

Application for Federal Assistance SF-424

* 1. Type of Submission:

- ☐ Preapplication
☒ Application
☐ Changed/Corrected Application

* 2. Type of Application:

- ☒ New
☐ Continuation
☐ Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received:

Completed by Grants.gov upon submission.

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

MD

8. APPLICANT INFORMATION:

* a. Legal Name:

Morgan State University

* b. Employer/Taxpayer Identification Number (EIN/TIN):

52-6002033

* c. UEI:

KULSKCCZJT27

d. Address:

* Street1:

1700 E. Cold Spring Lane

Street2:

* City:

Baltimore

County/Parish:

MD

* State:

MD: Maryland

Province:

* Country:

USA: UNITED STATES

* Zip / Postal Code:

21251-0001

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:

Ms .

* First Name:

Ailing

Middle Name:

* Last Name:

Zhang

Suffix:

Title: Sr. Grants Manager

Organizational Affiliation:

Morgan State University

* Telephone Number:

443-885-4118

Fax Number:

443-885-8280

* Email:

ailing.zhang@morgan.edu

Application for Federal Assistance SF-424

* 9. Type of Applicant 1: Select Applicant Type:

H: Public/State Controlled Institution of Higher Education

Type of Applicant 2: Select Applicant Type:

T: Historically Black Colleges and Universities (HBCUs)

Type of Applicant 3: Select Applicant Type:

* Other (specify):

* 10. Name of Federal Agency:

DOT - Federal Railroad Administration

11. Assistance Listing Number:

20.337

Assistance Listing Title:

Consolidated Rail Infrastructure and Safety Improvements Program

* 12. Funding Opportunity Number:

FR-CRS-26-001

* Title:

FY25-26 Consolidated Rail Infrastructure and Safety Improvements Grant Program

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment

Delete Attachment

View Attachment

* 15. Descriptive Title of Applicant's Project:

Building a Rail Workforce Pathway from High Schools and Community Colleges to University-Level Rail Education, Research and Career Preparation

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

Application for Federal Assistance SF-424			
16. Congressional Districts Of:			
* a. Applicant	<input type="text" value="MD-007"/>	* b. Program/Project	<input type="text" value="MD-007"/>
Attach an additional list of Program/Project Congressional Districts if needed.			
<input type="text"/>		<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/> <input type="button" value="View Attachment"/>
17. Proposed Project:			
* a. Start Date:	<input type="text" value="09/01/2027"/>	* b. End Date:	<input type="text" value="08/31/2031"/>
18. Estimated Funding (\$):			
* a. Federal	<input type="text" value="2,972,530.00"/>		
* b. Applicant	<input type="text" value="743,258.00"/>		
* c. State	<input type="text" value="0.00"/>		
* d. Local	<input type="text" value="0.00"/>		
* e. Other	<input type="text" value="0.00"/>		
* f. Program Income	<input type="text" value="0.00"/>		
* g. TOTAL	<input type="text" value="3,715,788.00"/>		
* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?			
<input checked="" type="checkbox"/> a. This application was made available to the State under the Executive Order 12372 Process for review on		<input type="text" value="06/30/2026"/>	
<input type="checkbox"/> b. Program is subject to E.O. 12372 but has not been selected by the State for review.			
<input type="checkbox"/> c. Program is not covered by E.O. 12372.			
* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
If "Yes", provide explanation and attach			
<input type="text"/>		<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/> <input type="button" value="View Attachment"/>
21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)			
<input checked="" type="checkbox"/> ** I AGREE			
** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.			
Authorized Representative:			
Prefix:	<input type="text" value="Dr."/>	* First Name:	<input type="text" value="Farin"/>
Middle Name:	<input type="text"/>		
* Last Name:	<input type="text" value="Kamangar"/>		
Suffix:	<input type="text"/>		
* Title:	<input type="text" value="Associate Vice President for Research"/>		
* Telephone Number:	<input type="text" value="3016559280"/>	Fax Number:	<input type="text" value="443-885-8280"/>
* Email:	<input type="text" value="AOR@morgan.edu"/>		
* Signature of Authorized Representative:	<input type="text" value="Completed by Grants.gov upon submission."/>	* Date Signed:	<input type="text" value="Completed by Grants.gov upon submission."/>

ATTACHMENTS FORM

Instructions: On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines.

Important: Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

1) Please attach Attachment 1	<input type="text" value="Project Narrative_Final.pdf"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
2) Please attach Attachment 2	<input type="text" value="Benefit-Cost Analysis.pdf"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
3) Please attach Attachment 3	<input type="text" value="Appendix B-1. Morgan State Un"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
4) Please attach Attachment 4	<input type="text" value="Appendix B-2. Executed In-Kin"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
5) Please attach Attachment 5	<input type="text" value="Appendix B-3. PST Proposed In"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
6) Please attach Attachment 6	<input type="text" value="Appendix C-1. Letter of Suppo"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
7) Please attach Attachment 7	<input type="text" value="Appendix C-2. Letter of Suppo"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
8) Please attach Attachment 8	<input type="text" value="Appendix C-3. Letter of Commi"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
9) Please attach Attachment 9	<input type="text" value="Budget Justification.pdf"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
10) Please attach Attachment 10	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
11) Please attach Attachment 11	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
12) Please attach Attachment 12	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
13) Please attach Attachment 13	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
14) Please attach Attachment 14	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>
15) Please attach Attachment 15	<input type="text"/>	<input type="button" value="Add Attachment"/>	<input type="button" value="Delete Attachment"/>	<input type="button" value="View Attachment"/>

Cover Page	
Project Title	Building a Rail Workforce Pathway from High Schools and Community Colleges to University-Level Rail Education, Research and Career Preparation
Applicant Name	Morgan State University
Amount of CRISI Program funding requested under this NOFO	\$2,972,530
Total amount of proposed non-Federal cost share	\$743,258
Amount of non-CRISI Federal funding (if applicable) including pending awards	Not Applicable
Total Project Cost	\$3,715,788
Source(s) of proposed non-Federal cost share and other Federal funding (provide funding amount by source)	In-kind faculty release time/fringe: \$379,356; In-kind Graduate Research Assistant support/fringe: \$166,770; Technology vendor equipment donations: \$195,000; MxV Rail track component donation: \$2,132.
Was a Federal grant application previously submitted for this Project? <i>If yes – please specify the program; funding year; and project title of the previous application. Identify any differences between the applications.</i>	No
City(ies) where the project is located	Baltimore
County(ies) where the project is located	Baltimore City
State(s) where the project is located	Maryland
Congressional district(s) where the project is located	MD-007
What percent of funding is spent in a Rural Area?	0%
Amount (if any) of funding request eligible for set-aside funds	<u>Amount:</u> Not Applicable <u>Set-Aside(s):</u> Not Applicable

Lifecycle Stage(s) proposed to be funded by this NOFO	<input type="checkbox"/> Systems Planning <input type="checkbox"/> Project Planning <input type="checkbox"/> Project Development <input type="checkbox"/> Final Design <input type="checkbox"/> Right-of-Way Acquisition ¹² <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Capital
Current Lifecycle Stage and its anticipated completion date	<input type="checkbox"/> Systems Planning <input type="checkbox"/> Project Planning <input type="checkbox"/> Project Development <input type="checkbox"/> Final Design <input type="checkbox"/> Right-of-Way Acquisition <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Capital Anticipated Date of Completion: 08/31/2031
Is the project located on real property owned by someone other than the applicant? <i>If yes – list real property owners and the nature of the property interest.</i>	Yes. Selected Maryland Transit Administration (MTA) light rail sites may be used for temporary, non-interfering research-grade sensor testing and field data collection.
Host railroad/infrastructure owner(s) of project assets	Maryland Transit Administration (MTA)
Other impacted railroad(s) (including tenants)	Not Applicable
If the applicant is a commuter railroad: list the intercity passenger and/or freight railroad service(s) utilizing the proposed project.	Not Applicable
Has the applicant executed an agreement with the host railroad regarding use of the railroad right-of-way where the project will be located consistent with <u>49 U.S.C. § 22905(c)</u> (if applicable)?	Pending
Is the project currently programmed in any medium- or long-range planning document? <i>If yes – specify planning document.</i>	No
Is the project located on a potential corridor selected for the Corridor Identification and Development Program? <i>If yes – specify the corridor(s).</i>	No
Is the project expected to need a waiver under FRA’s domestic preference requirements?	Not Applicable

i. Project Summary

The proposed activity is a workforce development project to build a connected rail education pathway from high schools and community colleges to university-level rail education, applied research, and career preparation. The railroad industry faces an aging workforce and growing demand for skilled workforce. The urgent need is to attract and engage younger generations into rail careers. Early exposure is critical, as students form career interests in middle and high school, yet rail topics are rarely included in STEM curricula. Community colleges provide strong technical training but often lack rail-specific content and clear pathways into rail careers. These gaps highlight the need for earlier exposure and targeted education to support a continuous pipeline into rail workforce preparation. Morgan State University (MSU) is well positioned to lead this effort. Through prior CRISI-funded work, MSU has developed rail courses, laboratory and simulation resources, and a strong program foundation. This project will expand engagement with high schools and community colleges by developing level-specific training aligned with a structured pathway, including career awareness at the high school level and technical preparation at the community college level. Morgan will provide coursework and applied learning opportunities to support student transition into university-level rail education. The project will establish a sustainable, replicable model that strengthens the rail workforce pipeline in the Baltimore-Washington region while creating a scalable framework that can be adopted by other institutions to build similar rail education pathways.

ii. Grant Funds, Sources, and Uses of Project Funds

The total project cost is \$3,715,788 for the four-year project period, as shown in Table 1. The amount of funding requested from FRA is \$2,972,530. Morgan State University and project partners will provide a total non-Federal cost share of \$743,258. The non-Federal cost share includes Morgan State University in-kind faculty release time and associated fringe benefits, in-kind Graduate Research Assistant support and associated fringe benefits, technology vendor in-kind equipment donations, and MxV Rail track component donation (Funding commitment letters documenting the non-Federal cost-share and partner contributions are included in Appendix B). Therefore, the total non-Federal cost share is \$743,258, which represents approximately 20% of the total project cost.

Table 1: Project funding overview table for non-Capital Projects.

Component/Task	CRISI Request	Non-CRISI Federal Funds	CRISI Cost-Share	Non-CRISI Federal Cost-Share (including in-kind)	Total
Task 1. Develop a Rail Education Pathway Guide	\$118,950	\$0	\$87,577	\$0	\$206,527

Task 2. Develop Modular Rail Curriculum Materials	\$1,013,658	\$0	\$92,728	\$0	\$1,106,386
Task 3. Develop Technology-Enabled Rail Demonstrations	\$641,294	\$0	\$324,852	\$0	\$966,146
Task 4. Implement Level-Specific Rail Pathway Activities	\$753,003	\$0	\$79,031	\$0	\$832,034
Task 5. Develop Tracking Toolkits and Identify Students	\$415,806	\$0	\$142,183	\$0	\$557,989
Final report	\$29,819	\$0	\$16,887	\$0	\$46,706
Total	\$2,972,530	\$0	\$743,258	\$0	\$3,715,788

iii. Applicant Eligibility:

Morgan State University (MSU) is eligible to submit this application under Section 3(a)(xii) of the FY 2025–2026 CRISI NOFO as a University Transportation Center engaged in rail-related research. Morgan is an institution with established capacity in transportation research, education, workforce development, technology transfer, and applied rail safety activities. Through its National Transportation Center, Morgan leads the Safety and Mobility Advancements Regional Transportation and Economics Research (SMARTER) Center, the USDOT Region 3 University Transportation Center, in partnership with Howard University, the University of Delaware, the University of Maryland, the University of Pittsburgh, the University of Virginia, Virginia Tech, and West Virginia University.

Morgan’s eligibility and readiness are further supported by its continuing development of rail-related education and research capacity. A prior FRA CRISI-supported effort led by the University of Delaware, “*Development and Implementation of HBCU-Based Railroad Engineering Program for Underrepresented Communities*,” identified Morgan State University as a key implementation site for expanding railroad engineering education at the undergraduate and graduate levels. Building on this foundation, the proposed project will further strengthen Morgan’s role in rail workforce development by connecting high school students, community college students, and Morgan students to rail education pathways, technology-enabled rail safety demonstrations, and applied learning opportunities.

iv. Project Eligibility:

The proposed project is eligible under the following categories identified in Section 3(d) of the FY 2025-2026 CRISI NOFO:

- Section 3(d)(xiii) as “*Workforce development and training activities, coordinated to the extent practicable with the existing local training programs supported by the Department of Transportation, the Department of Labor, and the Department of Education.*” The proposed project primarily satisfies this category by developing a connected rail education pathway that expands Morgan State University’s existing rail education foundation to high school students, community college students, and university students.

The project will develop a rail education pathway guide, modular rail curriculum materials, level-specific outreach and training activities, student tracking toolkits, and scholarship-supported participation opportunities to prepare the next generation of rail transportation professionals.

- Section 3(d)(xii): “Any research that the Secretary considers necessary to advance any particular aspect of rail-related capital, operations, or safety improvements.” The proposed project also includes applied rail safety research activities that will support technology-enabled learning in areas such as railroad crossing safety detection and warning concepts, drone- and sensor-based track and bridge inspection, and human-machine interaction using Morgan’s locomotive simulator. These research activities will be translated into reusable educational materials

The proposed project therefore falls within the Non-Capital Project lifecycle stage because its primary purpose is workforce development, training, and research-to-education translation. By connecting high school outreach, community college rail fundamentals, Morgan’s university-level rail education, and applied rail safety demonstrations, the project will strengthen the regional rail workforce pipeline and support long-term improvements in rail safety awareness, technology readiness, and workforce preparedness.

v. Detailed Project Description

Background

The railroad industry has a documented need to strengthen its next-generation workforce pipeline. FRA identifies generational transition as a key workforce challenge and notes that the industry must better convey its value to the “new” labor force, because the natural appeal of trains alone may not be enough to convince younger generations to choose railroad careers [1]. This creates a specific workforce development gap: potential future rail workers need earlier and more structured exposure to rail as a STEM, safety, and technology career field.

FRA’s Workforce Development Team framed this issue as a pipeline development challenge. As shown in the FRA-WDT Program Focus Areas (Figure 1), two of the primary workforce pipeline areas are PreK-12 and Collegiate programs. The PreK-12 focus emphasizes early engagement through outreach and interactive projects, while the collegiate focus emphasizes engaging colleges and universities in rail programs and shaping curriculum through college and university outreach [1]. The FRA-sponsored Tracks to the Future program was developed for students entering grades 9-12 and was built on the recognition that the rail industry faces challenges recruiting K-12 students into the future hiring pipeline. The report also notes that students often arrive at colleges and universities with predefined career interests, making early rail exposure an important component of future rail workforce development [2].

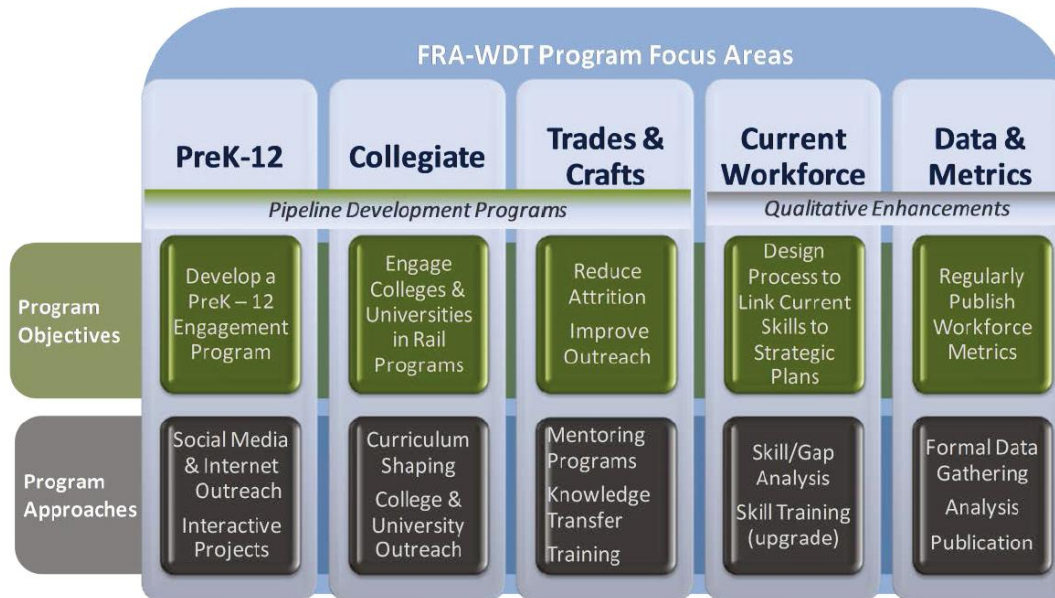


Figure 1 FRA Workforce Development Program Focus Areas for Pipeline Development[1]

Community colleges represent another critical but underused connector in the rail workforce pipeline. A national survey of community colleges in [3] shows that many community colleges already offer transportation-relevant technical foundations, including technology and technical support, operations and maintenance, transportation management, design engineering, and field engineering. However, these offerings are often delivered through general or shared technical programs rather than rail-specific pathways. In the same survey (Figure 2), degree or certificate programs related to rail safety and rail security accounted for only 1.8% and 1.2% of identified program areas, respectively, indicating that rail-specific training remains limited [3]. The gap is therefore not a lack of technical preparation among community college students, but a lack of rail-specific connection. This creates an opportunity to add targeted rail fundamentals modules, rail safety case studies, and pathway guidance into existing community college technical and transfer programs, rather than requiring community colleges to establish full rail degree programs.

