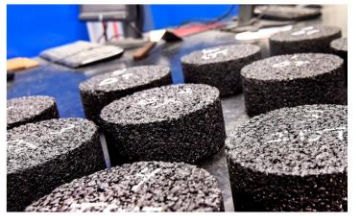
We are supported by faculty and staff from across the Texas A&M University System, including TEES and TTI engineering divisions, Construction Science, Architecture, Animal Science, and Food Science & Technology. Our updated website now reflects all our research areas, including several exciting new additions.

We are truly energized by this momentum and look forward to continued collaboration, innovation, and student success. More details and highlights can be found in this issue of our newsletter.

Thank you—and please don't hesitate to share your feedback with us!

Anand Puppala

Dr. Anand Puppala
Director



CENTER ACTIVITY

Building a Community of Emerging Scholars

The Center has seen exceptional growth in recent years, now comprising a vibrant and diverse team of over 50 undergraduate and 125 graduate student researchers, 32+ faculty members, 15+ postdoctoral researchers (TEES/TAMU), and 25+ full-time research staff (TTI).

At the heart of our success are our student researchers. Their energy, creativity, and dedication fuel the Center's progress across a wide range of initiatives. From developing cutting-edge technologies and analyzing complex systems to shaping impactful policy recommendations, our students are making meaningful contributions every day.

Their work not only advances the Center's mission but also plays a vital role in shaping the future of transportation and infrastructure research.

We are proud to support their journey as scholars, innovators, and future leaders—and we remain committed to fostering an environment where they can thrive.

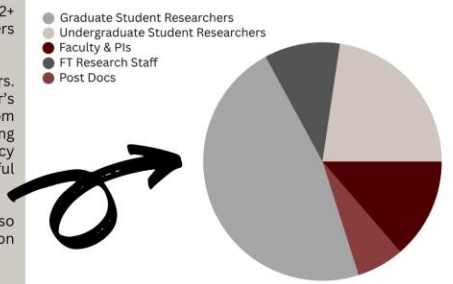
Center Funding Sources

The Center continues to thrive thanks to a diverse portfolio of funding sources and, most importantly, the dedication and innovation of our student researchers. Their work is at the heart of our mission, driving progress across a wide range of disciplines.

On the TEES side, the majority of research funding comes from federal sources (54.7%), with additional support from University Transportation Centers (22.1%), the private sector (14.1%), and state agencies (9.1%). This broad support reflects the Center's strong alignment with national research priorities and industry needs.

On the TTI side, funding is primarily provided by the State Government (80.6%), with contributions from UTCs (6.9%), universities (6.1%), the private sector (6.0%), and a small portion from federal sources (0.5%). This distribution highlights the Center's essential role in shaping state-level transportation research and policy.

Fiscal Year 2025 Research Personnel



Recent Lab Access and Safety Updates

We would like to extend our sincere appreciation to everyone for their cooperation, patience, and understanding during the recent transition period as we updated our safety procedures, lab access protocols, and overall research security measures.

These improvements are essential to maintaining a safe, secure, and productive environment for all researchers, students, and staff. We recognize that transitions can bring temporary challenges, and we are grateful for the professionalism and flexibility shown by our entire community throughout this process.

Your continued support is vital to the success of our center, and we are excited about the stronger, safer foundation we are building together for the future of our research!

Upcoming Short Courses hosted at CIR:

- National Corrosion and Materials Reliability Lab: Fundamentals, Experiments, and Applications of Corrosion (August)
- Smart Grid Center Short Course: Primer on the Planning and Operation of Large-Scale Electric Grids Three Day Short Course (September)
- Smart Grid Center Short Course: Fundamentals of Electric Transmission System Planning Three-Day Short Course (October)

FOR REGISTRATION INFORMATION, UPDATES AND UPCOMING COURSE OFFERINGS VISIT CIR.TAMU.EDU/WORKFORCE-DEVELOPMENT OR SCAN THE QR CODE!

News & LinkedIn

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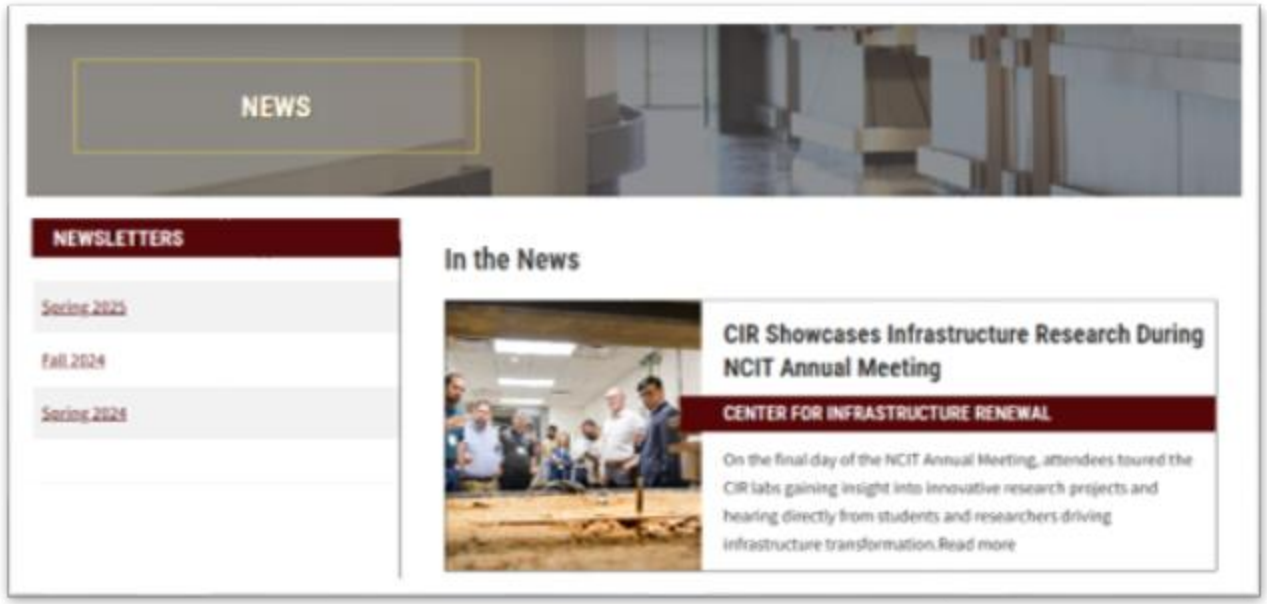

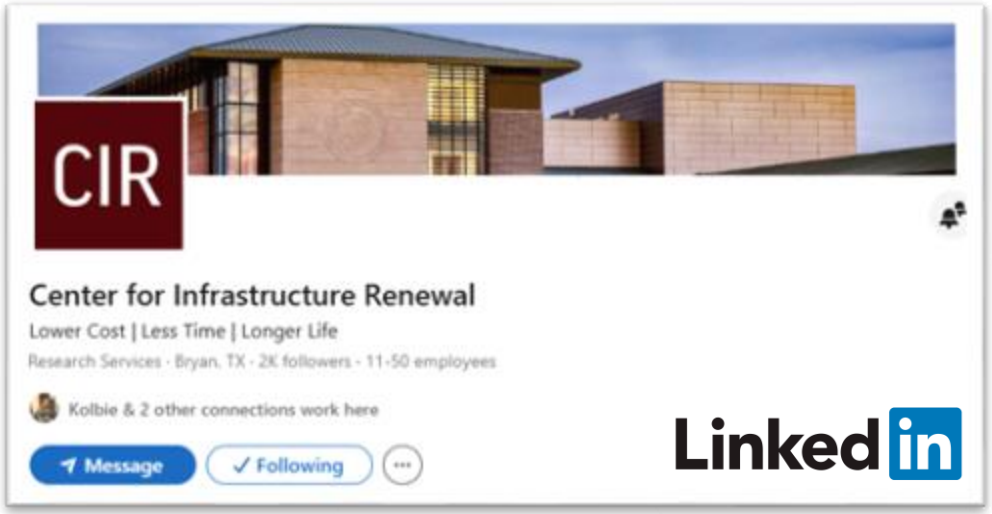

CIR.TAMU.EDU/NEWS

- Visit our website for the latest news posts and newsletters

- Follow & subscribe on LinkedIn to receive post alerts and stay informed about the latest updates from CIR

Student Successes

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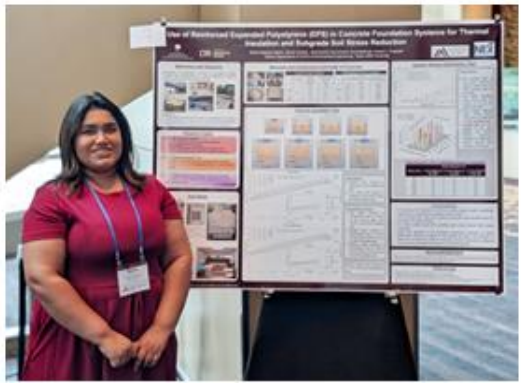

CVEN Students present research at IAI Summit

Zoheb Faisal and Mahia Mahbub Riana presented sustainable construction innovations at the IAI Summit, showcasing Soil-Geopolymer Composites and EPS-reinforced foundations for enhanced durability and thermal performance. PI: Anand Puppala.

