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IRISE RESEARCH IMPLEMENTATION

IRISE Annual Meeting

May 23rd, 2024

The Path

- Development of Benefit Methodologies
- 2022 Project Benefit Results
- 2024 Project Benefit Results and Implementation Strategies
- Review of IRISE Implementation Ready Projects and Strategies

Development of Benefit Methodologies

The transfer of new technologies into practice is the goal of IRISE research

- More durable and longer lasting highway infrastructure creates benefits to extend the life of highways and bridges
- These benefits must be measured decades into the future
- The challenge is to quantify and predict benefits for many of these advancements

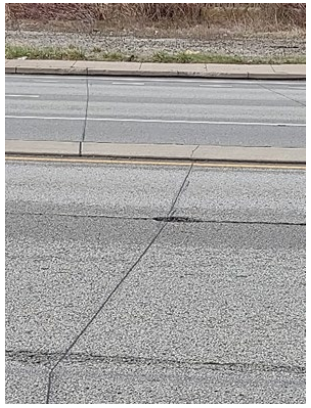
Development of Benefit Methodologies

- Benefits must be considered in the cost of design, construction and maintenance phases of highway infrastructure projects

- Environmental impacts and sustainability benefits are difficult to evaluate but need to be considered

- Methodologies have been developed that quantify and can extrapolate cost and user data available on an appropriate scale (state or project) for highway infrastructure and user costs or case studies

2022 Project Benefit Results –Material Compatibility Repair Project



Pavement Repair Research Results Benefit Analysis Summary					
Repair Method and PennDOT Costs per Year	Total Repairs Cost	Adjustment for Increased Repair Costs (7%)	Average 2 Year Life Cycle Annual Replacement Costs - Current Method	Average 15 Year Annual Life Cycle Replacement Costs - New Method	Potential Savings over 15 Year Cycle of Repairs
Partial Depth Repairs (Material Comptable Repairs)					
2018	$1,049,049.65	$1,122,483.13	$600,339	$85,648	$7,720,360
2019	$3,045,572.50	$3,258,762.58			
2020	$383,670.00	$410,526.90			
2021	$324,420.00	$347,129.40			

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2022 Project Benefit Results - Pavement Surface Distresses Related to Pavement Marking

- Two case studies of recent asphalt major longitudinal joint repair projects from ECMS determined that 1,180,950 lineal feet of longitudinal joints were repaired at $1.60/LF
- When joints are repaired the reapplied pavement markings are a cost that could be eliminated if longer lasting joints were constructed
- The potential savings for reapplication of longitudinal pavement markings per year could be **$1,937,772** for thermoplastic for the two case studies evaluated

2022 Project Benefit Results - Remote-Controlled Technology Assessment for Safer Pavement Construction and QA/QC

Three technologies were identified to improve worker safety in work zones:

- Automated Real-Time Thermal Profiling for Asphalt Paving based on the Pave IR system
- Remote-Controlled GPR (Ground Penetrating Radar)
- Autonomous Impact Protection Vehicle (AIPV)

Monetary of Technology Preventable Highway Worker Injury Reports of Vehicles intruding into active work zones in Pennsylvania 2017-2020

Year	Number of Injuries	Average Cost	Total	Inflation Factor	Present Value
2017	11	$20,227	$222,297	1.6	$355,995.20
2018	4	$20,227	$80,908	1.7	$137,543.60
2019	6	$20,227	$121,362	1.75	$212,383.50
2020	2	$20,227	$40,454	1.82	$73,626.28
Total					**$779,548.58**

2022 Project Benefit Results - Development of Simplified Mechanistic-Empirical Design Tool for Pennsylvania Rigid Pavements

Three case studies were identified to illustrate the benefits of using the ME design method that would result in less concrete pavement depth.