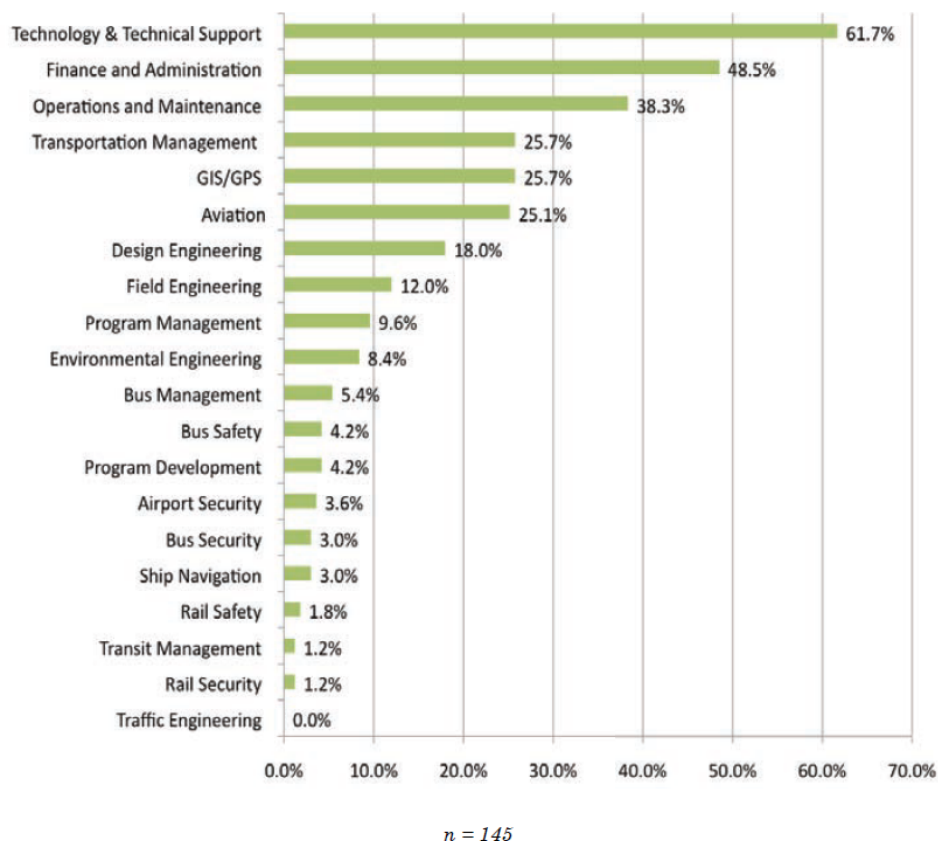


Figure 2 Community College Transportation Foundations and Rail Education Gap [3]

Preliminary outreach and planning discussions also indicate that high schools and community colleges in the Baltimore and Washington, D.C. metropolitan areas are appropriate target partners for a connected rail education pipeline. The region includes a large and diverse student population, extensive high school and community college networks, major transit and rail activity, and close proximity to transportation agencies, infrastructure owners, consultants, and technology partners. This creates an opportunity to connect existing student interests and technical preparation for future workforce preparation.

As a beneficiary of previous CRISI-supported workforce development efforts, Morgan State University has established a rail education foundation that provides a strong basis for the proposed expansion. The university now offers rail-related undergraduate and graduate courses, maintains rail laboratory and demonstration resources, and supports transportation outreach through the National Transportation Center (NTC) and related student engagement activities. From the 2023-2024 academic year through the 2025-2026 academic year, Morgan's Rail Program enrolled a total of 22 domestic undergraduate students and 18 domestic graduate students, demonstrating both an existing student base and institutional capacity to deliver rail education.

Building on these workforce needs, the opportunity to engage high school and community college students earlier in the education pipeline, and Morgan's existing rail education foundation, the proposed project will develop a connected rail education pipeline that links high school exposure, community college rail fundamentals, and university-level rail education. The

project is intended not only to expand student awareness of rail careers, but also to create a structured pathway model that helps students move from general STEM and transportation programs into rail education and workforce opportunities. The project will provide a replicable rail education pipeline model for universities seeking to connect high school outreach, community college pathways, and university-level rail education.

Project Framework

The proposed project will expand Morgan State University's existing rail education foundation into a university-led workforce development framework designed to serve high school students, community college students, and Morgan students. Rather than creating a new rail program from the ground up, the project will build on Morgan's established rail-related courses, laboratory resources, technology demonstration resources, and outreach and partnership capacity. As shown in Figure 3, these existing resources will be organized into three implementation tools: a rail education pathway guide, modular rail curriculum materials, and technology-enabled rail demonstrations. These tools will support level-specific outcomes by providing early rail exposure for high school students, rail fundamentals and transfer or certificate pathways for community college students, and broader access to rail education, applied learning, and research opportunities for Morgan students. A tracking toolkit and student identification process will document participation, identify interested students, support follow-up, and provide feedback for improving the pathway over time.

The Baltimore-Washington, D.C. region provides a strong setting for testing this model because it has a large and diverse student population, an extensive community college network, and close proximity to major rail, transit, and federal transportation institutions. This regional environment creates practical opportunities to connect local high schools and community colleges with Morgan's university-level rail education resources. By focusing on this region, the project can test how a university-led rail education pathway can guide students from early rail exposure and technical preparation into Morgan's rail courses, laboratory resources, technology demonstrations, and workforce preparation activities.

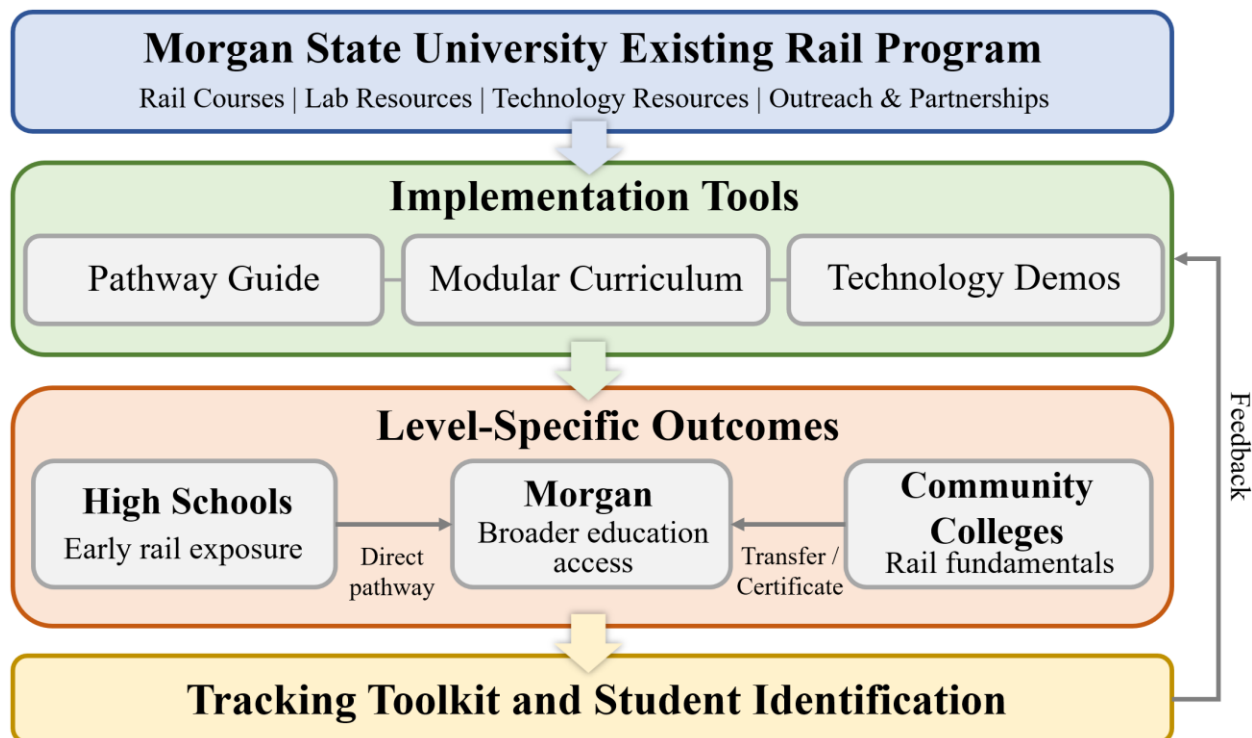


Figure 3 Morgan-led implementation framework connecting existing rail education resources, implementation tools, level-specific outcomes, and evaluation feedback for rail workforce development.

The pathway guide will serve as the connection mechanism. It will provide a student/advisor roadmap, identify next steps after each activity, and connect students to Morgan rail opportunities, including courses, campus activities, laboratory demonstrations, seminars, research exposure, and workforce preparation activities. This guide will help ensure that high school outreach, community college modules, and Morgan-based learning activities function as connected entry points rather than isolated events.

The modular curriculum will provide adaptable instructional content for different student levels. Morgan will translate selected rail course content into short rail learning modules that can be used in high school outreach activities, community college technical or transfer programs, and Morgan university-level courses. These modules will cover rail system basics, infrastructure, operations, safety, inspection, technology applications, and rail career pathways at an appropriate depth for each audience.

Technology demonstrations will provide the hands-on and applied learning component of the framework. The FRA Railroad Industry Workforce Development Survey identified training and emerging technologies as a major workforce development theme, highlighting the need to prepare the workforce for technology-supported rail operations [4]. Using Morgan’s laboratory and technology resources, the project will develop demonstrations and case-based activities related to rail components, simulation, sensing and data examples, inspection concepts, train stopping distance, and applied rail safety. In this framework, technology will be used as a learning and training tool to make rail education more visible, practical, and workforce-relevant, rather than as a stand-alone deployment objective.

Together, these tools will allow Morgan to organize high school outreach, community college rail fundamentals, and Morgan-based learning activities into one connected workforce development framework. This approach allows partner high schools and community colleges to connect students to rail education without requiring them to develop full rail programs independently.

Statement of Work

This section describes the workforce development activities to be implemented under the proposed project. Building on Morgan's existing rail education program, the project will develop coordinated tools, pathway activities, and evaluation mechanisms to connect high school students, community college students, and Morgan students to rail education and workforce preparation opportunities. The proposed work includes the following five core tasks:

Task 1. Develop a Rail Education Pathway Guide

The project will develop a Rail Education Pathway Guide to show students and advisors how to move from initial rail exposure into Morgan's rail education opportunities. The guide will not be a general outreach brochure. It will serve as a next-step tool that explains what students can do after participating in a rail activity and how they can stay connected to Morgan's rail education pipeline.

For high school students, the guide will focus on building interest and helping students see Morgan as a future education destination. A typical pathway may begin with a school visit, rail STEM seminar, or career talk. Interested students may then be invited to a Morgan campus rail day, National Summer Transportation Institute (NSTI) activity, or rail lab demonstration. Students may later engage with Morgan student mentors, participate in a short shadowing experience or summer rail activity, and receive information about Morgan's transportation and rail-related programs. Where eligible, students may also participate in tuition-supported Morgan rail courses as a bridge from early exposure to university-level rail education. In this way, a one-time outreach activity becomes the first step toward sustained engagement with Morgan's rail education pathway and future enrollment interest.

An example Rail Education Pathway Guide is provided below:

Step 1. Rail Awareness

- School visit
- Rail STEM seminar
- Career talk

Step 2. Morgan Rail Experience

- Campus rail day
- NSTI activity
- Rail lab demonstration

Step 3. Student Engagement

- Meet Morgan student mentors
- Short shadowing experience
- Summer rail activity

Step 4. Morgan Education Pathway

- Explore Morgan transportation programs

- Participate in tuition-supported Morgan rail courses
- Apply to Morgan

For community college students, the guide will have a different focus. Rather than emphasizing general rail awareness, it will show how students in existing technical or transfer-oriented programs can move from a rail fundamentals activity into Morgan rail workshops, tuition-supported Morgan rail courses, certificate or completion-based options, transfer guidance, internships, and future university-level rail education. The community college guide will also help faculty and advisors connect rail fundamentals to existing programs such as engineering technology, transportation, GIS, CADD, construction, logistics, safety, and related transfer pathways. In this way, community college students will have a clearer pathway from introductory rail learning to continued rail education and workforce preparation at Morgan.

Task 2. Develop Modular Rail Curriculum Materials

The project will develop modular rail curriculum materials that adapt rail education content to three student levels: high school rail exposure, community college rail fundamentals, and Morgan university-level rail modules, as shown in Figure 4. The purpose is to create flexible learning materials that can be used in different settings. The same rail education foundation will be adjusted by student readiness, learning goal, delivery format, and expected outcome.

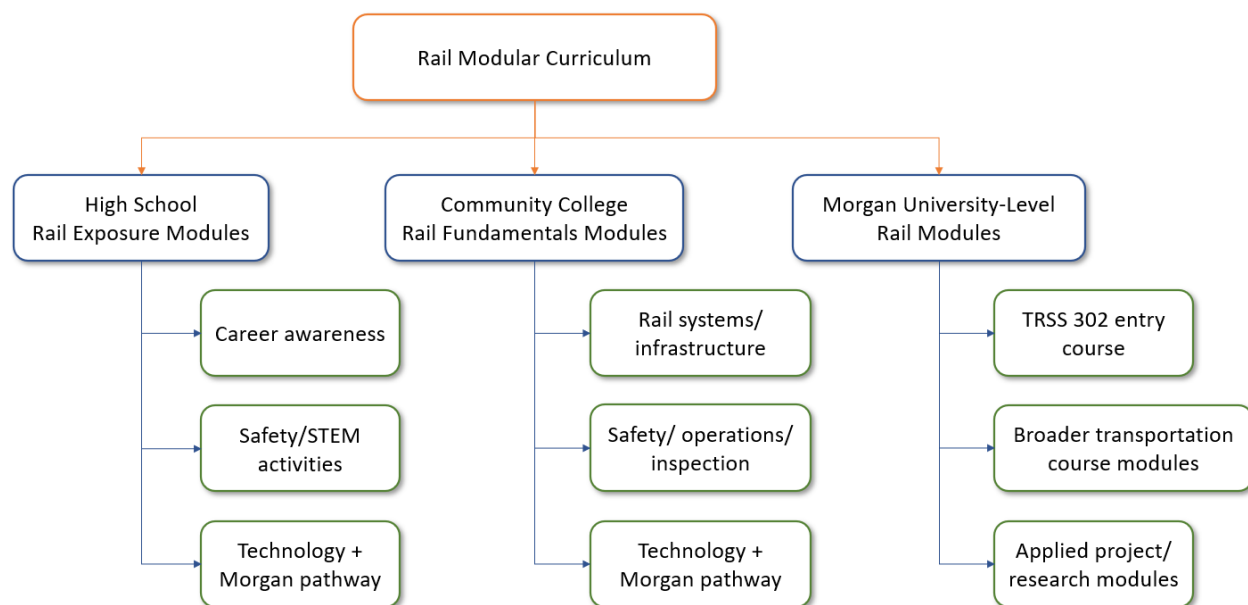


Figure 4 Modular rail curriculum framework for adapting Morgan’s rail education content to high school exposure, community college rail fundamentals, and Morgan university-level rail learning.

a. High school rail exposure modules

Morgan will develop short rail exposure modules designed to build awareness and interest. These materials will be visual, activity-based, and appropriate for short seminars, school visits, campus rail days, NSTI-related activities, and summer rail activities. Example high school modules will include:

- How Railroads Work, introducing the basic components of a rail system, including trains, tracks, stations, freight, passenger rail, and transit;
- Why Trains Cannot Stop Quickly, using simple physics concepts such as speed, mass, braking distance, and warning time to explain rail safety;
- Rail Safety and Careers, connecting rail safety concepts with transportation, engineering, operations, inspection, planning, and technology careers; and
- Rail Technology Demonstration, using simple demonstrations or videos to show how sensing, inspection, simulation, and data are used in rail transportation.

The purpose is to help students understand rail as a STEM, safety, infrastructure, and technology field and to encourage future interest in Morgan transportation and rail-related programs.

b. Community college rail fundamentals modules.

Morgan will develop rail fundamentals materials that can be embedded into existing technical or transfer-oriented programs. These materials will be more structured than the high school modules and may be delivered as a short workshop, guest lecture sequence, or a four-session rail fundamentals unit. Example community college modules will include:

- Rail Systems and Career Pathways, introducing the rail industry, major rail modes, workforce needs, and Morgan rail education opportunities;
- Track and Infrastructure Fundamentals, covering rail, ties, ballast, subgrade, switches, basic track geometry, and infrastructure maintenance concepts;
- Rail Safety, Operations, and Inspection Basics, introducing right-of-way safety, train operations, warning-time concepts, inspection needs, and maintenance decision-making; and
- Rail Technology Applications and Morgan Pathway Options, introducing examples such as sensing, data, simulation, drone inspection, and applied safety case studies, while connecting students to certificate or completion-based options, transfer guidance, Morgan rail workshops, internships, and future university-level rail education.

These community college materials will be designed to connect with existing programs such as engineering technology, transportation, GIS, CADD, construction, logistics, safety, or related transfer pathways. The expected result is that community college students gain rail-specific fundamentals without requiring the college to establish a full rail degree program.

c. Morgan university-level rail modules.

Morgan will develop university-level rail modules that broaden rail education access for students who may not initially be rail-focused. *TRSS 302 Introduction to Rail Transportation Systems*, is an existing course that will serve as the primary entry point for a broader group of Morgan students, including transportation, STEM, and other interested students who want structured exposure to rail transportation. In addition, smaller rail modules will be developed for insertion into general transportation courses where rail examples naturally fit. Potential course-module connections include:

- *TRSS 301 Introduction to Transportation Systems: Rail as a Multimodal Transportation System* module;

- *TRSS 319 Geographic Information Systems: Rail Corridor Mapping and Asset Data* module;
- *TRSS 412 Urban Infrastructure Planning and Management: Rail Infrastructure and Asset Management* module;
- *TRSS 420 Transportation Systems Evaluation: Rail Safety and Project Evaluation* module; and
- *TRSS 499 Senior Transportation Project: Rail Research and Innovation Project Module.*

These Morgan-level materials will be deeper than the high school and community college versions. Their purpose is to expand rail exposure beyond students already interested in rail, create additional entry points into rail education across the transportation curriculum, and help interested students continue into rail laboratory activities, seminars, applied projects, internships, research exposure, and workforce preparation.