NCMRL Showcases Research Excellence at AMPP 2025

National Corrosion and Materials Reliability Lab (CIR) Group Members have strong presence at Association for Materials Protection and Performance Conference in Nashville. PI: Homero Castaneda.

HVI LABORATORY

HVIL Student Awarded DoD SMART Fellowship

Garrett Kawaguchi received a DoD-supported fellowship in Mechanical Engineering, including tuition and stipend, to advance national defense research. PI: Dr. Thomas Lacy.

SMART
SCIENCE, MATHEMATICS, AND RESEARCH FOR TRANSFORMATION
PART OF THE NATIONAL DEFENSE EDUCATION PROGRAM

Student Successes

CIR | CENTER FOR Infrastructure Renewal

Researchers Excel at EMI 2025

Texas A&M Engineering showcased its research excellence at the 2025 EMI Conference in Anaheim, CA, with impactful contributions from postdoctoral and graduate researchers. (PIs: Petros Sideris & Anand Puppala)

CIR Researchers Represent at TRB 2025

Ayazhan Bazarbekova and In Kyu Jeon presented sustainable cement research at the 104th TRB Meeting, highlighting biochar-enhanced hydration and EPS-based materials. PI: Yong-Rak Kim.


Zachry Department of
Civil & Environmental Engineering
Texas A&M University
is pleased to present
Wonsuh Sung
the
Award for Excellence in Teaching
2025

CVEN Excellence in Teaching Award

Dr. Wonsuh Sung received the Excellence in Teaching Award and led a published study on data-driven shear capacity models for prestressed concrete beams. PIs: Dr. Petros Sideris and Dr. Stephanie Paal.

TEES Awarded Funding

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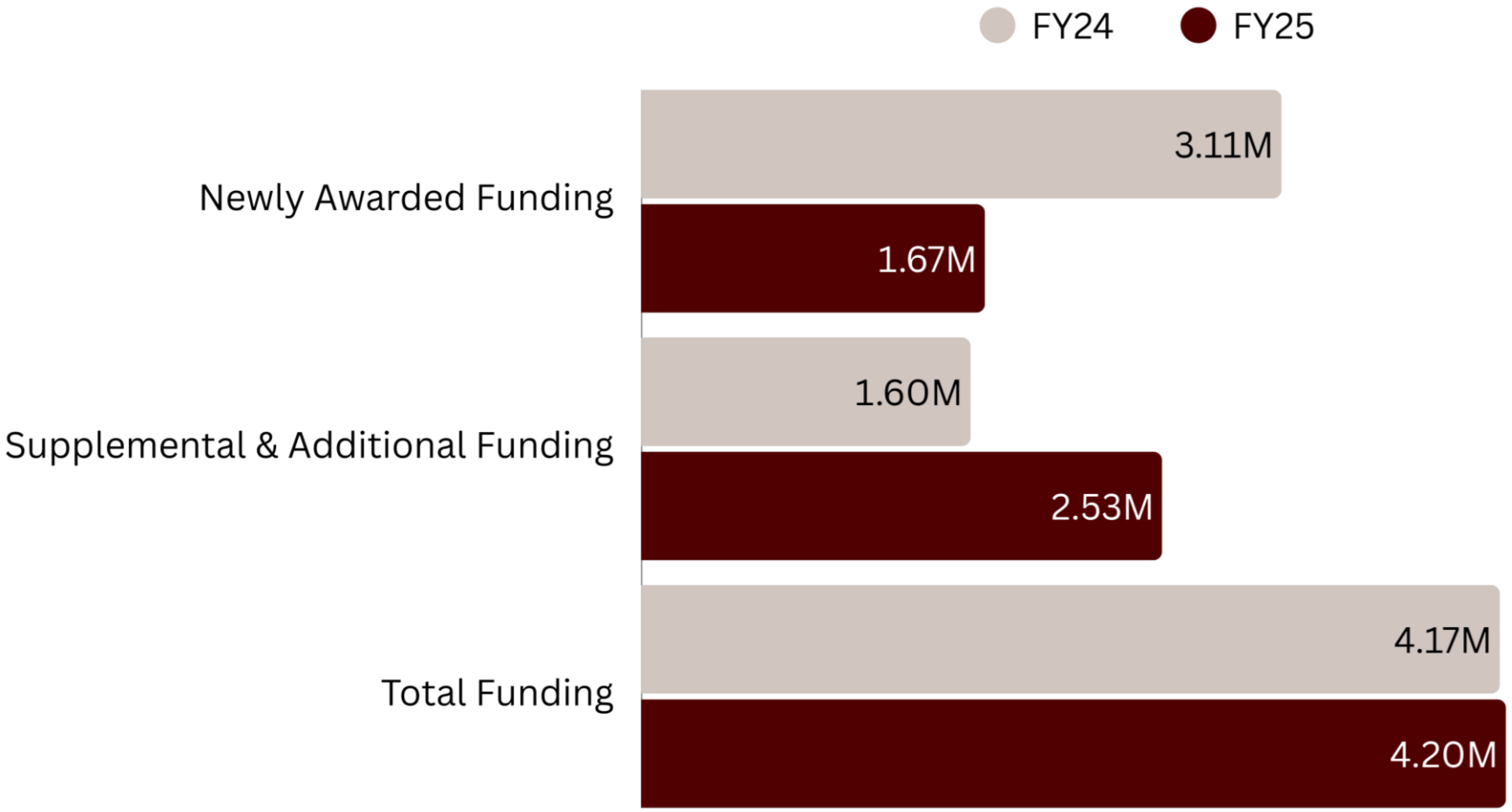

Note: *Fiscal Year 2025 data reflects funding from September 2024 - July 2025.*

60% Increase in Supplemental Funding in FY25

- **Strong funder confidence in our work & successful project execution**
- **Total awarded funding remains competitive despite fewer awards**

TEES Proposal Submissions

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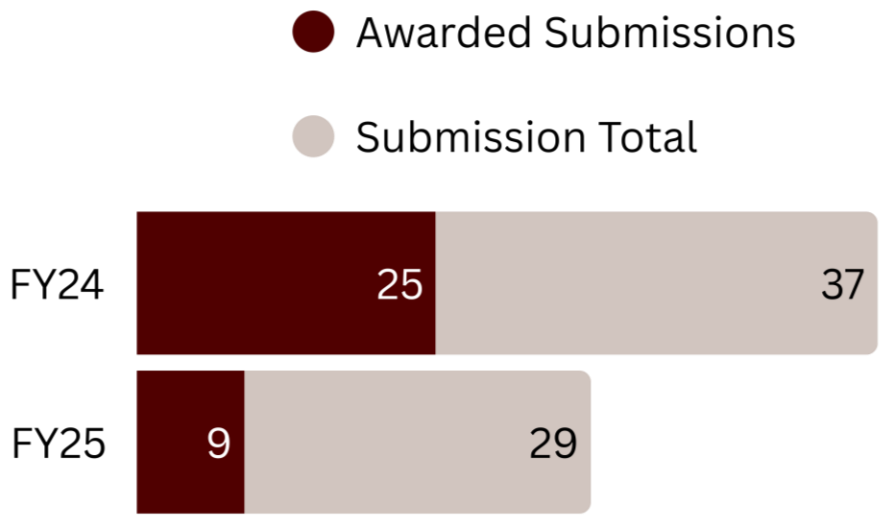
We've seen 3x Increase in Submitted Proposal Funding

FY24 $16M → FY25 = $55M

This reflects improved outreach strategy focused on:

- **High-impact, competitive funding opportunities**
- **Enhanced engagement with funding agencies**
- **Improved proposal quality & alignment with funder priorities**



Average Award per Proposal up 147%

FY24 $188K → FY25 $466K

Proposals are more targeted and higher-value!

Strategic Plan Metrics

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Partnerships

- ✓ Increase the number of multicenter-related research projects to 2 by 2023, with one focused on materials and construction, and one on testing, sensing & models.
- ✓ Increase the number of industry partnerships to 3 by 2026.
- ✓ Have 5 industry partners active in funding research in CIR labs and using CIR facilities by 2026.
- ✓ Increase the number of industry partners using CIR services for testing/proving of technology and products to 10 by 2026.
- ✓ Increase the number of strategic partnerships to 3 by 2026.
- ✓ Increase the number of state sponsored research projects from inside and outside of the state of Texas to 15 by 2026.
- ✓ Have at least 8 federal research projects by 2026.