Project	Original Design Total Costs	PittRigid ME Design Total Costs	Cost Reduction
Southern Beltway Plain Cement Concrete Pavement RPS	$44,025,986	$37,422,088	$6,603,898
US-119 Plain Cement Concrete Pavement RPS	$10,640,273	$9,044,232	$1,596,041
Ivory Avenue Plain Cement Concrete Pavement RPS	$210,375	$178,819	$31,556
		Total	**$8,231,495**

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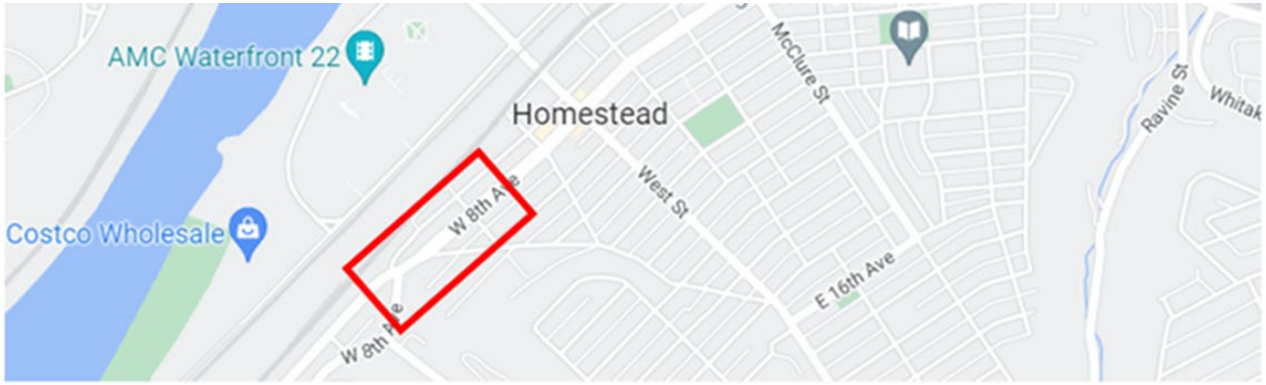
2022 Project Benefit Results - Early Opening to Concrete Pavements to Traffic

Case Study of PennDOT Project Route 837 Construction Project PennDOT-District 11-0 Golden Triangle Construction Contractor

- Strength was verified using the Early Opening Method by utilizing maturity sensors in the test cylinders and water curing them
- The unit cost differential on materials was $6.50 per cubic yard. This translated to a total cost benefit of **$40,950** by using the normal strength PennDOT class AAPAVE mix in lieu of the HES mix by determining strength earlier to open it to traffic



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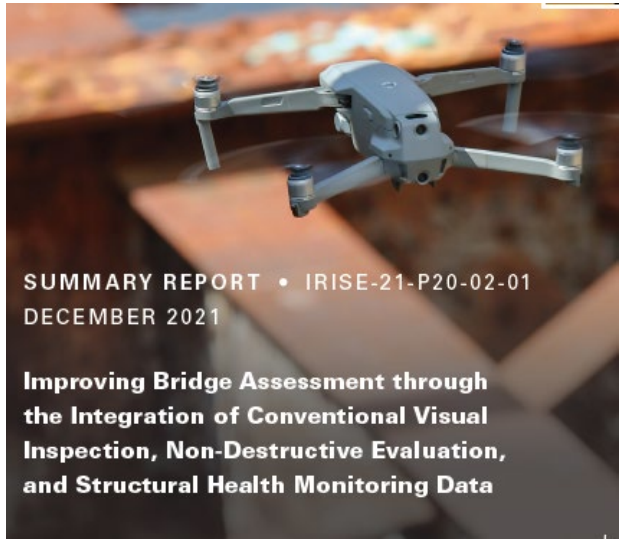
2024 Project Benefit Results and Implementation Strategies

2024 Developing and Applying Methodologies to Quantify the Benefits of IRISE Projects – CDR Maguire David Snively, PE Project Manager

- The goals of this project will be to identify a maximum of five (5) completed or in- process IRISE research projects from prior year programs and
- Develop unique methodologies to quantify the **Implementing** research findings, and analyze the potential benefits of the research results

2024 Project Benefit Results and Implementation Strategies



Project being considered (completed):

- Improving Bridge Assessment Through the Integration of Conventional Visual Inspection, Non- Destructive Evaluation, and Structural Health Monitoring Data
- Steel Bridge Corrosion Prevention and Mitigation Strategies
- Investigating New Underground Utility Location Technologies and Novel Methods to Improve the Safety and Efficiency of Highway Construction

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2024 Project Benefit Results and Implementation Strategies

Project being considered (in process) :