Task 3. Develop Technology-Enabled Rail Demonstrations

The project will develop technology-enabled rail demonstrations that translate applied rail safety, inspection, sensing, data, simulation, and infrastructure research into educational and workforce training materials. These demonstrations will help students understand how modern technologies support rail safety, infrastructure condition assessment, inspection, human factors, and decision-making. The demonstrations will be education-oriented and will focus on three content areas.

a. Railroad crossing safety real-time safety alert system demonstration.

This demonstration will build on Morgan State University and the SMARTER Center's existing work-zone safety alert system and adapt its sensing, alert, and decision-support concepts into a rail workforce education and training context. The activity will use selected rail crossing settings to help students understand how technologies such as LiDAR-based sensing, edge computing, warning-time analysis, user alerts, and behavior observation can support rail safety awareness and transportation decision-making. As shown in Table 2, four MTA light rail crossing locations have been identified and confirmed with the Maryland Transit Administration (MTA) as proposed demonstration sites. These locations will provide practical field contexts for hands-on learning, technology familiarization, case study development, and workforce preparation.

Where field activities are conducted, they will be temporary, non-intrusive, non-interfering, and subject to MTA safety requirements, site access procedures, operational constraints, and final site approval. The demonstration is also supported by partner input from the Baltimore City Department of Transportation (BCDOT) and Mead & Hunt, which together provide practical field context, public-sector relevance, and technical expertise for education-oriented rail safety demonstrations. The activity will not involve construction, right-of-way acquisition, permanent installation of operational rail equipment, or modification of rail infrastructure.

Table 2: Preliminary MTA Light Rail Grade Crossing Demonstration Locations

Railroad Operator and Owner	Latitude Coordinates	Longitude Coordinates
Maryland Transit Administration (MTA)	39.28632005	-76.61938982
	39.28759406	-76.61939464
	39.47570878	-76.65111041
	39.48975408	-76.65802132

b. Drone- and sensor-based track and bridge inspection demonstration.

This demonstration will focus on rail infrastructure inspection using unmanned aerial systems, sensing networks, imaging, and data interpretation. Students will learn how drone imagery, sensor data, and inspection workflows can support track and bridge condition assessment, infrastructure monitoring, defect identification, and maintenance planning. The demonstration will introduce students to practical inspection steps, including visual documentation, image review, sensor data organization, condition rating concepts, and the translation of field observations into maintenance or safety-related decisions. Demonstration materials may include track and bridge component examples, inspection images or videos, simplified sensor datasets, image annotation exercises, condition assessment worksheets, and case studies that show how inspection information can be used in rail infrastructure management.

c. Human-machine interaction and locomotive simulator demonstration.

This demonstration will use Morgan's locomotive simulator to support human factors and rail operations learning. Students will examine how operators interact with train control information, warning messages, safety alerts, simulated operating conditions, and decision-making tasks. Topics may include operator response to alerts, workload, situational awareness, reaction time, rule compliance, decision-making under rail safety scenarios, and the role of interface design in safe rail operations. The simulator activities will help students understand how human behavior, system information, and operating context affect rail safety and performance. Demonstration materials may include simulator scenarios, operator response exercises, observation checklists, discussion questions, and short case studies linking human factors concepts to rail workforce preparation.

A key part of this component will be research-to-education translation. Morgan will convert applied research concepts, demonstration results, datasets, images, videos, simulator scenarios, and case studies into reusable educational materials, including classroom demonstrations, safety scenario exercises, inspection worksheets, guided data activities, simulator-based learning exercises, discussion prompts, student project topics, and short assessment questions. The demonstrations will support education and workforce training and will not involve construction, permanent installation of operational equipment, or modification of rail infrastructure.

Task 4. Implement Level-Specific Rail Pathway Activities

The project will implement level-specific rail pathway activities that use the Rail Education Pathway Guide, modular curriculum materials, and technology-enabled demonstrations developed under the previous components. These activities will be organized around three student groups: high school students, community college students, and Morgan students. The purpose is to move students from initial rail exposure to Morgan-based learning experiences, tuition-supported course participation, and continued pathway support toward rail education and workforce preparation.

As shown in Table 3, high school activities will begin with rail awareness, STEM seminars, and career talks, followed by Morgan campus rail days, NSTI activities, and technology demonstrations. Eligible students may participate in tuition-supported Morgan rail courses or

modules and receive follow-up support through Morgan student mentors, short shadowing experiences, and summer rail activities. Community college activities will begin with rail fundamentals workshops and short rail modules, followed by Morgan rail workshops, rail lab visits, and technology demonstrations. Eligible community college students may participate in tuition-supported Morgan rail courses or modules connected to transfer, certificate, or continued education pathways, with additional support through transfer guidance, internship information, and faculty or advisor connections. Morgan student activities will build from TRSS 302 as an entry-point course, rail course orientation, and AREMA Student Chapter engagement into rail modules, seminars, tuition support for rail-track undergraduate and master's students, capstone projects, research exposure, and summer internships.

Through these level-specific activities, the project will help high school students develop rail awareness and familiarity with Morgan, help community college students connect rail fundamentals to transfer and career pathways, and help Morgan students progress toward applied rail learning, research engagement, and workforce readiness.

Table 3 Level-Specific Rail Pathway Activities

Implementation Element	High School Students	Community College Students	Morgan Students
Initial Rail Exposure	<ul style="list-style-type: none"> • Rail awareness • STEM seminar • Career talk 	<ul style="list-style-type: none"> • Rail fundamentals workshop • Short rail module 	<ul style="list-style-type: none"> • TRSS 302 entry-point course • Rail course orientation • AREMA student Chapter engagement
Morgan Experience	<ul style="list-style-type: none"> • Campus rail day • NSTI activity • Technology demo 	<ul style="list-style-type: none"> • Morgan rail workshop • Rail lab visit • Technology demo 	<ul style="list-style-type: none"> • Rail modules in selected general transportation courses • Rail seminars
Tuition-Supported Course Participation	<ul style="list-style-type: none"> • Tuition-supported Morgan rail courses/modules 	<ul style="list-style-type: none"> • Tuition-supported Morgan rail courses/modules • Transfer/certificate pathway 	<ul style="list-style-type: none"> • Tuition support for rail-track undergraduate/master's students
Pathway Support and Follow-up	<ul style="list-style-type: none"> • Morgan Student mentors • Short shadowing experience • Summer rail activity 	<ul style="list-style-type: none"> • Transfer guidance • Internship information • Faculty/advisor connection 	<ul style="list-style-type: none"> • Capstone projects • Research exposure • Summer Internships
Expected Result	<ul style="list-style-type: none"> • Rail awareness • Morgan familiarity • Future enrollment interest 	<ul style="list-style-type: none"> • Rail fundamentals • Pathway connection • Career awareness 	<ul style="list-style-type: none"> • Applied rail learning • Research engagement • Workforce readiness

The activities listed in the above table represent the primary implementation formats for each student level and will be selected each year based on partner availability, student readiness, course schedules, and implementation capacity. This flexible structure will allow Morgan to

adapt activities to different student groups while maintaining a clear pathway from initial rail exposure to Morgan course participation, applied learning, research exposure, internships, and workforce preparation.

Tuition support will be an important mechanism to increase student participation in Morgan's rail education pathway. This support will help eligible students participate in Morgan rail courses as part of the proposed high school, community college, and university-level pathway activities. Priority will be given to students who demonstrate interest in rail transportation and are positioned to enter or continue in Morgan's rail track or railroad concentration, including high school students participating in eligible Morgan course opportunities, community college students or transfer students, undergraduate students, and master's students. Tuition support information and opportunities, where available, will be shared with interested students as part of the pathway follow-up process. This support will help reduce participation barriers, strengthen students' connection to Morgan, and encourage them to move from initial rail exposure or rail fundamentals activities into continued rail education at Morgan.

Task 5. Develop Tracking Toolkits and Identify Students

Morgan will develop tracking toolkits to document student participation, identify students who show interest in rail education, and support continued engagement with Morgan's rail education pathway. The purpose is to recognize students who respond to project activities and connect them with appropriate next-step opportunities, such as follow-up events, Morgan rail courses, tuition-supported course participation, mentoring, transfer guidance, research exposure, internships, or continued rail education at Morgan.

The tracking toolkits will be used to record participation in project-supported rail activities and identify students who show continued interest, where permitted and consistent with applicable school, institutional, and privacy requirements. Students who express interest may be invited to follow-up activities, connected with Morgan faculty or student mentors, and provided with information about Morgan rail courses, tuition support opportunities, transfer or certificate pathways, undergraduate and graduate rail education options, and workforce preparation activities.

The toolkit will include:

- Participation records: activity type, date, student level, partner institution, number of participants, and repeat participation where feasible.
- Pre/post surveys: changes in rail awareness, rail safety understanding, rail career interest, and knowledge of Morgan rail education opportunities.
- Pathway progression tracking: student next steps after participating in an activity, such as attending a Morgan rail event, joining a rail workshop, requesting program or transfer information, enrolling in TRSS 302, or participating in a rail project, research activity, or internship.
- Student and partner feedback: input from students, teachers, community college faculty and advisors, Morgan instructors, mentors, and project partners.
- Annual evaluation summaries: participation trends, student interest, pathway movement, feedback, lessons learned, and recommended updates.

The results will be used to improve the rail education pathway guide, modular curriculum materials, technology demonstrations, and pathway activities. The toolkit will also help Morgan document whether students are moving from initial rail exposure toward continued engagement with Morgan's rail education and workforce preparation opportunities.

Project Schedule

This project is proposed as a four-year workforce development project from September 1, 2027, to August 31, 2031, divided into pathway development, pilot implementation, expansion, and sustainability phases.

The pathway development phase will take place in Year 1. During this phase, Morgan will develop the Rail Education Pathway Guide, prepare modular rail curriculum materials, design technology-enabled rail demonstrations, develop the tracking and evaluation toolkit, and coordinate with participating high schools, community colleges, and project partners. Initial work will focus on adapting Morgan's existing rail course content, laboratory resources, technology examples, and outreach experience into materials that can be used for high school exposure, community college rail fundamentals, and Morgan university-level learning.

The pilot implementation phase will begin in Year 2. During this phase, Morgan will pilot selected high school rail awareness activities, community college rail fundamentals activities, Morgan course-based rail modules, tuition-supported Morgan rail course participation, and technology-enabled demonstrations. The project team will collect participation records, student feedback, partner feedback, and pre/post survey results to evaluate early implementation and identify needed revisions to the pathway guide, curriculum materials, demonstrations, and activity formats.

The expansion phase will take place in Year 3. During this phase, Morgan will refine and expand the pathway activities based on the Year 2 pilot results. Additional high school and community college activities may be implemented based on partner availability, student readiness, and annual implementation capacity. Morgan will also continue implementing rail modules in selected courses, supporting eligible students in Morgan rail course participation, and connecting interested students to laboratory activities, research exposure, student projects, internships, and workforce preparation opportunities.

The sustainability and finalization phase will take place in Year 4. During this phase, Morgan will finalize the pathway guide, modular curriculum materials, technology demonstration packages, and tracking and evaluation toolkit. The project team will summarize participation, student interest, tuition-supported course participation, pathway movement, partner feedback, and lessons learned. At the conclusion of the grant, successful materials and activities will be positioned for continued use through Morgan's rail courses, transportation curriculum, National Transportation Center outreach activities, laboratory resources, and partner engagement with high schools and community colleges.

Expected Outcomes, Users and Beneficiaries

The direct users and beneficiaries will include high school students, community college students, Morgan students, teachers, community college faculty and advisors, Morgan instructors, student mentors, and project partners. Partner high schools will receive rail outreach and pathway information that can help students connect STEM learning to transportation careers. Community

colleges will receive rail fundamentals content and pathway guidance that can supplement existing technical and transfer programs. Morgan will benefit by expanding the reach of its rail education program, strengthening student engagement, and creating reusable materials and activities that can continue beyond the grant period.

During the project period, Morgan expects to engage approximately 50-75 high school students, 20-30 community college students, and 20-30 Morgan students per year through rail awareness activities, rail fundamentals workshops, Morgan campus or laboratory experiences, technology demonstrations, course modules, mentoring, and pathway follow-up activities. In addition to these broader engagement activities, tuition support will be used as a targeted mechanism to help eligible students participate in Morgan rail courses and continue along the rail education pathway. Based on the proposed budget, the project will support approximately 10 high school students per year in 3-credit Morgan rail course participation, 10 community college students per year in 6-credit Morgan rail course participation, 10 Morgan undergraduate students per year pursuing rail-related study, and 5 Morgan graduate students per year pursuing rail-related study.

The broader benefit is the creation of a replicable university-led rail education pathway model. By linking high school exposure, community college rail fundamentals, and university-level rail education, the project will help address the gap between general STEM or transportation interest and actual entry into rail-related education and workforce opportunities.

References

- [1] Federal Railroad Administration. (2016). Railroad Industry Modal Profile: An Outline of the Railroad Industry Workforce Trends, Challenges, and Opportunities - Update (DOT/FRA/ORD-16/09). U.S. Department of Transportation.
- [2] Federal Railroad Administration. (2024). Expanding the Talent Pool: Tracks to the Future Program for High School Students (Research Results RR 24-08). U.S. Department of Transportation.
- [3] Glitman, K. (2010). Transportation Workforce Development at Community Colleges (Report No. 10-002). University of Vermont Transportation Research Center.
- [4] Federal Railroad Administration. (2020). Railroad Industry Workforce Development Survey (RR 20-19). U.S. Department of Transportation.

vi. Project Location

The proposed project will be led by Morgan State University in Baltimore, Maryland. The primary education, curriculum, outreach, and laboratory activities will be coordinated through Morgan's campus, transportation classrooms, rail-related laboratory and demonstration resources, and National Transportation Center outreach capacity. The project service area will include participating high schools and community colleges in the Baltimore and Washington, D.C. metropolitan areas.

The demonstration component may include temporary, non-interfering research-grade sensor testing, field observation, and data collection at selected MTA light rail locations and/or selected City intersections, subject to MTA and BCDOT safety requirements, site access procedures, operational constraints, and required approvals. The project does not involve right-of-way acquisition, construction, permanent installation of operational rail equipment, or modification of rail infrastructure.

vii. Evaluation and Selection Criteria

The proposed project is responsive to FRA’s evaluation and selection criteria for Non-Capital Projects because it builds on Morgan State University’s existing rail education foundation, transportation research and outreach capacity, technology demonstration resources, and regional partner engagement. The project is organized as a structured workforce development pathway that connects high school exposure, community college rail fundamentals, Morgan rail course participation, applied rail safety demonstrations, student tracking, and continued workforce preparation.

Project Readiness

a. Established rail curriculum and academic pathways – Morgan has already established a set of rail-related courses that can support the proposed pathway expansion. Core courses include:

- *TRSS 302 Introduction to Rail Transportation Systems;*
- *TRSS 426/TRSP 626 Rail Transportation Engineering;*
- *TRSS 427/TRSP 627 Rail Transportation Safety and Derailment Engineering;*
- *TRSS 428/TRSP 628 Railroad Inspection and Maintenance Management;*
- *TRSS 307/TRSP 607 Freight Transportation and Logistics;*
- *TRSS 406/TRSP 606 Urban Public Transportation.*

These courses provide an existing curriculum base that can be adapted into high school exposure modules, community college rail fundamentals activities, and Morgan university-level rail learning.

b. Existing student base, degree pathways, and student engagement– Morgan’s Department of Transportation and Urban Infrastructure Studies provides multiple education pathways that can connect student interest in rail transportation to formal academic progress, including undergraduate, certificate, master’s, and doctoral study. From the 2023-2024 academic year through the 2025-2026 academic year, Morgan’s Rail Program enrolled 22 domestic undergraduate students and 18 domestic graduate students. In addition, the AREMA Student Chapter at Morgan provides an important student engagement mechanism for introducing Morgan students to rail education, professional activities, peer learning, and industry connections. This existing student base and student organization structure demonstrate Morgan’s current ability to deliver rail education and provide a foundation for expanding the pipeline to high school and community college students.

c. Laboratory, simulation, and technology resources – The project is supported by Morgan’s existing rail, transportation technology, simulation, and safety research resources. Morgan has a PST locomotive simulator, scaled model train and track resources, full-scale track components, Rail Traffic Controller (RTC) simulation software, and other rail-related education resources that can support rail operations learning, infrastructure demonstrations, and hands-on rail activities. In addition, Morgan’s National Transportation Center and SMARTER Center provide broader transportation technology capabilities, including LiDAR-based sensing, edge-computing safety alert systems, and drone/UAV-based imaging experience. These resources provide the physical, simulation-based, and data-driven foundation for developing railroad crossing safety

demonstrations, drone- and sensor-based track and bridge inspection activities, and human-machine interaction exercises for different student levels.

d. Institutional outreach and technology platform – Morgan’s National Transportation Center provides an established platform for transportation research, education, workforce development, and technology transfer. Through the NTC, Morgan leads the SMARTER Center, the USDOT Region 3 University Transportation Center, and has existing capacity in simulation, sensing, data analysis, safety technology, human factors, and smart infrastructure. Morgan will also leverage its established National Summer Transportation Institute (NSTI) to support the proposed rail pathway expansion. NSTI has more than 28 years of operation and has served over 600 participants, providing a tested platform for introducing middle and high school students to transportation careers through STEM education, hands-on activities, field trips, speakers, and campus-based learning experiences. This institutional platform provides a practical foundation for adding rail-focused content, including rail awareness, rail safety, technology demonstrations, and rail career pathway information.

e. Partner coordination and field support – The project is supported by confirmed agency and industry partners that strengthen implementation readiness. The Maryland Transit Administration (MTA) has provided a letter of support indicating its willingness to coordinate with the project team on non-interfering field-based safety analyses, demonstrations, passive pilot testing, and field data collection at selected light rail locations, subject to MTA safety requirements, site access procedures, and operational constraints. The Baltimore City Department of Transportation (BCDOT) has provided a letter of support recognizing the importance of preparing the next generation of transportation professionals and supporting Morgan’s planned light rail safety technology demonstration and educational case study activities. Mead & Hunt has provided a letter of commitment to support technical planning, safety alert concepts, field observation, and related demonstration activities. These partner commitments reduce implementation risk and strengthen the project’s readiness for field-based learning, technology demonstration, and research-to-education translation.