Strategic Plan Metrics

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Human Capital

- ✓ Increase full-time research staff in the CIR to 10 by 2026
- ✓ Increase the number of PI's actively using CIR Facilities to 25 by 2026

Facilities & Equipment

- ✓ Improve provision and/or access to remote-sensing and UAV research-related equipment to enable 20% increase in infrastructure-related remote-sensing research
- ✓ Acquire new laboratory and field equipment and nondestructive testing capabilities in various infrastructure tracks, such as additive manufacturing and unmanned aerial vehicles
- ✓ Develop stronger computing capabilities for modeling and simulation

Training & Technology Transfer

- ✓ Increase the number of patents granted to CIR researchers to 1 per year by 2026
- ○ *Increase the number of startups and established companies maturing and bringing CIR discoveries to market to 7 by 2026*
- ✓ Host 2 conferences or symposia per year sponsored by CIR researchers
- ○ *Host 10 continuing education classes in our spaces per year by 2026*

Center Updates - TTI

Dr. Edith Arámbula Mercado

CIR Deputy Director

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TTI Funding

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FY25 Sponsor Funding

20 Sponsors

- 80% DOTs
- 8% Universities
- 7% National
- 5% Industry

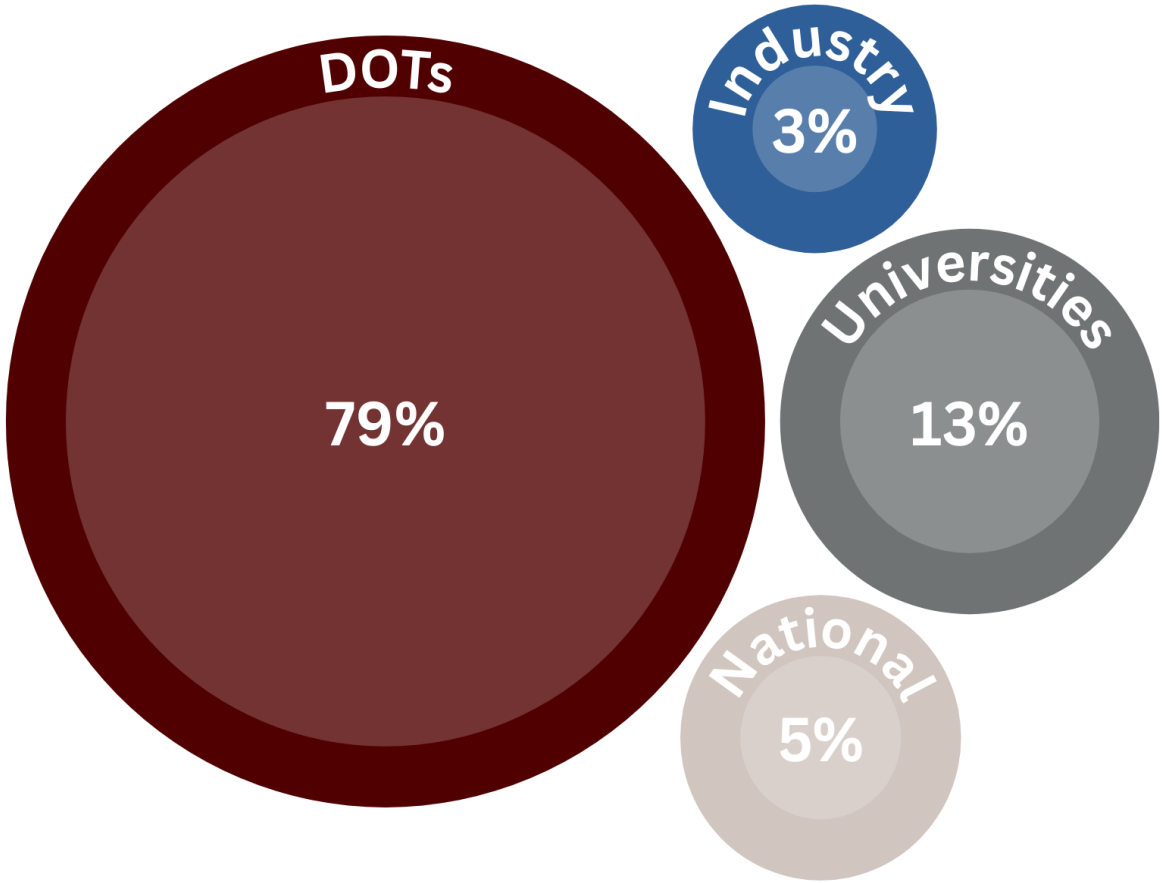
122 Active projects

- Est. Budget → $18M

Total PIs: 29

CIR Est. Research Expenditures Distribution

FY25 → $5.7M



TTI Investment

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Lab Equipment Procurement Investment

FY25 → $250K

Funding Sources:

- TTI Capital Equipment Program: $135K
- Sponsored Funding: $34K
- Division/Program Reinvestment: $77K

Equipment	Quantity	Cost
Superpave Compactors	2 units	$100,000
Environmental Chamber with humidity control	1 unit	$30,000
Oven	1 unit	$27,000
Tall Sieve Shaker with Screens	2 units	$20,000
Fine Grinder	1 unit	$15,000
Rolling Thin Film Oven	1 unit	$15,000
Resistivity Meters	1 unit	$13,000
Stereomicroscope	1 unit	$9,800
Jaw Crusher	1 unit	$9,000
Circular Sieve Shaker	1 unit	$7,000

CAP Member Spotlight

Dr. Rich Szecsy

CEO, Big Town Concrete

"Practical and Applied Needs for Concrete Compressive Strength Modeling Amid Rapid Changes in Cement Types and SCMs in the Texas Marketplace"