- Prediction of Dowel Corrosion and Effect on Performance of Concrete Pavements
- Design and Construction of Two-Lift Concrete Pavements for Pennsylvania
- Joint Design Optimization

Project Start Date: January 3, 2024

Scheduled Completion Date: December 31. 2024

Review of IRISE Implementation Ready Projects and Strategies

Future IRISE Research Efforts will:

- Select Completed Research Project with Implementable results
- Quantify Benefits on a Statewide or Case Study/Project Level
- Development a framework for Implementation

Thank you

engineering.pitt.edu
https://www.engineering.pitt.edu/subsites/consortiums/irise/
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PennDOT Research Program Update

Brian Wall

IRISE Annual Meeting

May 23rd, 2024

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Presentation Overview

- Research by the Numbers
- Procurement
- Problem Statements
- Program Calendar
- Implementation
- New Product Evaluation Program
- Local Technical Assistance Program/PennDOT Connects
- Resources

Research by the Numbers

- Budget ≈ $8 million
- Active Research Projects ≈ 38
- Active Research Projects Portfolio ≈ $10.9 million
- Active Pooled Fund Projects ≈ 30
- Active Pooled Fund Projects Portfolio ≈ $2.7
- Full Time Staff = 6*

Procurement

- Research ITQ ✔
- RFP ✔
- DGS Master Agreements ✘
- ECMS ✘

Procurement-

Transportation Research, Education, and Technology Transfer Services ITQ

- Policy Studies
- Design and Testing
- Construction
- Materials and New Products Evaluation
- Environmental
- Maintenance
- Highway Safety and Traffic Engineering
- Planning Studies
- Multimodal

Procurement-
Vendors

Private Sector:

- 25 Firms*
- Civil Engineering
- Consulting Firms
- Environmental Engineering

Universities:

- New York University
- Penn State University
- Rowan University
- Rutgers University
- Temple University
- University of Pittsburgh
- Villanova University

Procurement-
State Adverse Interest

State Adverse Interest Act (AIA) precludes a consultant or advisor for a state agency from obtaining a contract that was the result of a recommendation the consultant or advisor made to that state agency. In other words, the consultant or advisor cannot place itself in a position to benefit from further contracting opportunities with the agency as a result of the services it is providing.

"State Advisor" and "State Consultant": The AIA defines both as a person who performs "professional, scientific, technical or advisory service for the agency". The only difference between the state advisor and the state consultant is that consultant receives compensation, but the advisor does not.

Procurement-
Conflict of Interest

If an outside entity holds a role in developing the detail of a proposal that would give it an unfair advantage and that would represent the essence of an un-level playing field, which is the essential part of PA law.

Procurement-
Employee Ethics Act

Employee Ethics Act - To protect the integrity of the Commonwealth procurement process, it is essential that certain information remain confidential throughout the proposal development process until Notice to Proceed is issued. During this time, you must discharge your duties impartially so as to assure fair, competitive access to Commonwealth agency procurement by responsible contractors and to conduct yourself in a manner which fosters public confidence in the integrity of the Commonwealth procurement process. 62 Pa.C.S. §2301. 4.

Those doing business with Commonwealth agencies must observe high standards of honesty and integrity. Any effort to influence any employee to breach standards of ethical conduct is also a breach of ethical standards. 62 Pa.C.S. §§ 2301, 2302(b).

Procurement-
Dos and Don'ts

Do:

- Talk About New Research Opportunities with PennDOT
- Continue to Coordinate Activities with PennDOT Districts and Bureaus
- Contact PennDOT Office Services for ITQ and Proposal Information
- Request Project Updates
- Request Final Reports

Do Not:

- Influence a Problem Statement Submission
- Contact a Technical Advisor or Research Program Staff for Proposal Information

Problem Statements

- IDEA Forms ✗
- Research Problems Statements ✔
- Guidelines Developed ✔
- New Form Developed ✔
- Solicitation ✔
- Research Projects: 11
- Estimated Cost: $2.2 Million
- Program Management Committee: June 12

Project Categories:

- Policy: 3
- Design: 2
- Materials: 1
- Environmental: 1
- Maintenance: 3
- Safety: 1

Program Calendar

January-March:

Problem Statements Solicitation

April-May:

Problem Statement Review

June:

Program Approval

July:

Program Initiated

Implementation

Definition:

The incorporation of research findings and recommendations into a new or revised policy, procedure, specification, or other work method.