Technical Merit

a. Appropriate task structure – The proposed project is organized around five connected components: development of a Rail Education Pathway Guide, modular rail curriculum materials, technology-enabled rail demonstrations, level-specific pathway activities, and a tracking and evaluation toolkit. This task structure is appropriate for a Non-Capital workforce development project because it connects planning, content development, implementation, student support, and evaluation into one coordinated pathway.

b. Level-specific pathway design – The project is designed to match different student readiness levels. High school activities will focus on rail awareness, STEM connections, safety awareness, career interest, and Morgan campus exposure. Community college activities will focus on rail fundamentals, short rail modules, Morgan rail workshops, transfer or certificate pathway guidance, and connection to existing technical or transfer-oriented programs. Morgan student activities will expand access to rail education through TRSS 302 as an entry-point course, rail course orientation, AREMA Student Chapter engagement, selected transportation course modules, tuition support for rail-track undergraduate and master’s students, capstone projects, internships, and research exposure.

c. Research-to-education translation – The project includes applied rail safety and technology demonstrations that will be translated into education and workforce training materials. Demonstration areas include railroad crossing safety detection and warning concepts, drone- and sensor-based track and bridge inspection, and human-machine interaction using Morgan’s locomotive simulator. The technical approach is strengthened by support from the Maryland Transit Administration (MTA), the Baltimore City Department of Transportation (BCDOT), and Mead & Hunt, which provide practical field context, public-sector relevance, and technical expertise for education-oriented rail safety demonstrations. These demonstrations will generate case studies, simplified datasets, inspection images, simulator scenarios, worksheets, discussion prompts, and student project topics. They are designed for education and workforce training and will be implemented as temporary, non-intrusive, and non-interfering research-grade activities, without construction, right-of-way acquisition, permanent installation of operational rail equipment, or modification of rail infrastructure.

d. Measurable and adaptable implementation – The modular design allows the pathway guide, curriculum modules, demonstrations, and activity formats to be reused in high school outreach, community college workshops, Morgan courses, laboratory activities, and future workforce development efforts. The tracking and evaluation toolkit will document participation, tuition-supported course participation, student interest, pathway progression, short survey results, and partner feedback. These data will allow Morgan to evaluate whether students are progressing from initial exposure to continued rail education, applied learning, research engagement, and workforce readiness.

e. Project risk control – The project reduces implementation risk by using Morgan’s existing courses, laboratories, outreach infrastructure, technology resources, and partner relationships. Field-based research or technology demonstration activities, where used, will be temporary, non-interfering, and coordinated with MTA and BCDOT. This approach allows the project to gain the educational value of real-world rail safety demonstrations while avoiding the risks associated with construction, permanent infrastructure installation, or operational rail system modification.

Project Benefits

a. Workforce development and education pipeline – The primary benefit of the proposed project is the creation of a connected rail workforce development pathway serving high school students, community college students, and Morgan students. High school students will gain early exposure to rail transportation as a STEM, safety, infrastructure, and technology field. Community college students will gain rail fundamentals that connect existing technical and transfer-oriented programs to rail education and career opportunities. Morgan students will gain broader access to rail courses, tuition-supported rail-track study, applied projects, research exposure, internships, and workforce preparation.

b. Safety awareness and technology readiness – The project will improve rail safety awareness and technology readiness by translating applied rail safety concepts into student learning activities. Students will learn how sensing, inspection, simulation, data interpretation, warning logic, human factors, and decision-making support rail safety and infrastructure condition assessment. These activities will help prepare students to enter rail-related education and workforce pathways with stronger practical understanding of rail safety and technology applications.

c. Ability to meet future workforce demand – The project addresses the gap between general STEM or transportation interest and actual entry into rail-related education and careers. By linking high school outreach, community college rail fundamentals, tuition-supported Morgan rail course participation, and university-level rail education, the project will help expand the number of students who understand rail transportation and can pursue rail-related education, internships, research, and workforce opportunities.

d. Sustainability and cost effectiveness – The proposed project provides a cost-effective Non-Capital workforce development benefit because it builds on Morgan’s existing rail courses, laboratory resources, technology resources, outreach platform, and regional partnerships. The project will create reusable pathway guides, curriculum modules, technology demonstration materials, case studies, datasets, and tracking tools that can continue to support rail education and outreach beyond the grant period. Because the project does not require construction, right-of-way acquisition, permanent installation of operational rail equipment, or infrastructure modification, it avoids long-term infrastructure maintenance obligations while producing durable education and workforce development benefits.

Together, these readiness, technical merits, and benefit factors demonstrate that Morgan State University is prepared to implement the proposed Non-Capital CRISI workforce development project within the proposed scope, schedule, and budget, while producing measurable and reusable outcomes for rail education, safety awareness, and next-generation workforce preparation.

viii. Project Implementation and Management

This project will be managed and implemented by Morgan State University through the Department of Transportation and Urban Infrastructure Studies and the National Transportation Center. Morgan State University will serve as the applicant and primary recipient and will be responsible for overall project management, financial administration, coordination with FRA, partner coordination, reporting, and completion of project milestones and deliverables.

The project will be led by Dr. Yuliang Zhou, Assistant Professor in the Department of Transportation and Urban Infrastructure Studies, who will serve as Principal Investigator and Project Manager. Dr. Zhou has nearly ten years of railroad research experience and received doctoral training through Penn State’s Railroad Transportation Engineering (RTE) program. His work has focused on railway infrastructure engineering, sensor-driven condition assessment, railroad bridge monitoring, distributed fiber optic sensing for track health monitoring, ballast and subgrade behavior, and UAS-based inspection of rail infrastructure. At Morgan, he serves as Faculty Advisor for the AREMA Student Chapter and Founding Lab Manager and Lead Coordinator of the Railway Education and Applied Learning Laboratory. This background provides the project with direct rail technical expertise and a foundation for translating rail research and demonstration activities into student learning and workforce preparation.

The Morgan team also includes senior faculty with extensive experience in transportation education, curriculum development, outreach, student mentoring, and federally funded transportation programs. Dr. Anthony Saka brings more than three decades of transportation

engineering education and professional experience and has played a central role in building Morgan's transportation degree programs, including undergraduate, certificate, master's, and doctoral pathways. Dr. Young-Jae Lee brings extensive teaching and research experience in transit operations, Intelligent Transportation Systems, freight transportation, logistics, and rail transit operations research. Dr. Celeste Chavis brings experience in transportation education, curriculum development, ABET assessment, transportation equity, and public transportation. Dr. Mansoureh Jeihani will support the project through her leadership of Morgan's National Transportation Center, SMARTER Center, and transportation outreach infrastructure, including the NSTI platform. The team also brings experience from the prior FRA CRISI-supported effort to develop and implement rail transportation engineering curriculum at Morgan, providing a strong foundation for the proposed workforce development expansion.

The division of responsibilities will follow the project's education and workforce development focus. Dr. Zhou will provide overall project leadership, coordinate FRA reporting and partner communication, lead rail demonstration development, supervise student research and training activities, and coordinate the translation of rail technology demonstrations into educational materials. Dr. Saka will provide senior guidance on curriculum structure, academic pathway development, program integration, and long-term sustainability within Morgan's transportation programs. Dr. Lee will support rail operations, transit systems, ITS-related learning materials, transportation systems analysis, and student project development. Dr. Jeihani will support coordination with Morgan's NTC, SMARTER Center, NSTI outreach platform, and technology demonstration resources. Dr. Chavis will support curriculum integration, student engagement, pathway evaluation, outreach activities, and assessment of workforce development outcomes.

Mead & Hunt will serve as a technical subcontractor. Mead & Hunt will provide technical support for education-oriented rail safety demonstration planning, safety alert concepts, signalized crossing strategies, field observation, bench testing concepts, and translation of demonstration concepts into educational and workforce training materials. Dr. Anam Ardeshiri brings experience in traffic engineering, ITS, traffic signal systems, transit signal priority and preemption, LiDAR-based safety applications, and coordination with Baltimore City and transit agencies. Joanna Bush brings specialized grade crossing safety expertise, including interconnected crossings, railroad preemption systems, traffic signal operations, railroad coordination, operational safety analysis, diagnostic reviews, and MUTCD Part 8 guidance.

The project team will use Morgan's existing rail courses, transportation curriculum, laboratory resources, locomotive simulator, National Transportation Center, SMARTER Center resources, NSTI outreach platform, AREMA Student Chapter activities, and regional transportation education networks to implement the proposed workforce development activities. The project will also coordinate with the Maryland Transit Administration, the Baltimore City Department of Transportation, and Mead & Hunt to support selected education-oriented field demonstrations and case study development. The project will be organized around the development of a rail education pathway guide, modular rail curriculum materials, technology-enabled rail

demonstrations, level-specific pathway activities for high school, community college, and Morgan students, and a tracking and evaluation toolkit. These activities will be implemented over a four-year project period from September 1, 2027, to August 31, 2031.

Appendix A. Resumes of key researchers.

Morgan State University

- Professor Yuliang Zhou
- Professor Anthony Saka
- Professor Mansoureh Jeihani
- Professor Young-Jae Lee
- Professor Celeste Chavis

Mead & Hunt

- Dr. Anam Ardeshiri, Department Manager, Traffic Engineering & Intelligent Transportation Systems
- Joanna Bush, Senior Traffic & Grade Crossing Safety Engineer

YULIANG ZHOU, Ph.D.

Assistant Professor, Department of Transportation and Urban Infrastructure Studies

Morgan State University, School of Engineering
1700 E. Cold Spring Lane, Baltimore, Maryland 21251
Email: yuliang.zhou@morgan.edu | Phone: (814) 996-9488

EDUCATION

The Pennsylvania State University, PA

Ph.D. in Civil Engineering (Rail Transportation Engineering), **2025**

Tongji University, Shanghai, China

Ph.D. in Transportation Engineering, **2021**

Tongji University, Shanghai, China

B.S. in Traffic Engineering, **2016**

SUMMARY OF QUALIFICATIONS

Dr. Yuliang Zhou, is an Assistant Professor in the Department of Transportation and Urban Infrastructure Studies at Morgan State University. He earned his doctoral training in Civil Engineering with a focus on Rail Transportation Engineering at The Pennsylvania State University and previously completed a Ph.D. and B.S. in urban rail related fields at Tongji University. His academic background is centered on railroad engineering, rail infrastructure health monitoring, sensor-driven condition assessment, and rail transportation systems.

Dr. Zhou specializes in assessing the condition of rail infrastructure and monitoring its health using advanced sensing technologies, including distributed fiber-optic sensing, MEMS sensors, UAV-based imaging, low-cost sensor networks, and multi-sensor data-model fusion. His research has supported projects funded by the Federal Railroad Administration (FRA), U.S. Department of Transportation (USDOT), Association of American Railroads (AAR), and University Transportation Centers, with applications to railroad track, bridges, ballast, subgrade, light rail infrastructure, and maintenance decision-making.

At Morgan State University, Dr. Zhou supports rail education and workforce development through rail coursework, applied learning, student mentoring, the AREMA Student Chapter, and the Railway Education and Applied Learning Laboratory (REAL Lab). His work connects rail infrastructure research with hands-on demonstrations, student projects, and workforce preparation, with the goal of expanding student access to rail transportation education at an HBCU.

PROFESSIONAL HISTORY

Assistant Professor, Department of Transportation and Urban Infrastructure Studies, School of Engineering, Morgan State University, Baltimore, MD, August 2025 - Present

Graduate Researcher, Railroad Transportation Engineering Program and Larson Transportation Institute, The Pennsylvania State University, University Park, PA, January 2022 - July 2025

Graduate Researcher, College of Transportation, Tongji University, Shanghai, China, September 2016 - December 2021

RAIL WORKFORCE DEVELOPMENT

Dr. Zhou's teaching and workforce-development activities focus on expanding access to rail transportation education and connecting students to applied rail infrastructure research. Representative activities include:

- Instructor and curriculum contributor for rail transportation education at Morgan State University, including TRSS 302 Introduction to Rail Transportation Systems, TRSS 426/TRSP 626 Rail Transportation Engineering, TRSS 427/TRSP 627 Rail Transportation Safety and Derailment Engineering, and TRSS 428/TRSP 628 Railroad Inspection and Maintenance Management;
- Faculty Advisor, American Railway Engineering and Maintenance-of-Way Association (AREMA) Student Chapter, Morgan State University.
- Founding Lab Manager and Lead Coordinator, Railway Education and Applied Learning Laboratory (REAL Lab), Morgan State University.

SELECTED RESEARCH PROJECTS

- PI, UAS-Based Automated Inspection Framework for Track and Overhead Contact System: A Study on Maryland Light Rail, Center for Multimodal Mobility (CMMM), a USDOT University Transportation Center, 2026-2027, \$80,000.
- Researcher, Rural Railroad Safety and Workforce Development Center, U.S. Department of Transportation, November 2022 - December 2024.
- Researcher, Railroad Track Health Monitoring Using Distributed Fiber Optic Sensor, Association of American Railroads (AAR), January 2022 - December 2023.
- Researcher, Rail Safety Improvement Through Enhanced Understanding of Ballast and Subgrade Interactions, Federal Railroad Administration (FRA), January 2022 - December 2024.

SELECTED PUBLICATIONS

- Zhou, Y., Hansmann, F., Antony, B., Huang, H., Zeng, K., Zhang, C., & Yang, Q. (2026). Bridging micro-mechanical sensing and macro-maintenance: Investigating the impact of tamping parameters on the evolution of clean and fouled ballast. *Transportation Geotechnics*, 102123.
- Huang, H., & Zhou, Y. (2026). Rail Safety Improvement Through Enhanced Understanding of Ballast and Subgrade Interactions. Department of Transportation. Federal Railroad Administration. Office of Research, Development and Technology.
- Li, Q., Xie, X., Zeng, K., & Zhou, Y. (2025). Metro tunnel structural anomaly detection based on vehicle-track-tunnel coupling model using FNO and CAE networks. *Transportation Geotechnics*, 55, 101680.
- Zhou, Y., Schlake, B., Hansmann, F., Huang, H., Antony, B., Zeng, K., & Zhang, C. (2024). Particle motion and stress response interacted with machine activity: Railroad tamping strategy. *Transportation Geotechnics*, 45, 101188.
- Zeng, K., Nazari, S., Zhou, Y., et al. (2024). Investigation into the effect of railroad ballast fouling on ballast movements and strain change using SmartGrid. *Transportation Geotechnics*, 48, 101307.
- Zhou, Y., Huang, H., Shen, S., & Wang, X. (2024). Measuring under-tie support condition: An approach using distributed fiber-optic strain sensors. *Measurement*, 114279.

- Ding, N., Zhou, Y., Li, D., & Zeng, K. (2024). Real-time deformation monitoring of large diameter shield tunnel based on multi-sensor data fusion technique. *Measurement*, 225, 114061.
- Zhou, Y., Huang, H., DelSignore, P., et al. (2024). Automated bridge inspection and load rating using low-cost sensor networks. AREMA Annual Conference.
- Zhou, Y., Huang, H., Hansmann, F., et al. (2024). When Smart-Tamper Meets Smart-Rock. AREMA Annual Conference.
- Zhou, Y., Huang, H., & Poudel, A. (2023). Continuous railroad track health monitoring using distributed fiber optic sensor. AREMA Annual Conference.
- Zhou, Y., Huang, H., Schlake, B., et al. (2022). What happens during the tamping process - When Smart-Tamper Meets Smart-Rock. World Congress on Railway Research, Birmingham, UK.

ANTHONY A. SAKA, PHD, PE, PTOE, PTP, FITE, FASCE

Professor, Department of Transportation and Urban Infrastructure Studies

Morgan State University, Baltimore, Maryland 21251

SUMMARY OF QUALIFICATIONS

Dr. Saka has over three decades of academic and professional transportation engineering experience, including development of educational curriculums. In the early nineties, he led the effort to restructure the MS in Urban Transportation program at Morgan State University to include concentrations in traffic engineering, transportation planning, transportation systems management, and distribution logistics. He was one of the first group of educators in the county to offer a full (three-credit hour) graduate course in Intelligent Transportation Systems. Dr. Saka also led the effort to expand the transportation program at Morgan State University to include the one-of-a-kind ABET accredited BS in transportation systems, the post-baccalaureate certificate (PBC) in urban transportation, the Doctor of Philosophy (PhD) in transportation and urban infrastructure systems, and the recent one-of-a-kind BS in transportation systems engineering. Under Dr. Saka's leadership, Morgan State University with an academic department (Transportation & Urban Infrastructure Studies) dedicated exclusively for transportation education and research has become a national leader. Dr. Saka's experience dovetails with the proposed FRA Workforce Development effort in Railroad Transportation Engineering, Operations, and Management which will not only provide a much-needed railroad transportation concentration track for the BS, MS, PhD, and PBC transportation programs at Morgan State University but also boost the competitiveness of the urban minority and underserved population (the primary market segment of Morgan State University) to participate in the rail transportation workforce.