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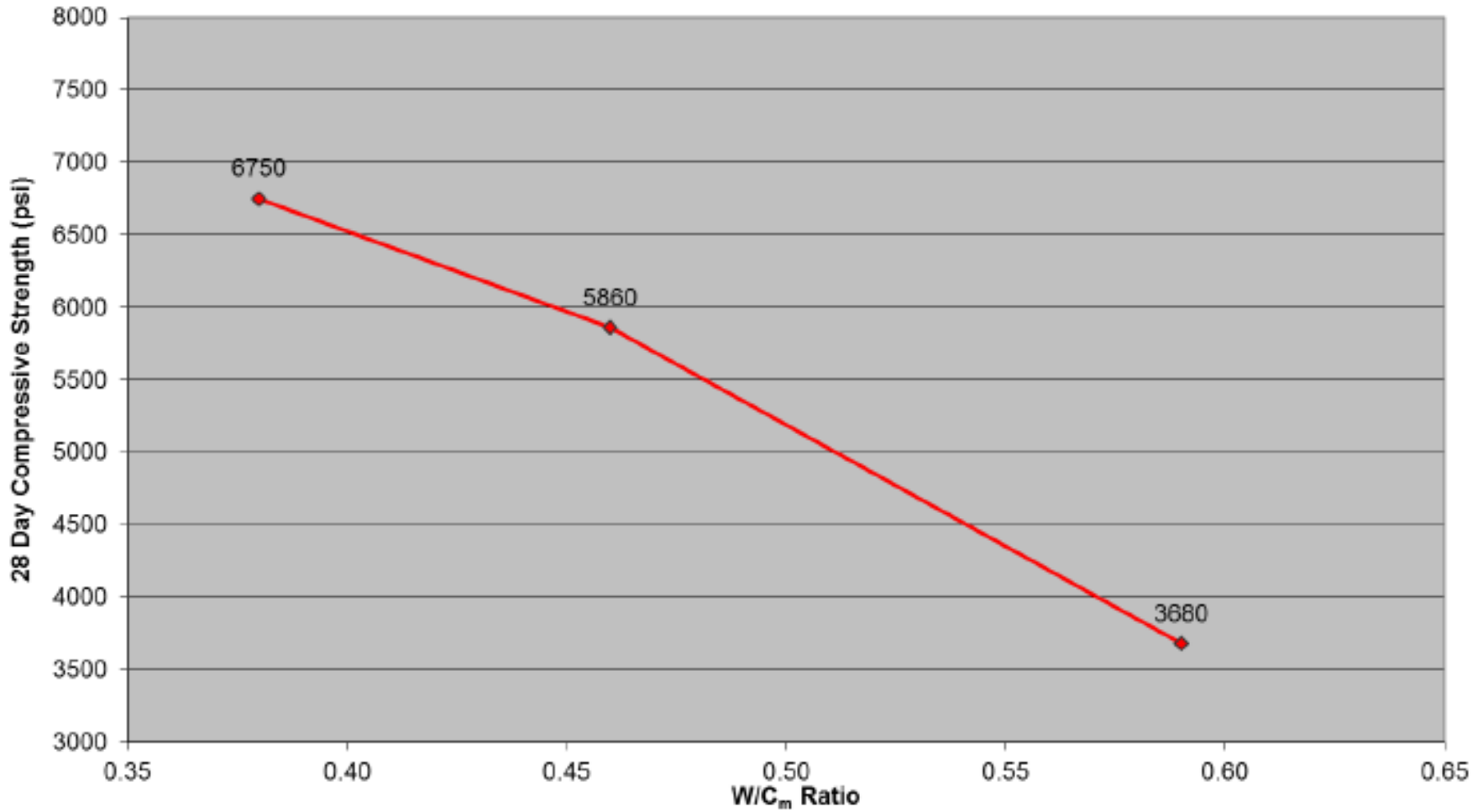
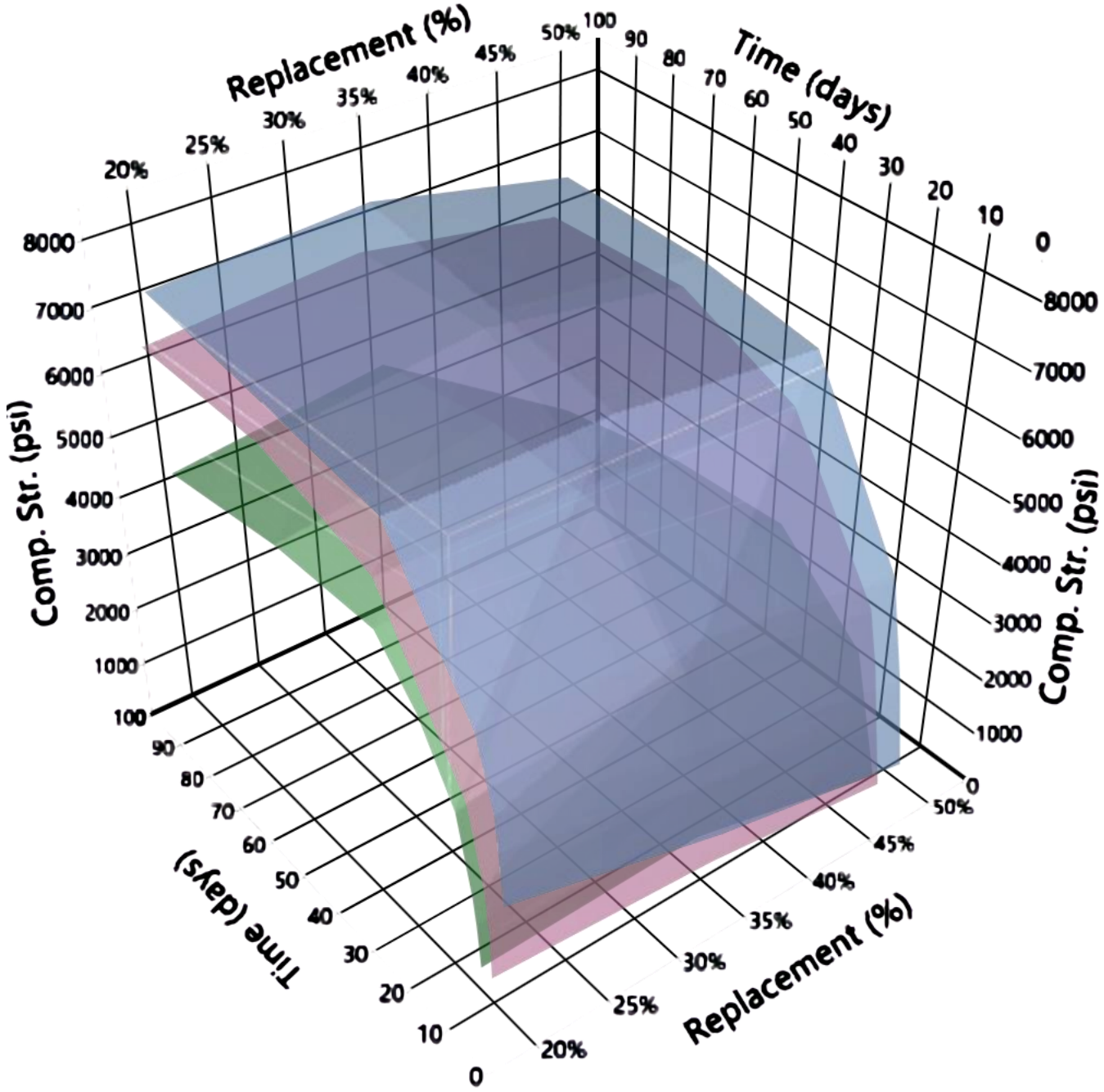


A Review of ACI 301 Section 4, Concrete Mixtures, Bill Goodlow, Technical Services Manager, CEMEX, pg. 43

4.5 sk (423 lb.)

6.0 sk (564 lb.)

7.5 sk (705 lb.)



CIR Research Highlight

Dr. Navid Jafari

Associate Professor of Civil & Environmental Engineering, TAMU

Geotechnical Infrastructure Challenges Under Extreme Events

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Extreme Weather Events

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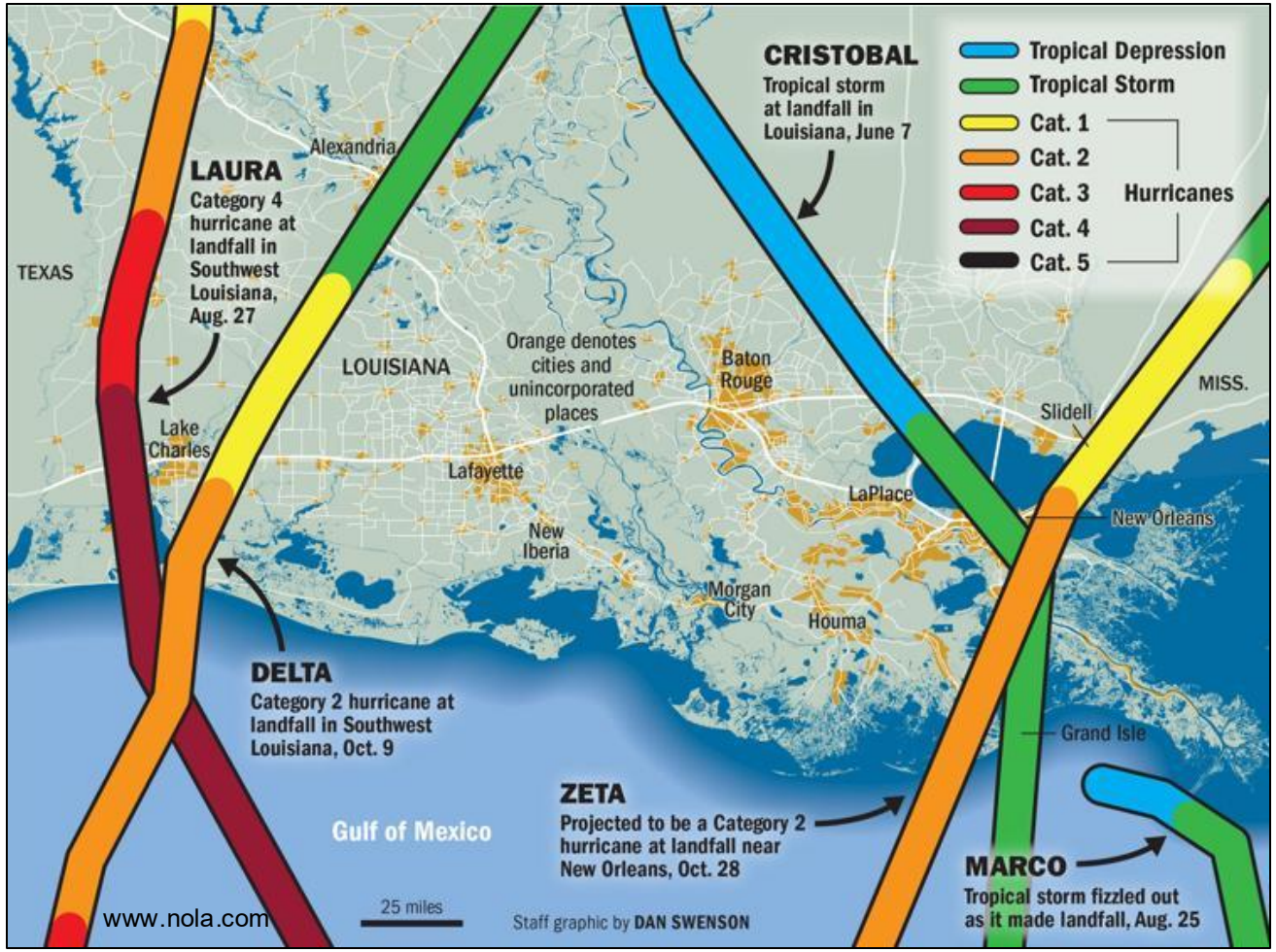
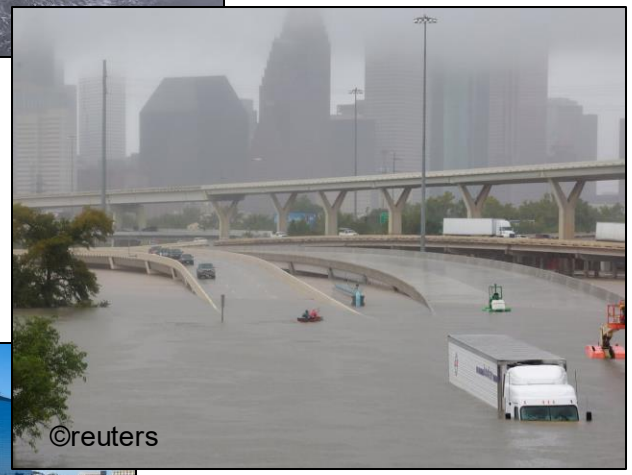