Lessons Learned:

- Easier to Track than to Track Down
- Breaking the Barriers
- Be Adaptable
- Always Look to Learn

Implementation

Tools:

- Open End Contracts: 2 @ $1.75 million and 17 Firms
- New Internal Review Process for Completed Projects
- AASHTO RAC and TRB

Internal Review Process:

- Technical Advisor Recommendation
- Desired Outcome
- Implementation Activities
- Champion Identification
- Audience Identification
- Cost/Duration
- Resource Identification

New Products Evaluation Program

- Municipal Research
- Bureau of Planning and Research
- Project Evaluation Application
- Rolling Application and Approval Process
- New Products Selection Committee
- Free Research and Specification Development for Municipalities
- Approved Products for Lower Volume Local Roads

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LTAP and PennDOT Connects

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DEPARTMENT OF TRANSPORTATION
LOCAL TECHNICAL ASSISTANCE PROGRAM

PennDOT Connects
Planning with our communities

FREE TRAINING AND TECHNICAL ASSISTANCE FOR PENNSYLVANIA MUNICIPALITIES

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Resources

Activities Report:

https://www.penndot.pa.gov/ProjectAndPrograms/Planning/Research-And-Implementation/SiteAssets/Research_Activities_Report_2022_23.pdf

ITQ Information:

https://www.dgs.pa.gov/Documents/ITQ%20Documents/Transportation%20Research,%20Education%20and%20Technology%20Transfer%20Services/Transportation%20Research,%20Education%20and%20Technology%20Transfer%20Services%20ITQ-%20Statement%20of%20Work.pdf

Projects Website:

https://www.penndot.gov/ProjectAndPrograms/Planning/Research-And-Implementation/Pages/researchProjects.aspx

Resources

New Products Evaluation Program:

https://www.penndot.gov/Doing-Business/LocalGovernment/Pages/New-Products-Evaluation-for-Local-Roads.aspx

LTAP:

https://gis.penndot.gov/LTAP/default.aspx

PennDOT Connects:

https://www.penndot.gov/ProjectAndPrograms/Planning/Pages/PennDOT-Connects.aspx

Thank you

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Pennsylvania Turnpike Implementation Initiative

Ed Skorpinski

IRISE Annual Meeting

May 23rd, 2024

Team Implementation

Kevin Scheurich (Design)

Joe Sutor (Planning)

Eric Buchan (Total Recon & Expansions)

Brian Mostek (Total Recon & Expansions)

Justina Wentling (Traffic)

Pamela Hess (Planning)

Carl DeFebo (Public Outreach)

Mohammad Mohammad (Total Recon & Expansions)

Ed Skorpinski (Construction)

Innovation Council - Implementation Workshop

Evaluation

- Research the idea
- Coordination within and outside your organization
- Build a Business Case

Development

- Partnerships
- Testing
- Trial and Error

Deployment

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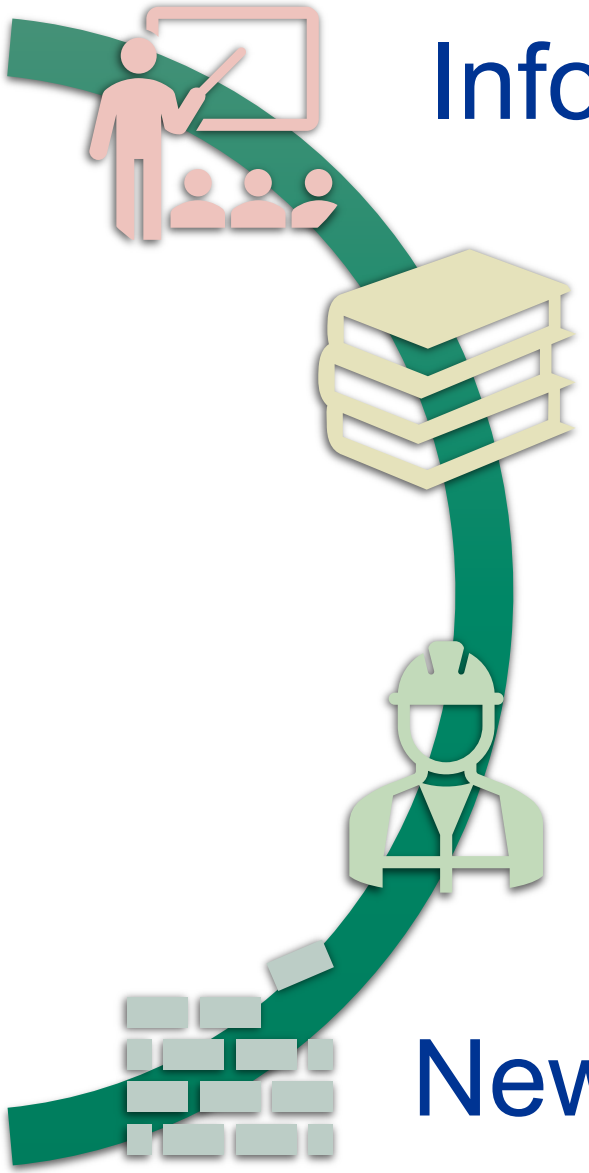
Categorizing Projects