EDUCATION

- PhD in Civil Engineering (Transportation Systems), School of Engineering & Applied Science, University of Virginia, Charlottesville, VA, 1987.
- MURP in Urban and Regional Planning (Transportation Planning), Graduate School of Public & International Affairs, University of Pittsburgh, Pittsburgh, PA, 1982.
- BA in City and Regional Planning, College of Liberal Arts, University of Southwestern Louisiana, Lafayette, LA, 1981.

ACADEMIC EXPERIENCE

- Professor, Department of Transportation & Urban Infrastructure Studies, School of Engineering, Morgan State University, Baltimore, MD (Full time since 2003)
- Associate Professor (tenured), Center for Transportation Studies, School of Engineering, Morgan State University, Baltimore, MD (Full time 1997 - 2003)
- Assistant Professor, Center for Transportation Studies, School of Education & Urban Studies, Morgan State University, Baltimore, MD (Full time 1992 - 1997)

- Teaching Assistant, Department of Civil Engineering, School of Engineering & Applied Science, University of Virginia, Charlottesville, VA (1985-1986)

OTHER PROFESSIONAL EXPERIENCE

- Principal Transportation Planning Engineer, Rappahannock Area Development Commission - RADCO (Full time 1990 - 1992)
- Senior Civil Engineer, Chesterfield County, VA Department of Transportation (Full time 1989 - 1990)
- Civil Engineer, Chesterfield County, VA Department of Transportation (Full time 1987 - 1989)

CERTIFICATIONS OR PROFESSIONAL REGISTRATIONS

- Professional Transportation Planner - PTP (since 2007, Inaugural group)
- Professional Traffic Operations Engineer - PTOE (since 1999, Inaugural group)
- Professional Engineer, Commonwealth of Virginia (since 1994)
- Professional Engineer, State of Maryland (since 1994)
- Engineer-in-Training, Commonwealth of Virginia (1988)

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- Fellow, American Society of Civil Engineers (Member: Since 1988)
- Fellow, Institute of Transportation Engineers (Member: Since 1986)
- Member, Institute for Operations Research and Management Sciences (since 1992)
- Member, American Society of Engineering Educators (Since 2007)

HONORS AND AWARDS

- Research Mentor, Ronald E. McNair Post-Baccalaureate Achievement Program at Coppin State College, Baltimore, 1997
- Award of Appreciation, ITS America Student Chapter, Morgan State University, 1996
- Award of Appreciation, ITS America Student Chapter, Morgan State University, 1994
- Award of Appreciation, District 5, Institute of Transportation Engineers, 1992
- Best Technical Paper, District 5, Institute of Transportation Engineers, 1992
- Best Technical Paper, District 5, Institute of Transportation Engineers, 1991

SAMPLE SERVICE ACTIVITIES

- Chair & Undergraduate Student Advisor, Department of Transportation & Urban Infrastructure Studies, School of Engineering, Morgan State University (Since 2007)
- Advisory Board Member, USDOT Center for Connected Multimodal Mobility (C2M2), Clemson University, Clemson, NC

- Member, Student Learning Outcomes Assessment Subcommittee, Middle State Accreditation, Morgan State University (2017-2018)
- Chair, Civil Engineering Department Chair Search Committee, Morgan State University (2017-2018)
- Chair, Industrial Engineering Department Chair Search Committee, Morgan State University (2020-2021)
- Member, School of Engineering Leadership Council, Morgan State University
- Member, Tenure & Promotion Appeal Committee, Morgan State University (2021)

SAMPLE RESEARCH INTERESTS

- Transportation Engineering Curriculum Development for Emerging Paradigms
- Negative Externalities of Poorly Maintained Road Infrastructure
- The Effects of Connected and Autonomous Vehicle Technology on Mobility & Accessibility
- Systems Thinking Solution Approach

MANSOUREH JEIHANI, Ph.D., PTP

Professor, Director of the National Transportation Center and the SMARTER University Transportation Center

Morgan State University, School of Engineering

Baltimore, Maryland 21251

Email: Mansoureh.Jeihani@morgan.edu | Phone: 443-885-1873 | [Google Scholar](#)

EDUCATION

Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia

Ph.D. in Civil Engineering (Transportation Systems Engineering), *December 2004*

Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia

M.A. in Economics, *December 2001*

Institute for Research in Planning and Development (IRPD), Tehran, Iran

M.S. in Socio-Economic Systems Engineering, *August 1998*

Iran National University (Shahid Beheshti), Tehran, Iran

B.S. in Computer Engineering, *January 1995*

SUMMARY OF QUALIFICATIONS

Mansoureh Jeihani, Ph.D., PTP, is a tenured Professor in the School of Engineering at Morgan State University and Director of both the National Transportation Center (NTC) and the USDOT-funded Safety & Mobility Advancements Regional Transportation and Economics Research (SMARTER) University Transportation Center. She has more than 18 years of experience as a faculty member and research center leader, and has directed three consecutive USDOT University Transportation Centers, securing and managing a research and education portfolio through competitive awards. Her work spans surface transportation safety, connected and automated vehicles, human factors, and the education and workforce-development mission that is central to the University Transportation Center program.

Dr. Jeihani specializes in transportation human-factors and behavioral research conducted in an advanced, integrated driving/traffic-simulation laboratory that she established and directs. Her research applies driving simulators, LiDAR and CCTV sensing, and machine learning to: 1) study driver behavior, distraction, and compliance under varied roadway, signage, and visibility conditions; 2) evaluate safety countermeasures and warning systems for vulnerable road users, work zones, and commercial vehicles; and 3) develop sensing, inspection, and conflict-detection methods for intersections and corridors. This methodological core (simulation, sensing, human factors, and applied safety analysis), transfers directly to rail and grade-crossing safety, operator behavior, and inspection-technology research.

As a center director, she leads transportation education and workforce-development programming, including the National Summer Transportation Institute, the Higher Learning Education Program, summer pre-college institutes, and graduate research training, with a sustained emphasis on broadening participation among underrepresented students at a Historically Black College and University (HBCU). She has mentored numerous graduate students and early-career researchers,

many of whom co-author the publications below. She is an ITE Fellow (2025), has received national awards from CUTC and ARTBA for workforce development and technology transfer, holds multiple patents, and serves on Transportation Research Board (TRB), NCHRP, BTSCR, and state advisory committees.

AREAS OF EXPERTISE

- Transportation safety, human factors, and driver-behavior research
- Driving/traffic simulation and integrated simulator testbeds
- Sensing, inspection, and conflict detection (LiDAR, CCTV, connected-vehicle data)
- Connected and automated vehicles and intelligent transportation systems
- Transportation education, workforce development, and student mentoring
- Curriculum development and applied/sponsored transportation research
- Mobility, and travel-behavior modeling

PROFESSIONAL HISTORY

Director, Safety & Mobility Advancements Regional Transportation and Economics Research (SMARTER) Center, USDOT University Transportation Center, Morgan State University, June 2023 - Present

Director, National Transportation Center, Morgan State University, July 2021 - Present

Director, Urban Mobility & Equity Center (UMEC), USDOT University Transportation Center, Morgan State University, July 2021 - September 2023

Interim Director, National Transportation Center and Urban Mobility & Equity Center, Morgan State University, January 2020 - June 2021

Professor, Morgan State University, Baltimore, MD, August 2018 - Present

Associate Professor, Morgan State University, Baltimore, MD, August 2012 - August 2018

Assistant Professor, Morgan State University, Baltimore, MD, January 2007 - August 2012

Senior Modeling Analyst, Southern California Association of Governments, Los Angeles, CA, April 2006 - January 2007

Senior Associate, Resource Systems Group Inc., White River Junction, VT, December 2004 - March 2006

EDUCATION & WORKFORCE DEVELOPMENT

As director of three USDOT University Transportation Centers, Dr. Jeihani has led the education and workforce-development mission required of every UTC, building a pipeline of transportation professionals with sustained attention to students from underrepresented groups. Representative programs and activities include:

- **National Summer Transportation Institute (NSTI)** - director of pre-college summer programming introducing high-school students to transportation careers (FMCSA and MDOT sponsored, 2021–2023).
- **Higher Learning Education Program** - Maryland Transportation Authority workforce-education program, 2021-2026.

- **ELET2: Engaged Learning Environment for Emerging Transportation Technologies** - NSF-funded curriculum and engaged-learning initiative on emerging transportation technologies, 2023-2025.
- **High-Impact Pedagogy at an HBCU** - co-investigator on an NSF project adopting high-impact pedagogical techniques to promote motivation and achievement in STEM fields at a Historically Black College and University.
- **CUTC Workforce Development Leadership Award (2020)** and **CUTC Technology Transfer Leadership Award (2020, 2025)**, recognizing national leadership in transportation workforce development and technology transfer.
- **Graduate mentoring** - ongoing supervision of M.S./Ph.D. students and postdoctoral researchers, faculty advisor to the ITE Student Chapter (2008–2013), and frequent participation in STEM outreach (Maryland STEM Career Fair for Girls, STEM EXPO).

SELECTED FUNDED PROJECTS

(Lead/PI role unless noted; selected from a portfolio in competitive awards.)

- **Director, SMARTER University Transportation Center**, U.S. Department of Transportation, 2023-2029, \$15M (plus \$4M Maryland DOT match).
- **Director, Urban Mobility & Equity Center (UMEC)**, U.S. Department of Transportation, 2016-2023, \$9M.
- **The Tribal and Rural Autonomous Vehicles for Efficiency, Liability and Safety (TRAVELS) Center** (multi-university), U.S. Department of Transportation, 2025-2031, \$15M (Morgan share \$550K).
- **National Center for Transportation Cybersecurity and Resiliency**, U.S. Department of Transportation, 2023-2029, \$20M (Morgan share \$2M).
- **Center for Multi-Modal Mobility in Urban, Rural, and Tribal Areas**, U.S. Department of Transportation, 2023-2029, \$10M (Morgan share \$1.25M).
- **Smart Traffic Signal Systems to Mitigate Bridge Collapse Impact in Baltimore City** (co-PI), USDOT SMART Grant, 2025-2026, ~\$2M.
- **CMV Safety Countermeasures Using Telematics and Driving Simulator Data**, Federal Motor Carrier Safety Administration, 2022-2024, \$333K.
- **A Comprehensive Study on CMV Safety Using ITS in Work Zones on Freeways and Arterials**, FMCSA, 2019-2021, \$133K.
- **Investigating the Effect of Different Bike Lane Types on Bicyclists' Safety and Behavior**, Maryland DOT, 2023-2024, \$81K.
- **Exploring Travelers' Behavior in Response to Variable Message Signs Using an Integrated Driving Simulator/Traffic Simulator**, Federal Highway Administration and Maryland SHA, 2012-2013, \$100K.
- **Driving Simulator Procurement**, National Transportation Center, 2011, \$50K - establishing Morgan State's driving-simulation laboratory.

TECHNOLOGY DEMONSTRATIONS, PATENTS & FACILITIES

Research Facilities and Testbeds

- **Integrated Driving/Traffic Simulation Laboratory** - a full-scale driving simulator integrated with traffic-simulation software, used for human-factors, distraction, signage, work-zone, and connected/automated-vehicle behavior studies.

- **Mixed Traffic Connected and Automated Vehicle (CAV) Testbed** and a LiDAR/CCTV-instrumented smart-campus corridor for real-world sensing, safety, and conflict-detection research.

Selected Demonstrations and Outreach

- Autonomous wheelchair technology demonstrated at BWI Thurgood Marshall Airport (covered by the Baltimore Banner, GovTech, ABC/WMAR, and others).
- Presenter, The White House ARPA-I Summit (2023); DCQI Innovation Showcase on connected and automated vehicles.

Selected Patents (Granted)

- Systems and Methods for Generating Vehicle Speed Alerts, U.S. Patent No. 11,565,711.
- Systems and Methods for Driver Distraction Detection and Classification, U.S. Patent No. 12,145,597.
- System and Method for Synchronization of Asynchronous Datasets, U.S. Patent No. 12,499,118.
- Autonomous Mobility System, U.S. Patent Pub. No. 2023/0064211. (Numerous additional provisional patents in distraction recognition, work-zone safety, and defensive-driving warning systems.)

SELECTED RECOGNITIONS AND HONORS

- ITE Fellow, Institute of Transportation Engineers, 2025
- Morgan State's Innovation Leader Award, 2026
- Excellence in New Research Acquisition (STEM), Morgan State University, 2025
- ARTBA Women Leaders in Transportation - Excellence in Academia Award, 2024
- Outstanding Faculty Award - Excellence in Research or Scholarship, Morgan State University, 2024
- CUTC Workforce Development Leadership Award (2020); CUTC Technology Transfer Leadership Award (2020, 2025)
- Innovation Award in Physical Science, Morgan State University Office of Technology Transfer, 2022

PROFESSIONAL AFFILIATIONS & SERVICE

- Transportation Research Board (TRB) - Truck and Bus Safety (2025); Artificial Intelligence and Advanced Computing Applications Committee (2020-2025); Transportation Network Modeling Committee (2012-2018)
- National Cooperative Highway Research Program (NCHRP) Panel, TRB, 2019-Present; Behavioral Traffic Safety Cooperative Research Program (BTSCR) Panel, 2023-Present
- Council of University Transportation Centers (CUTC), 2020-Present; Executive Committee and ITE/CUTC Liaison, 2023-Present
- Institute of Transportation Engineers (ITE), Mid-Colonial District Safety Committee (2025-Present)
- Maryland Connected & Automated Vehicles Working Group, 2019-Present; Co-Chair, Maryland CAV Technical Subgroup, 2022-Present
- Maryland Coordinated Highways Action Response Team (CHART) Board, 2025-Present; Maryland Strategic Highway Safety Plan, 2015-Present (Chair, Distracted Driving Strategy 3)

- Reviewer for NSF and numerous transportation journals (TRR, IEEE-ITS, ASCE, Transportmetrica, and others)

SELECTED PUBLICATIONS

Author of two books and more than 50 peer-reviewed journal articles and 90 conference papers; full list available on Google Scholar.

- Shen, T., Yang, D., Xie, K., Yang, H., Yang, X. T., & **Jeihani, M.** (2026). “A temporal-aware conflict risk modeling framework for signalized intersections using the pNEUMA data,” *Transportation Research Part C: Emerging Technologies*, 186, 105591.
- Samadi, N., Javid, R., Ziaei, S., Dehestanimonfared, N., Naseri, M., & **Jeihani, M.** (2025). “Machine Learning Assessment of Crash Severity in ADS and ADAS-L2 Involved Crashes with NHTSA Data,” *Safety*, 12(1).
- Ansariyar, A., & **Jeihani, M.** (2024). “Investigating LiDAR Sensor Accuracy for V2V and V2P Conflict Detection at Signalized Intersections,” *Future Transportation*, 4(3), 834–855.
- Taherpour, A., Massoumi, P., Ansariyar, A., Yang, D., Ahangari, S., & **Jeihani, M.** (2024). “Text and Voice Message Distraction Detection: A Machine Learning Approach Using Vehicle Trajectory Data,” *Transportation Research Record*, 2678(12).
- Javid, R., Sadeghvaziri, E., & **Jeihani, M.** (2023). “Development and evaluation of a Bayesian network model for preventing distracted driving,” *IATSS Research*, 47(4).
- Banerjee, S., **Jeihani, M.**, Khadem, N., & Kabir, M. (2020). “Influence of Red-Light Violation Warning Systems on Driver Behavior - A Driving Simulator Study,” *Traffic Injury Prevention*, 21(4).
- Nickkar, A., **Jeihani, M.**, & Sahebi, S. (2019). “Analysis of Driving Simulator Sickness Symptoms: Zero-Inflated Ordered Probit Approach,” *Transportation Research Record*, 2673(4).
- RashidiMoghaddam, Z., **Jeihani, M.**, Peeta, S., & Banerjee, S. (2019). “Comprehending the roles of traveler perception of travel time reliability on route choice behavior,” *Travel Behaviour and Society*, 16, 13-22.
- Danapour, M., Nickkar, A., **Jeihani, M.**, & Khaksar, H. (2018). “Competition between High-speed Rail and Air Transport in Iran: The Case of Tehran–Isfahan,” *Case Studies on Transport Policy*, 6(4), 456-461.
- **Jeihani, M.**, NarooieNezhad, S., & Kelarestaghi, K. (2017). “Integration of a Driving Simulator and a Traffic Simulator - Case Study: Exploring Drivers’ Behavior in Response to Variable Message Signs,” *IATSS Research*.
- **Jeihani, M.** & Ardeshiri, A. (2017). *Transportation Network Modeling and Calibration* (book). Momentum Press, New York, NY. ISBN 978-1-60650-893-0.

YOUNG-JAE LEE, Ph.D.

Professor and Graduate Coordinator
Department of Transportation and urban Infrastructure Studies
Morgan State University
1700 Cold Spring Lane, Baltimore, MD 21251
443/885-1872, 3348 (TEL); 443/885-8324 (FAX)
Email: YoungJae.Lee@morgan.edu
Webpage: http://www.morgan.edu/tuis/YoungJae_Lee

EDUCATION

- 1993-1998: Ph.D., University of Pennsylvania, Department of Systems Engineering (Transportation), Philadelphia, PA, August 1998
- 1992-1993: M.S.E., Department of Systems Engineering (Major in Transportation Engineering), University of Pennsylvania, Philadelphia, PA
- 1988-1989: M.S.E., Department of Civil Engineering, Urban Engineering Division (Major in Transportation Engineering), Seoul National University, Seoul, Korea,
- 1984-1988: B.S.E., Department of Civil Engineering, Urban Engineering Division, Seoul National University, Seoul, Korea

SUMMARY OF QUALIFICATIONS

Young-Jae Lee, Ph.D., is Professor and Graduate Coordinator in the Department of Transportation and Urban Infrastructure Studies at Morgan State University. He has more than two decades of academic experience at Morgan and a transportation-systems background from the University of Pennsylvania and Seoul National University. His doctoral research focused on optimizing transit network design with integrated routing and scheduling, and his current research portfolio centers on public transportation systems, transit operations, network design, operational efficiency, freight and logistics, intelligent transportation systems, connected-vehicle applications, and traffic safety.