2020 Hurricane and Tropical Storm Landfalls in Louisiana



Extreme Weather Events

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Robin Lubbock/WBUR


Shutterstock


Brina Montoya

Extreme Events & Infrastructure

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Natural Infrastructure: Wetlands

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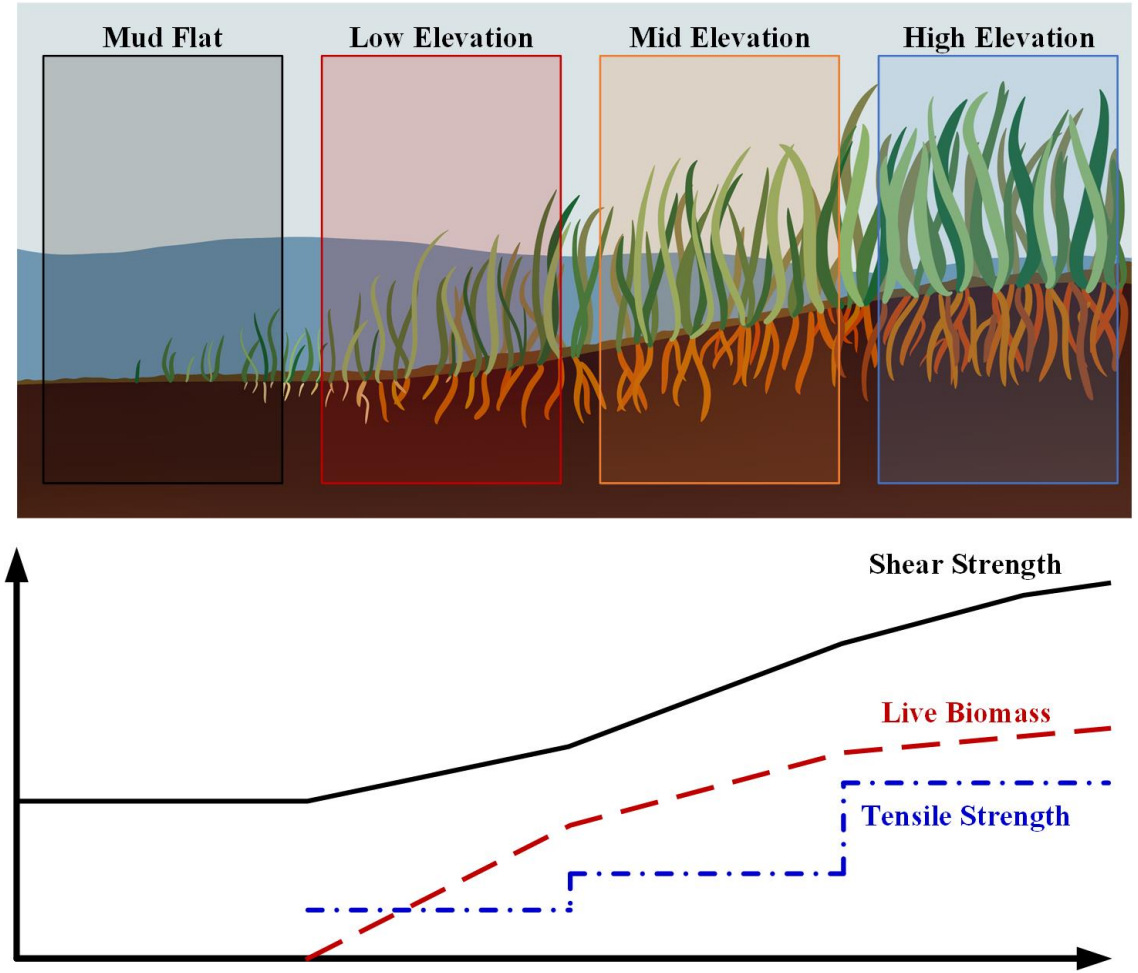
- Coastal wetlands are vital natural defenses, protecting infrastructure by reducing storm surge, stabilizing shorelines, and buffering flood risks.
- Root system shear strength strongly correlates with live root biomass (Jafari et al. 2024).
- Beyond live biomass, root tensile strength (TS) and morphological traits explains additional variation in shear resistance (Hassan et al. 2025).



Conceptual relationship between root properties (Jafari et al., 2024)

Root Biomechanics

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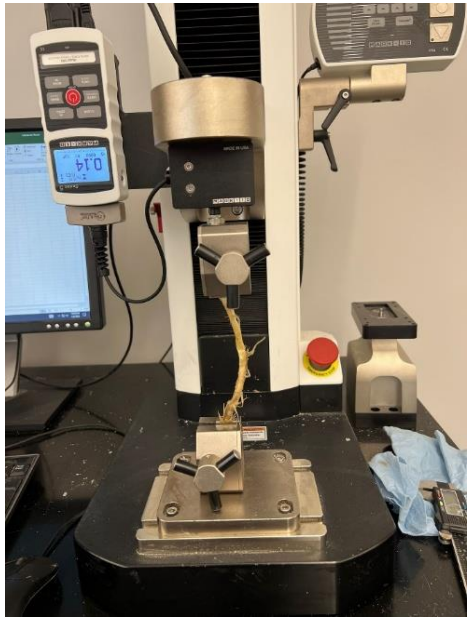
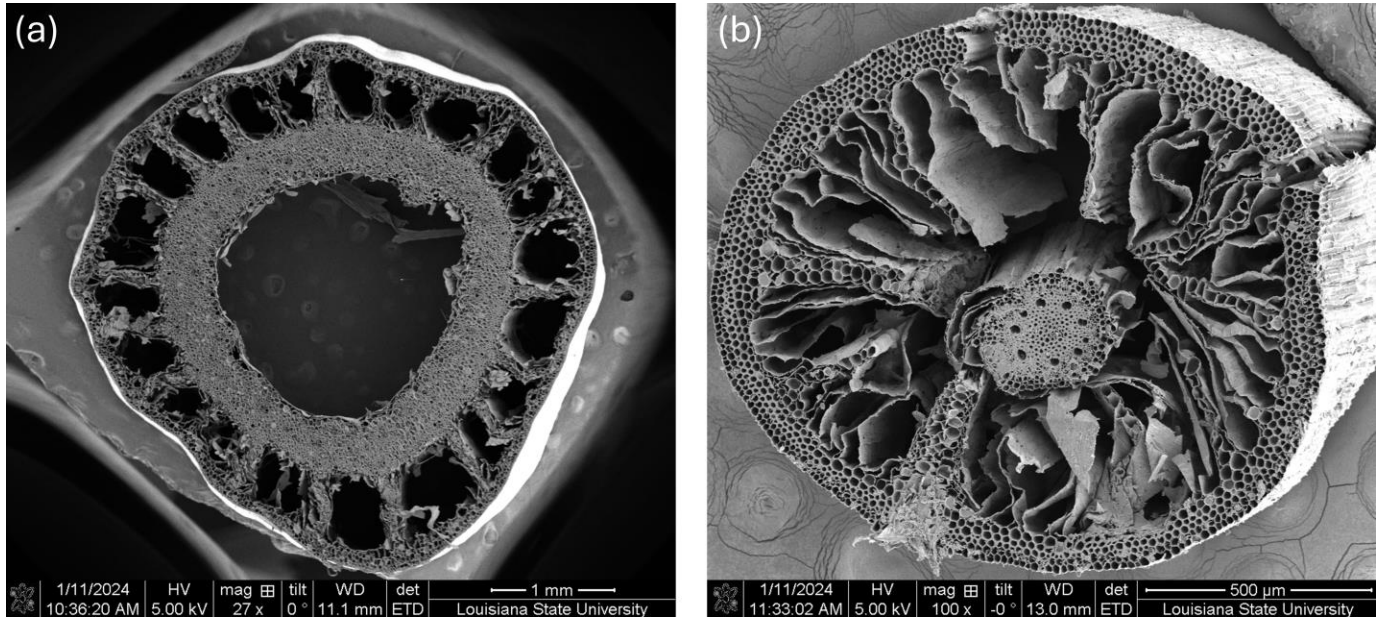
- Motorized tensile tests across root sizes/depths.
- Scanning electron microscopy (SEM) imaging for root cross-sections at ~4 µm resolution, combined with ML segmentation (Random Forest).
- Hydroperiod data integrated with mechanical results.



Motorized tensile testing device (ESM 1500)



SEM images of *Spartina* roots. (a) coarse root, and (b) fine root.