Project Types



Informational

Analyze Specifications

Develop a Tool

New Product

Informational Projects

Goal	Gather information about a particular topic
How to Implement	Information is made available for consortium partners to use at their disposal.
Example Projects	-Identify Major Causes of Construction Accidents -Landslide Virtual Seminar Series -Remote Controlled Technology Assessment

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Specification Analysis Projects

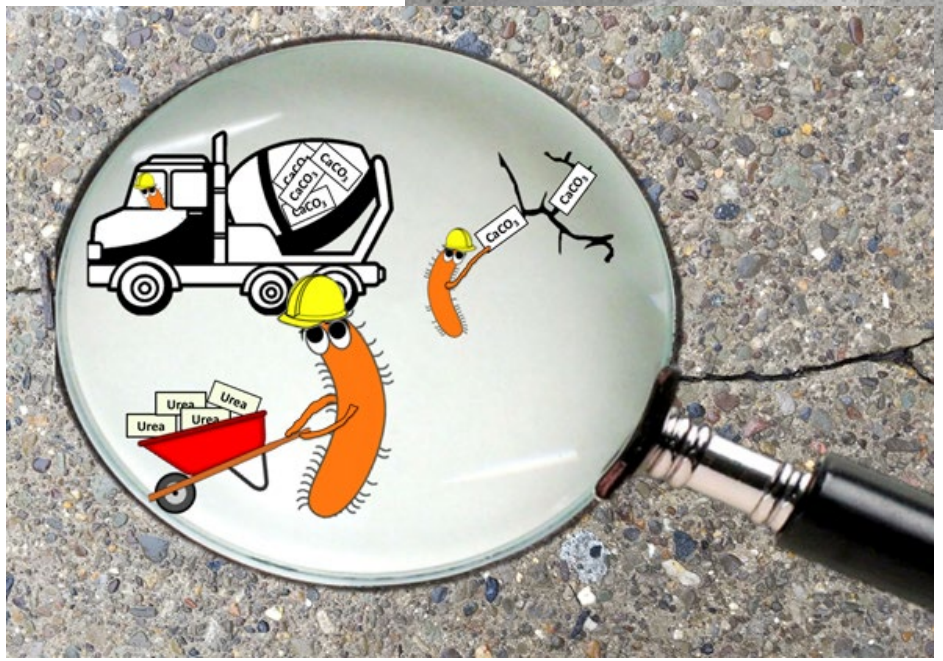
Goal	Study specific details about a problem, involving an in-depth study and experimentation to investigate the issue
How to Implement	Directly compare the results of the project and current specifications. Adjust the specifications as necessary.
Example Projects	-Early Opening of Concrete Pavements to Traffic -Joint Design Optimization

Tool Development Projects

Goal	A tool is made for consortium members to utilize at their disposal.
How to Implement	Incorporate the tool into daily work processes.
Example Projects	-PittRigid ME -Virtual Reality Safety Training

New Product Development Projects

Goal	A new product is developed to solve a current plan or replace an existing method
How to Implement	-Low Risk Products – Target pilot projects which can then be compared to existing methods -High Risk Products – Further study/development will be required prior to implementation
Example Projects	-Material Compatible Repairs -Microbes in Sustainable Construction Materials



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