Dr. Lee's rail-relevant expertise is primarily in rail transit and transit-systems operation. His work includes mathematical modeling for skip-stop rail transit operations, optimization of transit network design, transit signal priority using connected-vehicle technology, demand-responsive and automated feeder transit, Mobility-as-a-Service, flexible-route transportation for passengers and freight, and performance assessment of bus and transit networks. This background directly supports rail workforce-development activities involving rail/transit operations, multimodal systems, ITS applications, service planning, and operations research.

At Morgan State University, Dr. Lee contributes to transportation education and workforce preparation through graduate program coordination, teaching, student mentoring, sponsored research, professional service, and curriculum support. His courses include Urban Public Transportation Systems, Freight Transportation and Logistics, Intelligent Transportation Systems, Transportation Systems Evaluation, Operations Research in Transportation, and Introduction to Urban Transportation. He has also supported rail-related education through CRISI Rail Transportation Track Scholarship activities with the University of Delaware and Morgan colleagues.

RESEARCH AND PROFESSIONAL INTERESTS

- Optimization of transit routing, scheduling and operations
- Applications of ITS and Connected vehicle technology
- Livable and sustainable urban transportation
- Highway and street analysis and design
- Traffic safety
- Freight transportation and logistics

EMPLOYMENT

- Aug. 2020 – Present: Professor, Department of Transportation and Urban Infrastructure Studies, Morgan State University, Baltimore, MD
- Aug. 2007 – Aug. 2020: Associate Professor, Department of Transportation and Urban Infrastructure Studies, Morgan State University, Baltimore, MD
- Sep. 2000 – Aug. 2007: Assistant Professor, Institute for Transportation, Morgan State University, Baltimore, MD
- January 1999 – Aug. 2000: Lecturer, Center for Transportation Studies, Morgan State Univ., Baltimore, MD
- September 1998-December 1998: Post-doctoral research Fellow, Department of Systems Engineering, University of Pennsylvania, Philadelphia, PA
- January 1993-August 1998: Research Assistant, Department of Systems Engineering, University of Pennsylvania, Philadelphia, PA
- January 1993-August 1998: Teaching Assistant (SYS 550, SYS 552, SYS 554, SYS555), University of Pennsylvania, Philadelphia, PA
- September 1991-July 1992: Research Assistant, Transportation Engineering Laboratory, Seoul National University, Seoul, Korea
- March 1990-August 1991: Librarian while serving for National Military Service - Seoul, Korea
- March 1988-February 1990: Research assistant, Transportation Engineering Laboratory, Seoul National University - Seoul, Korea

EDUCATION & WORKFORCE DEVELOPMENT

- Dr. Lee's education and workforce-development contributions emphasize transportation systems education, graduate training, applied research mentoring, and exposure to public transportation and rail transit operations. Representative activities include:
- Professor and Graduate Coordinator for Transportation and Urban Infrastructure Studies at Morgan State University, supporting graduate advising, curriculum delivery, student research, and academic pathway development.
- Instructor for core transportation courses including Introduction to Urban Transportation, Operations Research in Transportation, Urban Public Transportation Systems, Freight Transportation and Logistics, Intelligent Transportation Systems, Transportation Systems Evaluation, Supervised Research, and Doctoral Research Seminar.

- Participant in CRISI Rail Transportation Track Scholarship activities with the University of Delaware and Dr. Anthony Saka, supporting Morgan’s rail transportation education pathway.
- Investigator on NSF International Research Experiences for Students (IRES): Interdisciplinary Research in Smart City, supporting student research exposure and international transportation-systems learning.
- Committee member and supervisor for Doctoral Scholars in Engineering at Morgan State University; former faculty advisor to the ITE Student Chapter and continuing faculty advisor to the ITS-MD Student Chapter.

COURSES TAUGHT AT THE MORGAN STATE UNIVERSITY

- Introduction to Urban Transportation (TRSS 301 / TRSP 601 / CREP 526)
- Operations Research in Transportation (TRSP 604)
- Urban Public Transportation Systems (TRSS 406 / TRSP 606)
- Freight Transportation and Logistics (TRSS 307 / TRSP 607)
- Advanced Logistics and Supply Chain Management (TRSS 408 / TRSP 608)
- Intelligent Transportation Systems (TRSS 417 / TRSP 617)
- Transportation Systems Evaluation (TRSS 420 / TRSP 620)
- Supervised Research (TRSP 788)
- Computer-Aided Highway Engineering (CEGR 651)
- Doctoral Research Seminar (TRSP 988)

SELECTED RESEARCH PROJECTS AND REPORTS

- Paul Schonfeld, Chester Harvey, and Young-Jae Lee, “Road Space Allocation for Complete Streets”, CMMM UTC, (2025-2026)
- Young-Jae Lee, Hassan Rezapour, and Mansha Swami, “Performance Assessment and Identification of Efficient Bus Transportation Networks Using Data Envelopment Analysis Models”, CMMM UTC, (2024-2025)
- B. Brian Park, Young-Jae Lee, and Di Yang, “Assessing Feasibility of Deploying Transit Signal Priority with Connected Vehicle Technology“, SMARTER center, (2024-2025)
- Paul Schonfeld, Ilya Ryzhov, and Young-Jae Lee, “Planning and Operation of Flexible-route Transportation Services for Persons and Freight”, CMMM UTC, (2024-2025)
- Young-Jae Lee, Celeste Chavis, Callie Babbitt, Amirreza Nickkar, and Michael Awotoye, “Mathematical Formulation to Optimize the Locations and Capacities of Food Waste Digesters”, Multiscale RECIPES for Sustainable Food Systems, NSF, (2024-2025)
- Young-Jae Lee, Hyeon-Shic Shin, Abdulmalik Musa Maleka, and Hassan Rezapour, “Competitiveness, User Preference, and Willingness-to-Pay for Peer-to-Peer Ridesharing Service”, CMMM UTC, (2023-2024)
- Seri Park (UNR), Young-Jae Lee, and Gloria Kim (UF), “National Science Foundation (NSF) International Research Experiences for Students (IRES): Interdisciplinary Research in Smart City”, Granted by NSF (2022 – 2025)
- CRISI Rail Transportation Track Scholarship with University of Delaware, Dr. Saka

- NSF RECIPES (Multiscale RECIPES for Sustainable Food Systems, RECIPES: Resilient, Equitable, and Circular Innovations with Partnership and Education Synergies) with Many other universities (Morgan Co-PI: Dr. Chavis)
- Lee, Young-Jae, Hyeon-Shic Shin and Paul Schonfeld (UMD), “User Preference Analysis for Mobility-as-a-Service (MaaS) and Its Impact in Maryland”, Granted by UMEC (2021-2023)

SELECTED PUBLICATIONS

- Lee, Young-Jae, Amirreza Nickkar and Mana Meskar, “Impact of Individual Passengers’ Travel Circuitry on optimal Transit Network Design”, Submitted for review
- Dadvar, Seyedehsan, Celeste Chavis, Young-Jae Lee, “Classification and Analysis of Bicycle and Pedestrian Crashes in Washington, DC”, Submitted
- Zeyu Mu, Bethany Bazemore, Mohammad Ridwan Tanvir, Young-Jae Lee, Di Yang, and B. Brian Park, “Enhancing Transit Signal Priority With Dynamic Green Time Reallocation Strategy”, submitted
- Tiruwork Tibebe, et al., "Interactions and tradeoffs for sustainability, equity, and resilience in wasted food models", Environmental Research Communications, Volume 7, Number 4, 2025
- Amirreza Nickkar, Shiva Pourfalamatoun, Erika E. Miller & Young-Jae Lee, “Applying the heteroskedastic ordered probit model on injury severity for improved age and gender estimation”, Traffic Injury Prevention, DOI: 10.1080/15389588.2023.2286429, 2023
- Nickkar, Amirreza, and Young-Jae Lee, "Optimal Integrated Single-Framework Algorithm for the Multi-Level School Bus Network Problem" Algorithms 16, no. 11: 528. <https://doi.org/10.3390/a16110528>, Oct 2023
- Nickkar, Amirreza, and Young-Jae Lee, "Dynamic Demand-Responsive Feeder Bus Network Design for a Short Headway Trunk Line" Algorithms 16, no. 11: 506. <https://doi.org/10.3390/a16110506>, Oct 2023
- Ansariyar, Alireaza, Amirreza Nickkar, Young-Jae Lee and Hyeon-Shic Shin, “User Preferences for Automated Shared Mobility Services: An Alternative-Specific Mixed Logit Regression Approach”, International Journal of Intelligent Transportation Systems Research, 21: 331-348, 2023
- Nickkar, Amirreza, Young-Jae Lee and Hyeon-Shic Shin, “Willingness-to-pay for Shared Automated Mobility Using an Adaptive Choice-Based Conjoint Analysis during the COVID-19 Period”, Volume 30, PP 11-20, Travel Behaviour and Society, 2023
- Nickkar, Amirreza, Young-Jae Lee, and Mana Meskar, “Developing an Optimal Peer-to-Peer Ride-Matching Problem Algorithm with Ride Transfers”, Transportation Research Record, May 2022

RECENT ACTIVITIES

- Member, TRB Standing Committee AP012, Transit System Planning (2023-2025)
- Member, TRB Standing Committee AP025, Public Transportation Planning and Development (2023-2025)
- Associate Editor, Urban Rail Transit (Current)

- Associate Editor, Korean Society of Civil Engineering, Journal of Civil Engineering (2017-2023)
- Member, TRB Standing Committee AP020, Innovative Public Transportation Services and Technologies (2017-2023)
- Voting member, SAE International Shared and Digital Mobility Committee (2017-2020)
- Presiding officer, Designing Equitable and Multimodal Transit Systems for Future Urban Mobility, TRB Annual Meeting, 2025
- Session Moderator, The 2nd Conference on Advancing Transportation Equity, TRB, Baltimore Maryland, July 15-18, 2024
- Guest Editor, Special Issue for Journal of Advanced Transportation (Advanced Data Intelligence Theory and Practice in Transport), 2021
- Guest Editor, Special Issue for KSCE Journal of Civil Engineering (Future Urban Mobility with MaaS), 2022
- Member for 6th International Demand Responsive Transportation Conference Planning Committee, sponsored by TRB, 2019
- Member for 10th GIS in Transit Conference Planning Committee, sponsored by TRB and URISA, 2017
- Module reviewer for the new ITS ePrimer Module 7: Public Transportation / Transit Management (2013)
- Technical Advisory Committee Member for the ITS Transit Standard Professional Capacity Building (2014)

CELESTE CHAVIS, Ph.D., P.E.

Professor and Chair, Department of Transportation and Urban Infrastructure Studies

Joint Appointment, Department of Civil and Environmental Engineering, Morgan State University
Morgan State University, School of Engineering

Baltimore, Maryland 21251

Email: celeste.chavis@morgan.edu | Phone: 443-885-5061

EDUCATION

University of California, Berkeley, Berkeley, California

Ph.D. in Civil and Environmental Engineering (Transportation Concentration), **2012**

Minors: City Planning and Mathematics; Dissertation: Multimodal Transport Modeling
for Nairobi, Kenya

University of California, Berkeley, Berkeley, California

M.S. in Civil and Environmental Engineering (Transportation Concentration), **2008**

The Ohio State University, Columbus, Ohio

B.S. in Civil Engineering, magna cum laude with Distinction, **2007**

SUMMARY OF QUALIFICATIONS

Celeste Chavis, Ph.D., P.E., is Professor and Chair of the Department of Transportation and Urban Infrastructure Studies at Morgan State University, with a joint appointment in Civil and Environmental Engineering. She has served at Morgan since 2013 and currently leads a transportation department with undergraduate, graduate, certificate, and doctoral pathways. Her academic background is in civil and environmental engineering with a transportation concentration, and she is a licensed Professional Engineer in the State of Maryland.

Dr. Chavis brings strong rail-workforce relevance through program leadership, curriculum development, accreditation, and transportation education. As Department Chair, she implemented the curriculum for Morgan's new rail transportation engineering track supported by a Federal Railroad Administration CRISI award, strengthened industry-facing advisory board engagement with rail-sector partners, and supported Morgan's broader rail education pathway. Her role in rail is best characterized as curriculum, program implementation, student pathway development, and workforce preparation rather than railroad infrastructure design research.

Her research and teaching portfolio focuses on transportation operations, safety, equity, public transportation, pedestrian and bicycle safety, micromobility, access to opportunity, food access, and data-driven performance metrics for multimodal transportation systems. She has led ABET assessment and accreditation activities, developed new transportation systems engineering curriculum, supported online and hybrid instruction, mentored graduate students, and participated in local, state, and national transportation service activities. This combination of transportation education leadership, equity-focused applied research, and rail-track implementation experience supports workforce-development projects that connect students to rail, transit, and broader transportation careers.

PROFESSIONAL HISTORY

Professor and Chair, Department of Transportation and Urban Infrastructure Studies, Morgan State University, Baltimore, MD, 2023 - Present

Professor, Transportation & Urban Infrastructure Studies and Civil & Environmental Engineering, School of Engineering, Morgan State University, Baltimore, MD, 2023 - Present

Associate Professor, Transportation & Urban Infrastructure Studies, School of Engineering, Morgan State University, Baltimore, MD, 2018 - 2023

Associate Professor, Civil Engineering, School of Engineering, Morgan State University, Baltimore, MD, 2020 - 2023

Assistant Professor, Transportation & Urban Infrastructure Studies, School of Engineering, Morgan State University, Baltimore, MD, 2013 - 2018

Interim Chair, Mechatronics Engineering, School of Engineering, Morgan State University, Baltimore, MD, 2021 - 2023

Interim Associate Dean for Undergraduate Studies, School of Engineering, Morgan State University, Baltimore, MD, 2021 - 2023

Instructional Technology Coordinator / Canvas Ambassador, School of Engineering, Morgan State University, Baltimore, MD, 2014 - 2021

Visiting Researcher, IBM Africa, Nairobi, Kenya, Summer 2015

Visiting Researcher, University of Massachusetts, Amherst, MA, Summer 2013

EDUCATION & WORKFORCE DEVELOPMENT

- Implemented the curriculum for Morgan State University's new rail transportation engineering track supported by a \$2.3M Federal Railroad Administration CRISI grant, strengthening Morgan's role in rail education and workforce preparation.
- As Department Chair, received Maryland Higher Education Commission approval to implement an online Master's program in Urban Transportation, expanded departmental partnerships with employers, and updated departmental marketing, website, and listserv communication.
- Revamped the Department's advisory board to include members from the rail industry and developed new employer partnerships to better connect academic pathways with workforce needs.
- Developed the curriculum for the B.S. in Transportation Systems Engineering program, approved by the Maryland Higher Education Commission in 2018.
- Led ABET-related assessment and accreditation activities, including the 2019 reaccreditation of the B.S. in Transportation Systems program and the 2021 initial accreditation of the B.S. in Transportation Systems Engineering program.
- Developed a Canvas-based ABET assessment process adopted by the School of Engineering in 2024, supporting outcome-based assessment across engineering programs.
- Serves as HBCU Eisenhower Scholarship Campus Manager and has supported transportation student fellowships, graduate mentoring, and doctoral committee leadership in Transportation and Urban Infrastructure Systems.
- Teaches and has taught courses including Introduction to Transportation Systems, Transportation Engineering, Traffic Engineering, Highway Engineering, Transportation

Systems Evaluation, Senior Transportation Project, Transportation Economics, Traffic and Highway System Design, and transportation internship courses.

SELECTED FUNDED PROJECTS

- Zarembski, A., Saka, A. A., Chavis, C., Head, M., Lee, Y. J., and Palese, J. Development and Implementation of HBCU Based Railroad Engineering Program for Underrepresented Communities, Federal Railroad Administration CRISI, \$4.6M total (\$2.36M MSU), 2022-2028.
- Chavis, C., and Kabir, M. Assessing the Impact of Dockless Scooter/Bike Parking Management on Pedestrian Access, Center for Multi-Modal Mobility in Urban, Rural, and Tribal Areas (CMMM), USDOT UTC, \$80,000, 2025-2026.
- Chavis, C., and Frias-Martinez, V. High Spatiotemporal Passenger-Centric Transit Performance Measures Using Archived GTFS Real-Time Data, CMMM, USDOT UTC, \$64,000, 2024-2025.
- Hamidi, S., Chavis, C., Christelle, A., Ewing, R., Junfeng, J., and Santi, P. Center for Climate-Smart Transportation, USDOT UTC, \$10M total (\$450,000 MSU), 2023-2028.
- Matherly, D., Chavis, C., and Pollack-Porter, K. TCRP H-60: Lessons Learned from COVID-19: Strategies to Enhance Racial and Social Equity through Public Transportation as a Community Lifeline, \$350,000 total (\$61,250 MSU), 2021-2024.
- Sun, Y., Chavis, C., and Markovic, N. NSF Excellence in Research: Interoperable Transportation Service Roaming System for Transportation Disadvantaged Populations, \$658,942 total (\$133,545 MSU), 2021-2025.
- Frias-Martinez, V., Chavis, C., Vitak, J., Iyer, S., and Erdogan, S. NSF Inclusive Public Transit Toolkit to Assess Quality of Service across Socioeconomic Status in Baltimore City, \$2.35M total (\$250,000 MSU), 2020-2025.
- Chavis, C., Nyarko, K., and Cirillo, C. A Comparative Study of Pedestrian Crossing Behavior and Safety in Baltimore and Washington, DC Using Video Surveillance, Urban Mobility and Equity Center, USDOT, \$120,000 total (\$80,000 MSU), 2020-2021.
- Chavis, C., Jeihani, M. The Effect of COVID-19 on Mobility and Equity: A Case Study on Transit Users in Baltimore, MD, Urban Mobility and Equity Center, USDOT, \$100,000, 2020-2021.
- Chavis, C., Cirillo, C., Shared Bus/Bike Lane Safety Analysis: Assessing Multimodal Access and Conflicts, Urban Mobility and Equity Center, USDOT, \$140,000 total (\$89,022 MSU), 2018-2020.
- Chavis, C., Lee, Y. J., and Dadvar, S. Analysis of Bicycle and Pedestrian Crash Causes and Interventions, District Department of Transportation, \$92,106, 2017-2018.
- Chavis, C., Gayah, V., Miller-Hooks, E., and Schonfeld, P. Integration of Multimodal Transportation Systems, Mid-Atlantic Transportation Sustainability University Transportation Center, \$153,301 total (\$36,766 MSU), 2014-2015.