Trade-offs between TS and Porosity

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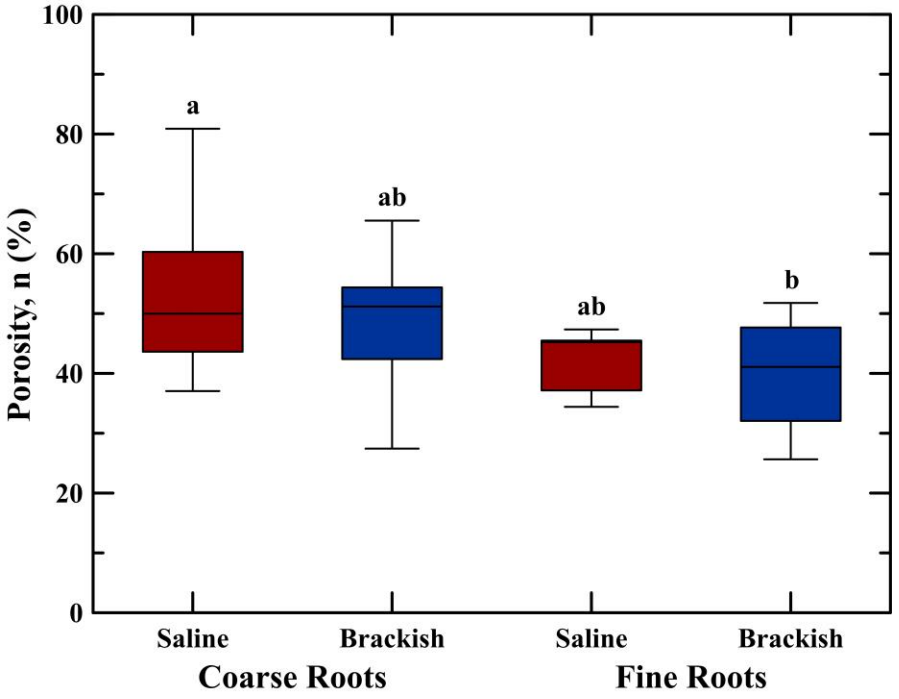
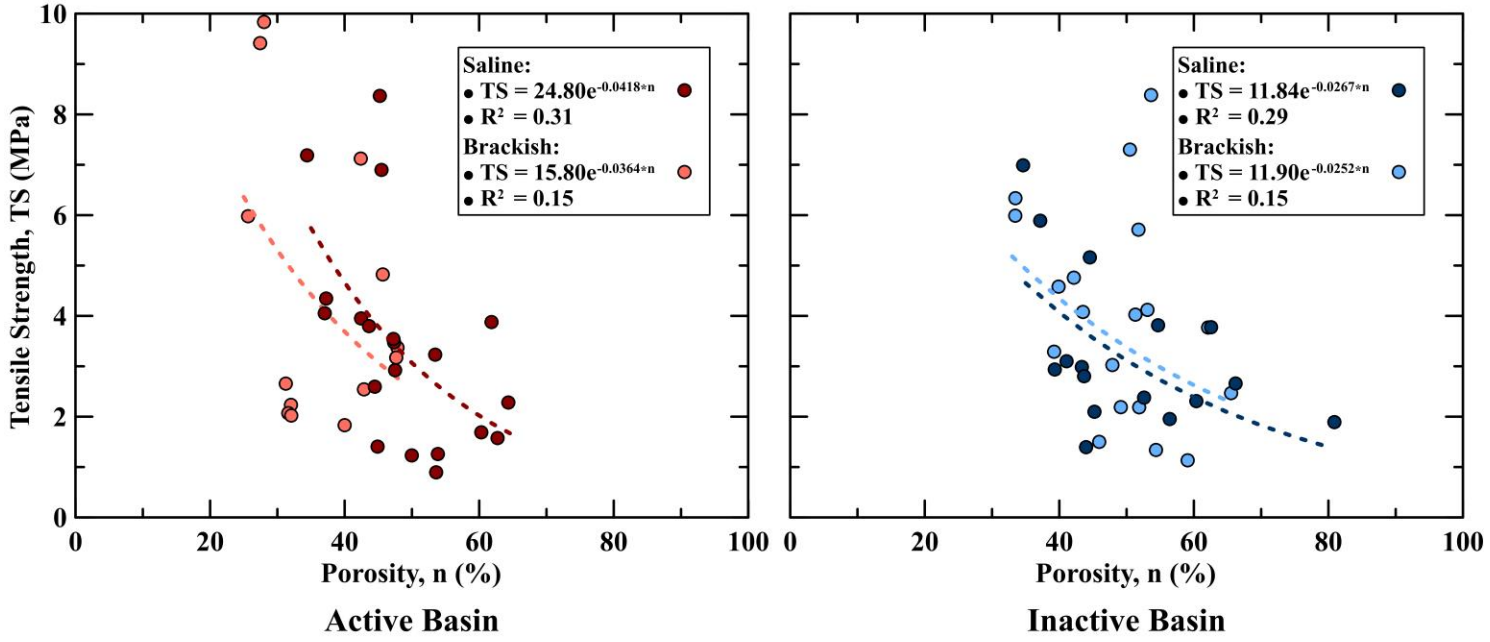
- Fine roots (<2 mm, shallow) are strongest (~5 MPa).
- Coarse roots are weaker (~2 MPa), more porous (~50%).
- Exponential trade-off: Porosity ↑ & TS ↓.





Relationship between root porosity and root tensile strength.

Biomechanics to Coastal Design

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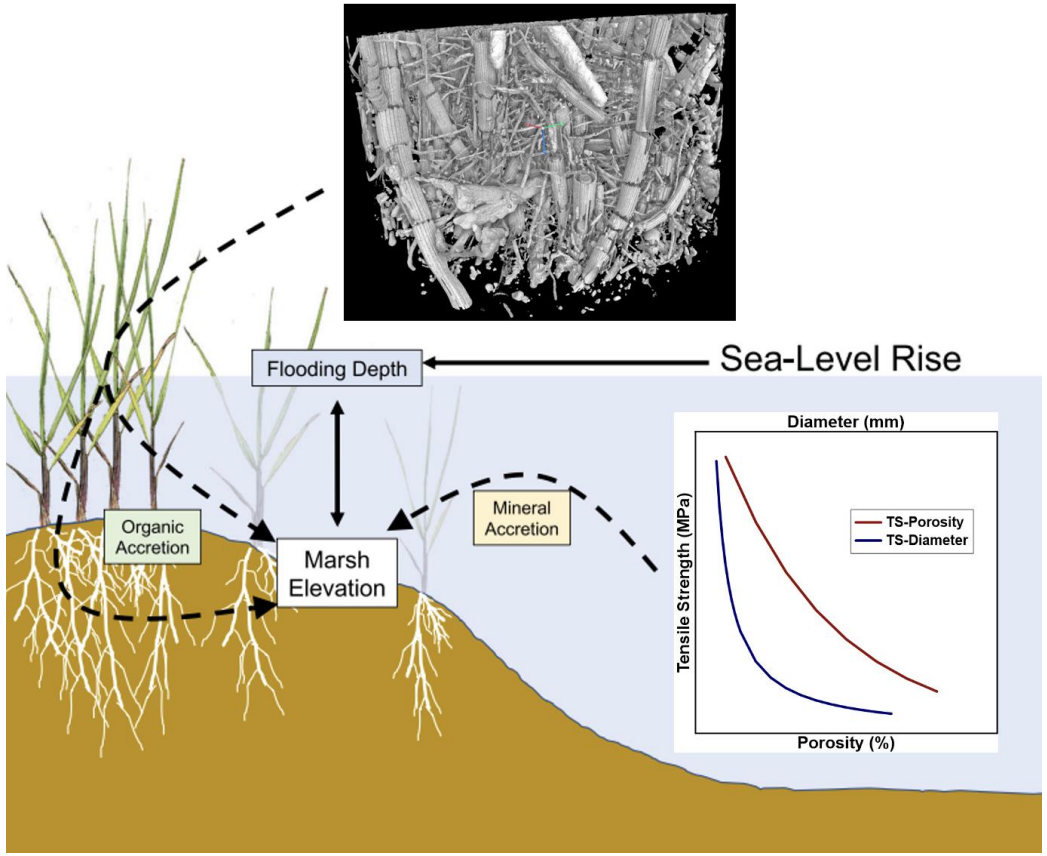
- Integrates into predictive models of shoreline erodibility and storm-driven erosion.
- Highlights the role of roots as natural infrastructure (wetlands, mangroves, coastal forests) in stabilizing soils and protecting shorelines.
- Moves restoration design toward a mechanistic framework, addressing the lack of design methodology.
- Opens the path for future research: 3D root structure analysis using XCT and multi-scale biomechanical models.



Conceptual framework linking sea-level rise, marsh elevation, and flooding events. Root strength emerges as a key trait influencing soil reinforcement, enabling trait-based, mechanistic design approaches for wetland restoration and shoreline protection.

Major Defects in Levees

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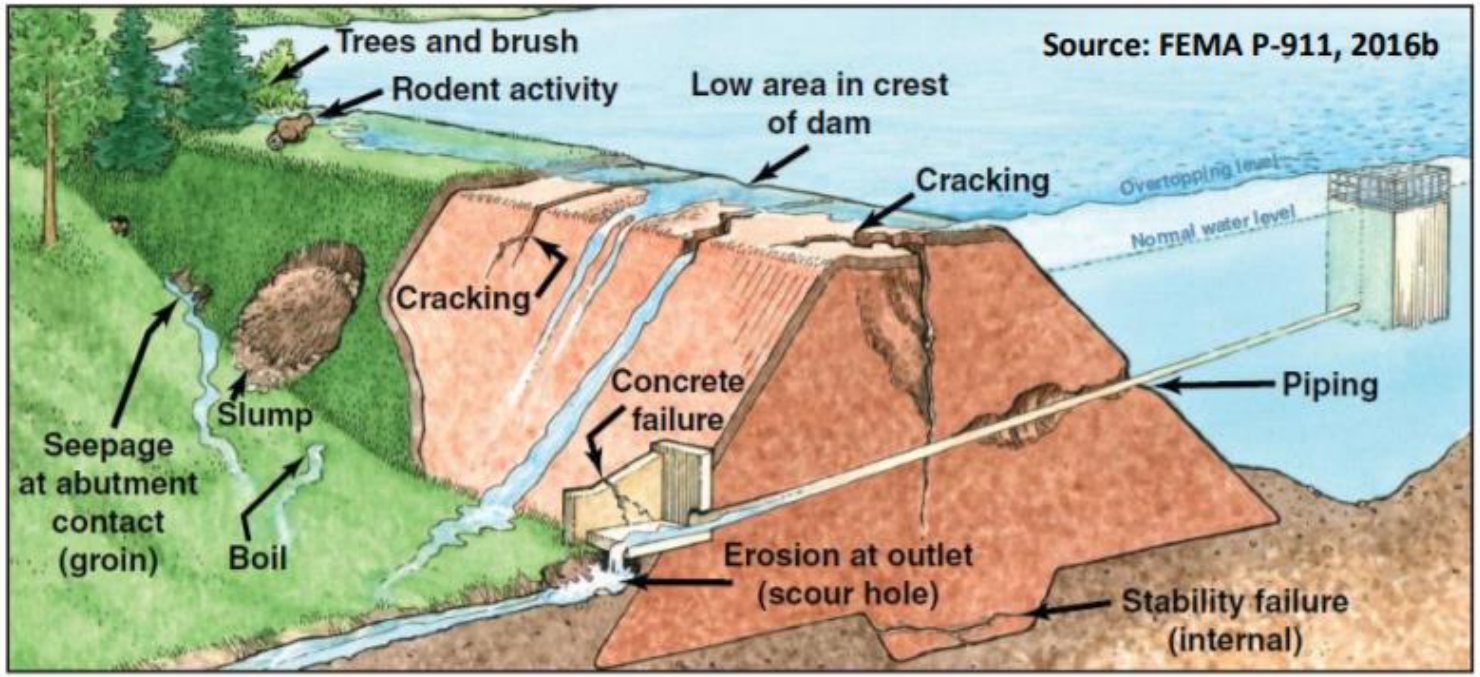

- Settlement of Slope System and Shallow Slope Failures (Slumps)
- Internal Erosion and Seepage
- External Erosion – Slopes and Near Culverts
- Vegetation Growth, Encroachment
- Cracking on Slopes

Inspections should identify these defects and proper maintenance measures need to be applied

Technology-Assisted Inspections

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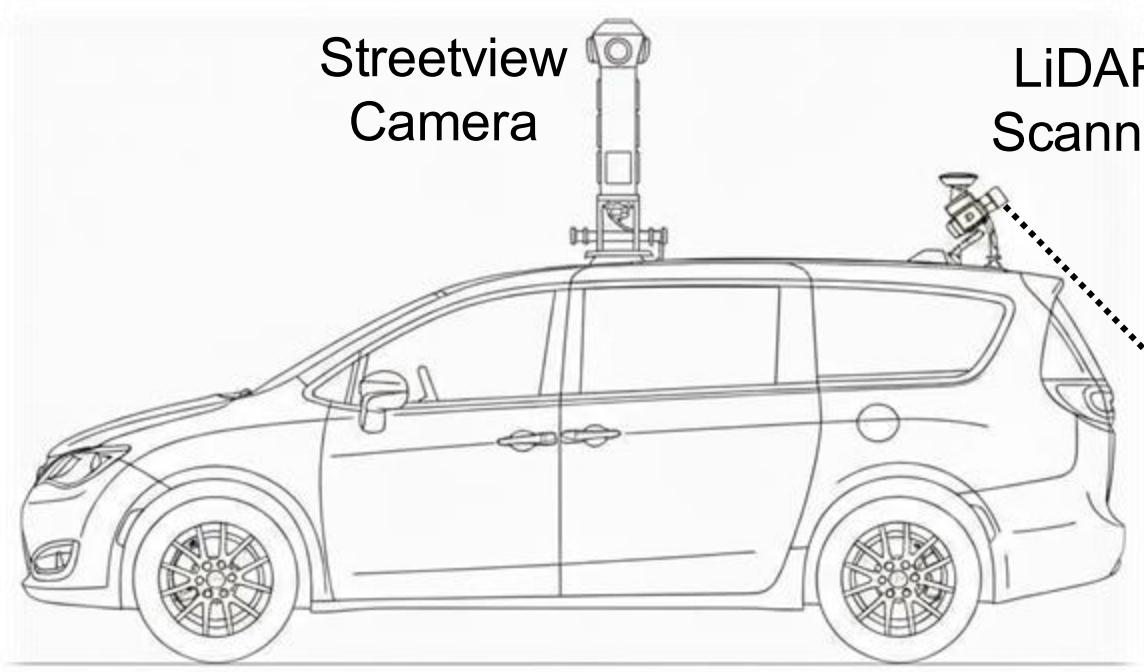
Applied Streetview Camera
- 6-lens camera system
- 360-degree imaging
- 1 photo per lens every meter

MiniRanger LiDAR scanner
- Absolute accuracy: 3 cm
- Laser range: 290 m
- Scan rate: 300k shots per second scanning continuously



Streetview Imagery

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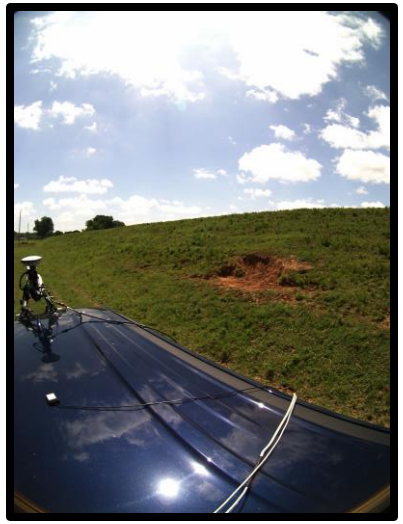
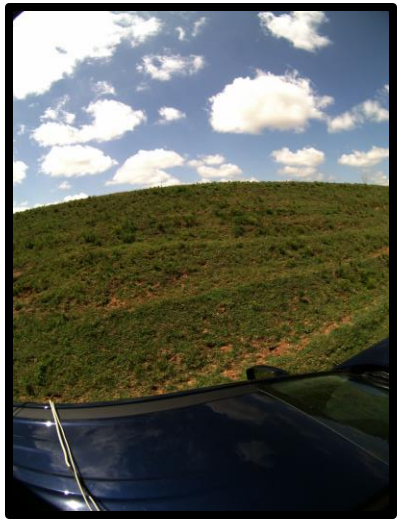