SELECTED PUBLICATIONS

- Yang, Y., Sloate, E., Khadem, N., Chavis, C., & Frias-Martinez, V. (2024). Comparing e-bike and conventional bicycle use patterns in a public bike share system: A case study of Richmond, VA. *Journal of Cycling and Micromobility Research*.
- Chavis, C., James, P., Nyarko, K., Owolabi, O., & Salimian, M. (2023). A Comparison of ABET Assessment Instruments. *ASEE Annual Conference & Exposition*.
- Oludem, A., Owolabi, O., Abiodun, P., Abedoh, H., Efe, F., James, P., Chavis, C., et al. (2023). Utilization of Real-Life Hands-On Pedagogy to Motivate Undergraduate Students in Grasping Transportation Related Concepts. *ASEE Annual Conference & Exposition*.
- Babbitt, C. W., Neff, R. A., Roe, B. E., Siddiqui, S., Chavis, C., & Trabold, T. (2022). Transforming wasted food will require systemic and sustainable infrastructure innovations. *Current Opinion in Environmental Sustainability*, 54.
- Chavis, C., & Bhuyan, I. (2022). Data-Driven Food Desert Metric to Understand Access to Grocery Stores Using CHAID Decision Tree Analysis. *Transportation Research Record*.
- Chavis, C., & Efe, S. (2021). Evaluation of Teaching through Online Tools and Canvas Learning Management System at Morgan State University. *ASEE Annual Conference & Exposition*.
- Grasso, S. H., Barnes, P., & Chavis, C. (2020). Bike Share Equity for Underrepresented Groups: Analyzing Barriers to System Usage in Baltimore, Maryland. *Sustainability*, 12(18).
- Bhuyan, I., Chavis, C., Nickkar, A., & Barnes, P. (2019). GIS-Based Equity Gap Analysis: Case Study of Baltimore Bike Share Program. *Urban Science*, 3(2).
- Ahangari, S., Chavis, C., Jeihani, M., & Moghaddam, Z. R. (2018). Quantifying the Impact of On-Street Parking on Congestion Mitigation Using a Driving Simulator. *Transportation Research Record*.
- Chavis, C., & Gayah, V. V. (2017). Development of a Mode Choice Model for General Purpose Flexible Route Transit Systems. *Transportation Research Record*.

SELECTED RECOGNITIONS AND HONORS

- Iva G. Jones Medallion Mantel Award for excellence in teaching, research, and service, Morgan State University, 2021.
- Transportation Research Board Certificate of Appreciation, 2017 and 2020.
- National Science Foundation Graduate Research Fellowship, 2010-2012.
- Ford Foundation Pre-doctoral Fellowship, 2008-2009.
- University of California, Berkeley Chancellor Fellowship, 2007.
- B.S. in Civil Engineering, magna cum laude with Distinction, The Ohio State University, 2007.
- ABET Program Evaluator, 2023; Professional Engineer, State of Maryland, 2016.

Anam Ardeshiri, PhD, PE, PTOE

Department Manager, Traffic Engineering & Intelligent Transportation Systems, Mead& Hunt

AREAS OF EXPERTISE

- Traffic engineering and Intelligent transportation systems (ITS)
- Traffic microsimulation modeling
- Traffic signal timing optimization
- Traffic operations & safety
- Transit signal priority & Preemption
- Connected Vehicles (CV) and V2X
- Transportation Systems Management and Operations (TSMO)

EDUCATION

- PhD, Transportation Engineering, Morgan State University, 2014
- MS, Transportation Engineering and Planning, Sharif University of Technology, 2007
- BS, Civil Engineering, Sharif University of Technology, 2004

REGISTRATION / CERTIFICATIONS

- Licensed Professional Engineer - Virginia (#402054458), Maryland (#65088)
- Professional Traffic Operations Engineer (#4212)

MEMBERSHIPS

- Intelligent Transportation Society of Maryland (ITS MD)
- The Intelligent Transportation Society of the District of Columbia (ITS DC)

TRAINING AND SEMINARS

- NHI Instructor Development course, FHWA-NHI-420018, 2013

PROFESSIONAL SUMMARY

Anam has 20 years of research and industry experience in the field of traffic engineering and intelligent transportation systems (ITS). Anam was involved in and have been leading transportation projects from intersection design to citywide transportation master plans. He is skilled in traffic analysis and simulation, traffic safety, signal timing and phasing optimization, Transit Signal Priority (TSP) and Emergency Vehicles Preemption (EVP), signal controller logic development, Advanced Transportation Management System (ATMS), V2X concept planning, testing, and deployment, ITS design and planning, signal communication systems, traffic signal infrastructure, signal controllers and cabinet components, and economic analysis. He has led multiple traffic engineering and ITS ensuring the project team delivers engineering services on schedule and within the budget, as well as maintaining quality control (QC). He has substantial experience in traffic operation, especially intersections with complex phasing and configuration and multiple applications (TSP, EVP, FYA, LPI, Adaptive, V2X), project scheduling, project management, traffic modeling, micro- and macro-simulation. Anam was previously an adjunct professor in Morgan State University in Baltimore, MD.

PROJECT EXPERIENCE

TSP Wayside Equipment Configuration, Installation and Maintenance

Washington Metropolitan Area Transit Authority (WMATA)

Washington, District of Columbia

Project Manager. Anam was responsible for configuration and installation of TSP wayside equipment. He upgraded WMATA's 3G cellular system to 4G, by configuring and installation of cellular modems and antennas in 55 intersections in Northern VA. Anam also upgraded Opticom GTT phase selector cards, redefined GTT CMS connection and configuration, and evaluated signal controller performance. He assisted with EVP/preemption controller programming and cabinet wiring. Anam played a key role as a liaison between the transit agency (WMATA) and traffic agencies (City of Alexandria and VDOT) to ensure the TSP program is a success for all agencies. He oversees TSP maintenance and performs TSP evaluation, intersection data and bus log analysis to fine-tune and improve system operations. He also delivered TSP technology training to the signal agencies in Northern Virginia.

Morgan State University (MSU) SMARTER Center - Connected & Automated Vehicles (CAV) Deployment Support

Baltimore, Maryland

Program Management Support. Anam assisted MSU's National Transportation Center (NTC) in deploying smart signal technologies in a smart corridor by the MSU campus in Baltimore City. Anam assisted with V2X technology selection, bench testing, deployment, and acceptance-testing of various ITS devices, including LiDAR sensors, RoadSide Units (RSU), CCTV, Advanced Traffic Controllers (ATC), and ThruGreen ATMS system. Anam played a key role in integrating all new technologies to City's signal system and make the system operational and test various safety and operational applications. Anam programmed and physically upgraded signal controllers to be able to send Signal Phasing and Timing (SPaT) data to RSUs and On-Board Units (OBUs). Utilized LiDAR data for veh-to-veh and veh-to-ped conflict evaluation and near-miss analysis to develop safety countermeasures.

Baltimore City On-Call Traffic & Transportation Engineering

Baltimore City Department of Transportation (BCDOT)

Baltimore, Maryland

Project Manager. Anam led and directed 100+ traffic studies, safety analyses, signal warrant analysis, left turn phasing study (protected only, E/P, permissive only), sight distance analysis, and intersection capacity analysis, traffic control device design (TCD) through milestone reviews, construction cost estimates and specifications, including construction support, TCD inventory and evaluation, hands-on programming and evaluation for new signal turn-ons. Anam used macro- and micro-simulation tools, including Synchro, SimTraffic, and VISSIM to perform queue, delay, and LOS (level of service) analyses. Anam supported DOT photo enforcement program to ensure red-light cameras functionality. He assisted with developing a traffic signal condition assessment methodology.

Signal Timing, Citywide Signal Timing

Baltimore City Department of Transportation

Baltimore City, Maryland

Project Manager. Anam was the project manager for the citywide traffic signal timing optimization project that included the timing & phasing optimization of 1,100 traffic signals in Baltimore City, as well as deployment of a cloud-based ATSM to remotely monitor and manage

Downtown traffic signals. Mead & Hunt led the concept of operations study and installation of the ThruGreen ATMS with cellular communications. Mead & Hunt performed Synchro/SimTraffic modeling, change and clearance intervals calculations (yellow and all-red times), turning movement counts analysis, signal timing and phasing optimization (cycle length, splits, offsets, lead/lag configuration, minimum and maximum green times, Walk and FDW time calculation), signal controller hands-on programming, field observations and post-implementation fine-tuning, special event signal timing, performance analysis with big data, training of City staff, and on-call signal timing support.

BaltimoreLINK Transit Signal Priority (TSP)

Maryland Department of Transportation Maryland Transit Administration (MDOT MTA)
Baltimore City, Maryland

Traffic Engineer. Anam was responsible for performing traffic analysis and simulation for a Citywide TSP feasibility evaluation on MTA's high-frequency buses. He prioritized over 700 signalized intersections for TSP implementation, by developing Synchro models to perform TSP ranking. He field-collected controllers' database, calculated slack times for TSP timing, inspected vehicle and pedestrian actuation status to recommend active and passive TSP locations. He designed TSP timings, configured Opticom GTT phase selectors, and programmed and installed 130 new ATC traffic controllers, set up Cubic ATMS.NOW central signal system, and established cellular communications in 130 traffic signals and has been monitoring, managing, and maintaining the signal system since 2016.

SELECTED PUBLICATIONS

- Driving behavior recognition and scoring: A Bayesian approach to driving simulator data analytics, Accident Analysis and Prevention, Coauthor, 2026
- Investigating the collected vehicle-pedestrian conflicts by a LIDAR sensor based on a new Post Encroachment Time Threshold (PET) classification at signalized intersections, Advances in Transportation Studies: an international Journal, Coauthor, 2023.
- Investigating the Traffic Behavior of Bicyclists in Interaction with Car Users on Shared Bike Lanes without Physical Barriers, TRB 2023, Coauthor.
- Enhancing the Performance of a Model to Predict Driving Distraction with the Random Forest Classifier, Transportation research record, Coauthor, 2021
- Transportation Network Modelling and Calibration, Momentum Press, Coauthor, 2017
- Driving Simulator Based Study of Compliance Behavior with Dynamic Message Sign Based Route Guidance, IET Intelligent Transport Systems, Author 2015
- Traffic Recovery Time Estimation under Different Flow Regimes in Traffic Simulation, Journal of Traffic and Transportation Engineering, Coauthor, 2015
- A Speed Limit Compliance Model for Dynamic Speed Display Sign, Journal of Safety Research, Author, 2014
- Speed Pattern Analysis in the Proximity of Dynamic Message Signs Using a Driving Simulator, Transportation Research Board Annual Conference, Coauthor, 2014
- On Abolishing Parking Citations, Parking Professional, Author, 2013

AWARDS / PAST EMPLOYMENT / OTHER INFORMATION

- Maryland ITS Scholarship, 2013
- FHWA's Dwight David Eisenhower Fellowship, 2011 & 2012

- Past Employment: Morgan State University; FHWA Resource Center; MDOT SHA Office of Planning and Preliminary Engineering
- No. of Years with Mead & Hunt: Hired 07/2014
- No. of Years with Other Firms: Eight
- LinkedIn URL: <https://www.linkedin.com/in/anam-ardeshiri-967b8049/>

JOANNA BUSH, PE

Senior Traffic & Grade Crossing Safety Engineer, Mead& Hunt

AREAS OF EXPERTISE

- Grade Crossing Safety
- Interconnected Crossings
- Railroad Preemption Systems
- Traffic Signal Operations
- Railroad Coordination
- Operational Safety Analysis
- Diagnostic Reviews
- Traffic Operations Analysis
- MUTCD Part 8
- Policy & Guidance Development
- Roundabouts Near Grade Crossings
- Annual Inspection Programs
- Traffic Signal Design
- Field Implementation & Cutovers

EDUCATION

- BS, Engineering, University of Wisconsin, Madison, 1999

REGISTRATION / CERTIFICATIONS

- Licensed Professional Engineer - Wisconsin (#37147-6, 2004, expires 07/31/2026)
- Minnesota (#56041, 2018, expires 06/30/2026)
- North Carolina (#055437, 2023, expires 12/31/2026)
- Virginia (#0402066271, 2023, expires 2/28/2027)

NATIONAL LEADERSHIP & INDUSTRY CONTRIBUTIONS

- National Committee on Uniform Traffic Control Devices (NCUTCD), Part 8 - Railroad & Light Rail Transit Committee
- Institute of Transportation Engineers (ITE) Railroad Grade Crossing Committee
- Lead, ITE Joint Task Force on Roundabouts Near Railroad Grade Crossings
- Panel Member - NCHRP 3-90, NCHRP 3-95, and NCHRP 47-15 Synthesis
- Contributor to Part 8 of the Wisconsin Supplement to the MUTCD
- Instructor - Grade Crossing Safety Course, University of Wisconsin Interdisciplinary Professional Programs
- LinkedIn URL: www.linkedin.com/in/joanna-bush-6051446

PROFESSIONAL SUMMARY

Joanna Bush, PE, is a nationally recognized traffic operations and grade crossing safety engineer with more than 25 years of experience spanning both the public and private transportation sectors. A former State Traffic Signal Systems Engineer for the Wisconsin Department of Transportation (WisDOT), she specializes in interconnected highway-rail grade crossing

systems, traffic signal operations, railroad coordination, operational safety analysis, and complex preemption design. Joanna currently supports WisDOT's Rails and Harbors Section on statewide policy development, design review, diagnostics, inspections, and operational troubleshooting for interconnected railroad crossings throughout Wisconsin. Her experience includes development, review, inspection, and field implementation of railroad preemption systems at more than 50 interconnected crossings, along with operational risk evaluation, railroad coordination, and grade crossing safety improvements. She is an active member of the National Committee on Uniform Traffic Control Devices (NCUTCD) Part 8 Committee and currently leads a joint Institute of Transportation Engineers (ITE) task force focused on roundabouts near railroad grade crossings.

RAILROAD & GRADE CROSSING SAFETY EXPERIENCE

Railroad Grade Crossing Safety & Interconnected Systems Support

Wisconsin Department of Transportation (WisDOT) - Bureau of Rails and Harbors

Joanna provides ongoing technical support to WisDOT's Rails and Harbors Section following her tenure as the State Traffic Signal Systems Engineer. In this role, she serves as a statewide traffic operations and grade crossing safety resource for WisDOT-funded projects involving at-grade railroad crossings, interconnected traffic signals, and intersections located within or near railroad right-of-way. Her work includes development of an Active Advance Warning System (AAWS) design and operational framework, design and design review of interconnected crossing systems, operational and safety evaluation of intersections near grade crossings, development of railroad preemption concepts, identification of required railroad and traffic signal interface circuits, review of controller programming, and field support during preemption system cutovers. She leads updates to WisDOT policy and practice related to the design, operation, maintenance, and inspection of interconnected crossings, including development of guidance for intersections and roundabouts near railroad grade crossings. Joanna also leads the continued development and implementation of WisDOT's joint annual inspection process documentation for interconnected crossings. This work includes development of inspection procedures, operational review practices, and implementation guidance intended to support consistent evaluation of interconnected crossing systems statewide.

Joint Annual Inspection Support

Multiple Wisconsin Agencies

Joanna has led annual joint inspections for interconnected crossings throughout Wisconsin in coordination with roadway agencies and railroad companies. These inspections evaluate the operation of interconnected crossing systems and verify continued operation and coordination between traffic signal operations and railroad warning system activation.

METRO Green Line Extension (SWLRT)

Metropolitan Council, Hennepin County, MN

Joanna supported the integration, programming, testing and field implementation of x-RPS railroad preemption interface units at multiple signalized intersections along the METRO Green Line Extension corridor. Several intersections required coordination between both light rail transit and freight railroad operations through interconnected x-RPS interfaces and traffic signal controller programming. This work included field troubleshooting, operational review, and support during implementation to verify proper operation of the interconnected systems.

Virginia Department of Transportation (VDOT) MUTCD Support

Virginia Department of Transportation (VDOT)

Joanna supports VDOT with implementation of the 11th Edition of the MUTCD and development of the Virginia MUTCD and associated guidance documents. Her work focuses primarily on Part 8 (Traffic Control for Railroad and Light Rail Transit Grade Crossings) and interconnected traffic signal operations, with additional involvement in Part 4 due to the operational relationship between railroad preemption and traffic signal control.