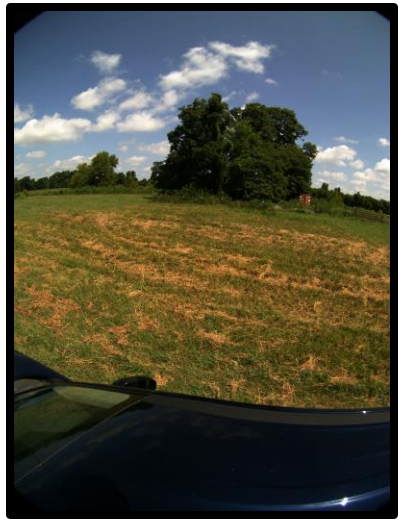


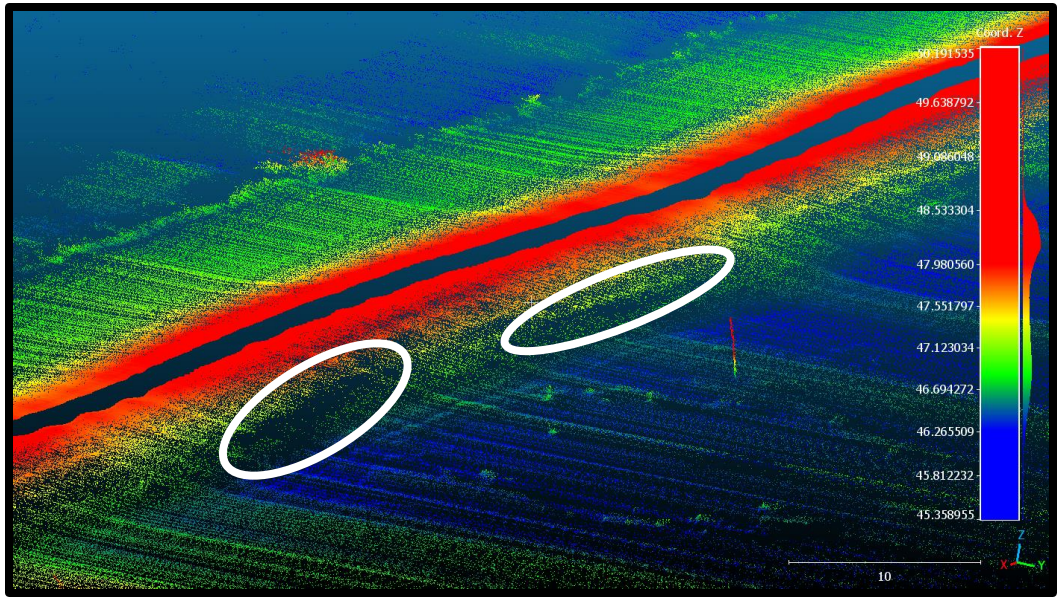

Processing – 3D Reconstruction

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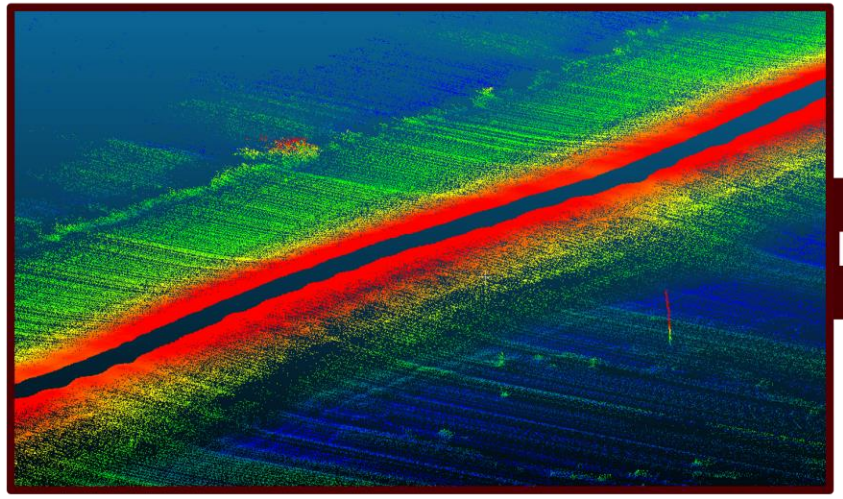
Raw Streetview Data

Structure from Motion

Colorized Point Cloud



Raw LiDAR Data

LiDAR Processing

Point Cloud with Increased Accuracy

3D Reconstruction

Robotic Integration for Levee Works

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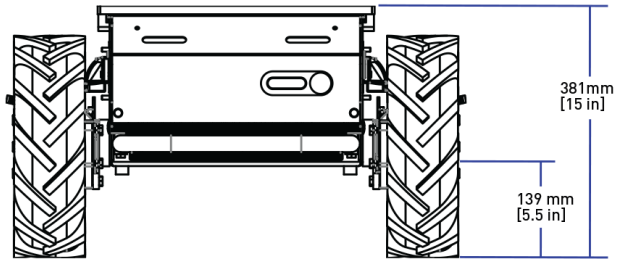
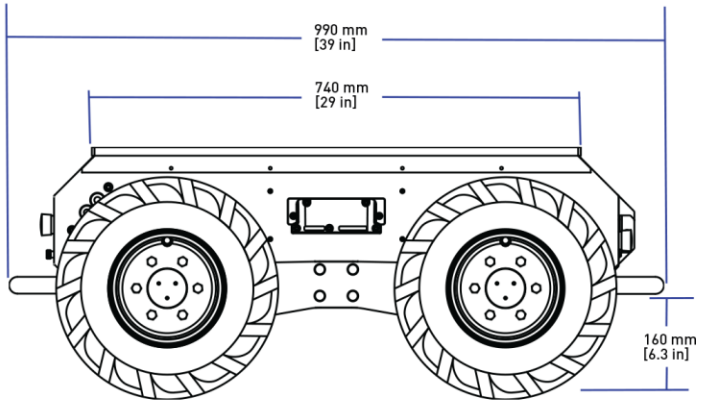
Husky A300 UGV

- Real-time robotic inspection platform
- Perform studies on all terrain and weather conditions
- AI/ML Based Algorithm development for screening and analyzing results
- Suitable for annual inspections and reconnaissance surveys



FRONT



SIDE

Husky A300 UGV Specs

- Max speed: 4.4 mph
- Extended Runtime: 12 hrs
- Dimensions: 39 x 26.5 x 14.6 in
- Base weight: 176 lbs
- Max payload: 110 lbs

CIR Competencies & Marketplaces

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Competencies	Marketplace					
Materials & Construction	Mega Infrastructure	Transportation Infrastructure	Energy Infrastructure	Infrastructure for Austere Enviornments	Resilient, Healthy & Sustainable Civil Infrastructure	
Novel, Smart & Durable Materials						
Advanced Construction Methods						
Artificial Intelligence & Machine Learning						
Digital Twinning, Visualization, AR & VR Interfacing						
Testing, Sensing & Modeling						
Life Cycle Sustainability, Cost Studies & Asset Management						
Intrusive, Non-Intrusive & Non-Destructive Lab & Field Studies (Full Scale Model Testing)						
Remote Sensing (Satellites) & UAV Studies						
Predictive Infrastructure Performance Modeling						
Smart, Secure, Connected & Autonomous Technologies						
Technology Transfer						
Workforce Training & Development						
Entrepreneurship & Commercialization						

Geo-Extreme 2025 Conference

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PRELIMINARY PROGRAM

Join Us in **Long Beach!**

Invitation to Attend

FACING THE CHALLENGE OF A CHANGING CLIMATE TOGETHER

Dear Colleagues and Friends,

It is our great pleasure to invite you to attend Geo-Extreme 2025, a vital gathering of professionals committed to advancing geoengineering solutions for a rapidly changing world. As climate-driven disasters intensify across the globe, the role of geo-professionals has never been more critical.

Over the past 50 years, extreme weather has claimed more than two million lives and caused over $4 trillion in economic losses, according to the United Nations. In the United States alone, weather and climate disasters in 2023 led to $93 billion in damages and 492 deaths, as reported by NOAA. The trend is unmistakable: billion-dollar disasters are increasing in both frequency and impact, and projections indicate this will continue as global temperatures rise.

In response to these urgent challenges, Geo-Extreme 2025 is organized around the theme of "Geotechnical Engineering for Extreme Events," to focus on resilience, sustainability, and innovation in geoengineering. We recognize the necessity of timely, forward-thinking actions—evaluating existing infrastructures, designing risk reduction systems in vulnerable regions, refining traditional geo-systems, and developing new climate-adaptive technologies and risk tools.

Long Beach, California, the venue for Geo-Extreme 2025, provides a particularly relevant backdrop, having recently witnessed the devastating impacts of wildfires and other extreme climate events affecting the greater Los Angeles area.

The conference brings together an exceptional program of topics that reflect the evolving needs of our profession. Sessions will feature research and case studies on big data analytics, compound and cascading event modeling, and climate-resilient infrastructure design. Experts will share lessons learned from real-world disasters, explore post-disaster materials management, and present innovations in seismic hazard mitigation, permafrost stability, and coastal resilience.

In addition, we will examine the increasing role of decision-making frameworks, including planning, preparedness, and recovery efforts, and the importance of integrating social equity and community resilience into all aspects of geoengineering for extreme events.

Whether you are a researcher, practitioner, policymaker, or student, this conference offers an unparalleled opportunity to connect with global experts, exchange cutting-edge ideas, and collaborate on solutions that will shape the future of resilient infrastructure. Together, we can strengthen our collective knowledge and contribute to the safety and sustainability of communities worldwide.

We are honored to host you for this critical event and look forward to the ideas, discussions, and partnerships that will emerge as we address the complex challenges of climate extremes through innovation, interdisciplinary coordination, and resilient geoengineering solutions.

Warm regards,

Conference Co-Chairs

Daniel Pradel, Ph.D., P.E., D.GE, F.ASCE, *The Ohio State University*

Navid H. Jafari, PhD, A.M.ASCE, *Texas A&M University*

Recap: Virtual One on One Meetings with CAP Members

Mr. Greg Baker

CAP Chair

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Texas A&M Transportation Institute

TEES | Texas A&M Engineering Experiment Station

Lower Cost | Less Time | Longer Life

Water Infrastructure

Dr. Anand Puppala

CIR Director

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Q & A Session

Mr. Greg Baker

CAP Chair

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Final Announcements

Mrs. Pamela Mize

CIR Program Specialist

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Thank you for attending the Fall 2025 CIR Advisory Panel Meeting!