Waukesha/Wauwatosa Railroad Corridor Safety Study

Wisconsin Department of Transportation (WisDOT) Bureau of Transit, Local Roads, Railroads and Harbors

In 2022, the Federal Railroad Administration (FRA) awarded WisDOT CRISI funding to conduct a safety study of 18 railroad crossings located within two rail corridors in Waukesha and Wauwatosa, Wisconsin. The corridors had a significant history of pedestrian, bicycle, and trespassing-related incidents, warranting a targeted review focused on non-motorized safety and railroad crossing operations. Joanna served as the lead grade crossing safety engineer responsible for coordinating and leading diagnostic field reviews for all 18 crossings. The study involved coordination with Canadian National, CPKC, WisDOT, FRA, the Office of the Commissioner of Railroads (OCR), local agencies, and institutional stakeholders. Joanna also analyzed railroad event log data to evaluate train activity, crossing warning system operation, and the interaction between railroad operations and non-motorized users throughout the corridors.

City of La Crosse Traffic Analysis (Hagar St/Avon St and St Cloud St/Liberty St)

Wisconsin Department of Transportation (WisDOT) Bureau of Transit, Local Roads, Railroads and Harbors

With the addition of Amtrak's Borealis service in 2024, Canadian National (CN) planned a third track expansion through the City of La Crosse to address increased operational demands near the La Crosse passenger rail station. Two key crossings within the corridor are located diagonally within adjacent intersections between the CN yard and the station, creating complex operational and geometric conditions requiring four-quadrant gate systems. Joanna performed a traffic and operational analysis evaluating existing traffic volumes, crash history, railroad operations, and driver behavior at the crossings. The study evaluated alternatives including crossing closure, extended medians, and modified gate configurations for further consideration as part of the corridor improvements.

Appendix B. Cost Share and In-Kind Contribution Documentation (See attachments)

Appendix B-1. Morgan State University Cost Share Commitment Letter

Appendix B-2. Executed In-Kind Donation Agreement from MxV Rail

Appendix B-3. PST Proposed In-Kind Contribution Documentation - Pending Execution

Appendix C. Letters of Support and Commitment (See attachments)

Appendix C-1. Letter of Support from the Maryland Transit Administration

Appendix C-2. Letter of Support from the Baltimore City Department of Transportation, Traffic Division

Appendix C-3. Letter of Commitment from Mead & Hunt

Benefit-Cost Analysis

Because the proposed project is a non-capital workforce development and training activity, many of its primary benefits are not readily monetized through a traditional quantitative benefit-cost analysis. The project is not designed as a capital construction project or an operational rail infrastructure improvement project. Instead, it is designed to build a connected rail education and workforce pathway that links high school exposure, community college rail fundamentals, university-level rail education, technology-enabled learning demonstrations, and workforce preparation. Therefore, the benefits of this project are best described qualitatively, with emphasis on workforce pipeline development, student access, education and training capacity, rail safety awareness, and long-term institutional sustainability.

The proposed project addresses a critical workforce need in the railroad and transit industries: the limited pipeline of students who are exposed to rail transportation early enough to pursue rail-related education and careers. Rail transportation is a specialized field with significant needs in engineering, operations, safety, inspection, maintenance, planning, data analysis, and emerging technologies. However, many high school and community college students have limited awareness of rail transportation as a career pathway. At the same time, many community college students already receive technical preparation in areas such as engineering technology, construction, logistics, safety, GIS, CADD, and transportation-related programs, but these programs are often not connected to rail-specific education or career pathways. The proposed project addresses this gap by creating a structured pathway from general STEM and transportation interest to rail-specific education and workforce preparation.

The project will generate significant educational and workforce development benefits by expanding Morgan State University's existing rail education foundation to serve high school students, community college students, undergraduate students, and graduate students. The project will create a rail education pathway guide, modular rail curriculum materials, technology-enabled rail demonstrations, level-specific outreach and pathway activities, and a tracking and evaluation toolkit. These products will allow Morgan to engage students at different readiness levels, introduce them to rail transportation and rail safety topics, guide them toward Morgan rail courses and rail-related programs, and support continued participation through tuition support, mentoring, applied learning, research exposure, internships, and workforce preparation activities.

A key benefit of the project is that it lowers barriers to participation in rail education. The proposed tuition support will help eligible students participate in Morgan rail courses and continue along the rail education pathway. This support will be particularly important for students who may have interest in transportation, engineering, technology, or public service but lack financial resources or prior exposure to rail transportation. By supporting high school students, community college students, undergraduate students, and graduate students, the project will help increase the number of students who can enter, continue, and complete rail-related

education. These benefits are not easily expressed as dollar values, but they directly support workforce pipeline development and talent acquisition in a specialized transportation sector.

The project also provides benefits through research-to-education translation. Applied demonstrations in railroad crossing safety concepts, drone- and sensor-based track and bridge inspection, and human-machine interaction using Morgan's locomotive simulator will be converted into reusable educational materials, including case studies, simplified datasets, inspection exercises, simulator scenarios, worksheets, discussion prompts, and student project topics. These materials will help students understand how modern technologies support rail safety, infrastructure condition assessment, field inspection, operator decision-making, and transportation system management. The field and demonstration activities will be temporary, non-intrusive, non-interfering, and education-oriented, and will not involve construction, right-of-way acquisition, permanent operational equipment installation, or rail infrastructure modification.

The proposed project provides regional benefits because Morgan State University is located in the Baltimore-Washington, D.C. metropolitan area, a region with major transit and rail activity, transportation agencies, rail and transit operators, consultants, technology partners, and a large and diverse student population. Graduates and participating students may pursue future opportunities with transit agencies, passenger rail systems, freight railroads, transportation consultants, technology firms, public agencies, and the rail supply industry. Potential regional and national employers include transit and passenger rail agencies, freight railroads, rail safety and inspection firms, engineering consultants, public transportation agencies, and technology companies supporting transportation infrastructure and operations.

The project also provides institutional and societal benefits by strengthening rail education capacity at an HBCU and creating a replicable model for other universities seeking to connect high school outreach, community college pathways, and university-level rail education. Morgan's National Transportation Center, SMARTER Center, NSTI outreach platform, transportation curriculum, rail laboratory resources, locomotive simulator, AREMA Student Chapter, and agency and industry partnerships provide a strong foundation for sustaining the pathway beyond the grant period. The reusable curriculum materials, pathway guide, demonstration packages, and tracking toolkit developed through the project will remain available for continued use after the grant period, increasing the long-term value of the federal investment.

Although the project's benefits are primarily qualitative, the expected outcomes are substantial. The project will increase rail career awareness among high school and community college students, expand access to rail-specific education, strengthen Morgan's rail workforce development capacity, support tuition-assisted participation in rail courses, provide students with applied learning experiences, and create a sustainable pipeline from early rail exposure to university-level rail education and workforce preparation. These outcomes support the long-term competitiveness, safety awareness, and workforce readiness of the rail and transit industries

while advancing Morgan State University's mission to expand transportation education and career opportunities for urban, minority, and underserved populations.



June 25, 2026

FRA CRISI Program Review Committee
Federal Railroad Administration
U.S. Department of Transportation

Proposal Title: Building a Rail Workforce Pathway from High Schools and Community Colleges to University-Level Rail Education, Research and Career Preparation

Dear FRA CRISI Program Review Committee:

MSU fully supports Dr. Zhou's activities and responsibilities as described in the submitted proposal. The total proposed project cost is \$3,715,788, comprising \$2,972,530 in requested FRA funds and \$743,258 in total non-federal cost share.

MSU's institutional in-kind cost share totals \$546,126, consisting of \$379,356 in faculty release time and associated fringe benefits, and \$166,770 in Graduate Research Assistant support and associated fringe benefits. The remaining \$197,132 in non-federal cost share will be provided through in-kind contributions from project partners and vendors, as documented in the separate attachments included with the application package.

Please do not hesitate to contact me at 443-885-4118 if you have any questions.

Sincerely,

Ailing Zhang

Ailing Zhang
Sr. Grants Manager for Research Administration
Division of Research and Economic Development
Morgan State University
Email: aor@morgan.edu

The following attachment is not included in the view since it is not a read-only PDF file.

Upon submission, this file will be transmitted to the Grantor without any data loss.

Appendix B-2. Executed In-Kind Donation Agreement from MxV Rail.pdf



STATEMENT OF WORK NO. I TO THE MASTER LICENSE AND SERVICES AGREEMENT
BETWEEN PST SOFTWARE INC. AND COMPANY

PST Software Inc. ("PST") and Morgan State University ("Company") enter into this Statement of Work No. I ("SOW") on May 18, 2026 ("SOW Effective Date"). This SOW is governed by the Master License and Services Agreement dated May 18, 2026 (the "Agreement") between PST and Company. Unless otherwise defined in this SOW, terms set forth in initial uppercase letters have the meaning established in the Agreement. PST agrees to complete the following project in accordance with the Agreement and the following terms:

I. Project Overview

This schedule reflects the delivery of the simulator control stand for establishing an academic rail laboratory for purposes of education and research.

- i. Note: Desktop PC, Server PC and Trainer Station PC required to run the simulation are **not** included. Company has agreed to source (see Appendix A for specifications).

II. Term of Schedule

This SOW commences on the SOW Effective Date and terminates upon Acceptance.

III. Scope of Work

a. Hardware

- i. (1) – Refurbished Simulator AAR-105 Locomotive Control Stand
 - 1. 5 Year Warranty (See Section VII)
 - 2. On-site installation

IV. Milestones/Target Dates

The work performed under this Statement of Work must be completed on or before the milestones described in the table below:

Milestone No.	Activity Description	Delivery Date
1	Delivery of Simulator AAR-105 Locomotive Control Stand	3 months from Effective Date

V. Acceptance Period:

Hardware: To be considered accepted upon notice of shipment to Company.



VI. Invoicing and Fees

Fees: \$150,000.00

\$80,000.000 IS HEREBY FULLY DONATED BY PST TO MORGAN STATE UNIVERSITY.

Fees after donation: \$70,000.00

Invoicing Terms:

Company shall be responsible for the payment and remittance of any sales or use taxes, goods and services taxes, value-added taxes, import/export fees, duties imposts or other similar governmental charges (referred to collectively hereafter as "Tax") imposed on this Agreement or the Software and Services to be provided hereunder. Company shall not be responsible for PST's income tax, or any tax imposed on PST's capital or franchise.

VII. Refurbished Hardware and Warranty

Refurbished hardware is guaranteed to be fully functional but may have cosmetic defects, including scrapes, dents, and other cosmetic imperfections. The warranty covers repair or replacement of any defective parts or materials arising from normal use. Any onsite repairs or replacement installation done under this warranty will be completed by Company with remote support from PST, if possible. If an expert technician is required for repairs, a PST representative will travel onsite with travel expenses reimbursed by Company.

VIII. Problem Resolution and Escalation

All Services issues shall be addressed by the PST Representative and the Watco Representative. Any dispute that cannot be resolved by the Representatives in a timely manner shall be escalated by either Party as described in the Agreement.

IX. Counterparts

This SOW may be executed in counterparts or duplicate originals. Facsimile, electronic and digital copies of the SOW, including properly executed PDF versions of the SOW, are regarded as an original instrument by the parties.

SIGNATURES BELOW

Agreed:

MORGAN STATE UNIVERSITY

PST SOFTWARE, INC.

By:_____

By:_____

Name:_____

Name:_____

Title:_____

Title: _____

Date:_____

Date: _____



SOFTWARE LICENSE SCHEDULE I

LICENSING FOR LOCOMOTIVE ENGINEER SIMULATION TRAINING

This Software License Schedule I ("Schedule") to the Master License and Services Agreement dated May 18th, 2026 (the "Agreement"), is entered into by and between PST Software Inc. ("PST") and Morgan State University ("Company"). Upon execution by the parties, this Schedule represents the parties' agreement on licensing terms and fees for the Software listed below and is hereby incorporated into the Agreement by reference. Unless otherwise defined in this Schedule, terms set forth in initial uppercase letters have the meaning established in the Agreement.

Software: Locomotive Simulation Software with Trainer Station

Territory: North America

License Term: Perpetual

Licensing Fee: 1 X Locomotive Engineer Simulation Licenses - **\$65,000**
1 X Trainer Station License - **\$50,000**

ALL FULLY DONATED BY PST AT NO COST TO MORGAN STATE UNIVERSITY.

Fees after donation: \$0.00

Acceptance: The software licenses will be considered accepted upon written notification of the availability of the Software on the FTP site from PST.

Invoicing: Upon written notification of the availability of the Software on the FTP site from PST.

Other terms: Company shall be responsible for the payment and remittance of any sales or use tax, property, or customs duties (referred to collectively hereafter as "Tax") imposed on this Agreement or the Software and Services to be provided hereunder. Company shall not be responsible for PST's income tax, or any tax imposed on PST's capital or franchise.

This Schedule may be executed in counterparts or duplicate originals, all of which are regarded as one and the same instrument. The parties' consent to use of facsimile, electronic and/or digital signatures in the execution of this Schedule, and the same are binding upon the parties as if they were an original signature. Facsimile, electronic and digital copies of this Schedule, including properly executed PDF versions of this Schedule, are regarded as an original instrument by the parties.

Agreed:
MORGAN STATE UNIVERSITY

PST SOFTWARE INC.

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

The following attachment is not included in the view since it is not a read-only PDF file.

Upon submission, this file will be transmitted to the Grantor without any data loss.

Appendix C-1. Letter of Support from the Maryland Transit Administratio

n.pdf



Date: **June 17, 2026**
To: **Morgan State – USDOT FRA CRISI Program**
From: **Qiana Gabriel, Acting Chief of Traffic**
Prepared By: **Baltimore City Department of Transportation – Traffic Division**
Subject: **Letter of Support – USDOT FRA CRISI Program**

The Baltimore City Department of Transportation (BCDOT) is pleased to support Morgan State University's CRISI proposal and its efforts to advance rail transportation workforce development through applied technology demonstrations, educational pathway development, and experiential learning opportunities in Intelligent Transportation Systems (ITS) and multimodal safety technologies. BCDOT recognizes the critical importance of preparing the next generation of transportation professionals to address evolving safety challenges.

Light rail grade crossings across Baltimore present ongoing safety concerns and would benefit from the deployment of advanced technologies to reduce conflicts and crashes involving light rail vehicles and other roadway users. As part of this proposal, BCDOT supports Morgan State University's planned light rail safety technology demonstration and accompanying educational case study activities.

BCDOT is committed to collaborating with the project team to identify suitable, non-intrusive technology deployment strategies and to support educational engagement related to rail safety, infrastructure, and emerging technologies. This collaboration may include coordination on site selection for demonstrations, development of safety alert concepts, sensor installation at selected City intersections, as well as support for field testing and data collection activities.

We have strong confidence in Morgan State University's technical expertise and educational leadership. The proposed team brings demonstrated capabilities in rail transportation engineering, infrastructure monitoring, advanced sensing technologies, and student-centered program delivery.

Sincerely,

A handwritten signature in black ink, appearing to read "Qiana Gabriel", on a light gray rectangular background.

Acting Chief of Traffic – BCDOT Traffic Division



June 22, 2026

Dr. Yuliang Zhou
Transportation & Urban Infrastructure Studies
School of Engineering, Morgan State University
yuliang.zhou@morgan.edu
443-885-5064

Reference: FY 2025–2026 FRA CRISI Grant Application – Letter of Commitment

Dear Dr. Zhou:

Mead & Hunt is pleased to extend its technical support to assist Morgan State University (MSU)'s University Transportation Center (UTC) in response to FY 2025–2026 FRA CRISI (Consolidated Rail Infrastructure and Safety Improvements) grant application. Mead & Hunt's extensive experience and knowledge of Baltimore City's traffic signal system and Maryland Transit Administration (MTA)'s Light Rail Transit (LRT) system and signal priority and preemption in Baltimore City grade crossings will add value to the project team to successfully test and implement innovative safety alert systems to mitigate conflicts between Light rail vehicles and crossing vehicles and pedestrians at signalized and un-signalized light rail grade crossings. Mead & Hunt's commitment will be measurable in the following ways:

- Safety alert concept development for railroad gate crossing, as well as signalized grade crossing
- Develop pedestrian time extension algorithm to improve ped safety
- Develop vehicular phase clearance time extension algorithm to prevent conflicts
- Configuration of signal controller, cabinet & sensor to enable safety applications
- Signal controller configuration for peer-to-peer communication
- Signal controller bench testing
- Cabinet hardware installation and signal system integration
- Field implementation and testing
- Field observation and fine tuning
- Signal timing parameters adjustment

Please contact my project manager Anam Ardeshiri, PhD, PE, PTOE at 443-471-3672 or anam.ardeshiri@meadhunt.com if you have any question or need information.

Sincerely,
Mead & Hunt Inc.

Keith Riniker, P.E. PTOE
Business Unit Lead

Budget Justification

Building a Rail Workforce Pathway from High Schools and Community Colleges to University-Level Rail Education, Research and Career Preparation

Federal Railroad Administration (FRA) CRISI Program | Applicant: Morgan State University

MSU PI: Dr. Yuliang Zhou | Project Period: September 1, 2027 - August 31, 2031

A. Personnel

Principal Investigator (Dr. Yuliang Zhou): Dr. Zhou will serve as the Morgan State University PI and will provide overall project leadership, coordination, student supervision, and oversight of the rail workforce development pathway. His responsibilities include coordinating the Rail Education Pathway Guide, curriculum adaptation, technology-enabled demonstration development, partner engagement, student tracking, reporting, and integration of education and research activities across the project tasks.

Federal funds support one month of PI summer salary per year, escalated at 1.5% annually, totaling \$41,304 over the four-year project period.

In addition, 2.375 ACAD release credits are provided as **non-federal matches** and total \$98,097 over four years. This effort supports sustained project leadership, student supervision, partner coordination, and implementation oversight during the academic year.

Faculty Match:

Dr. Chavis will support curriculum integration, pathway activities, student engagement, and coordination with transportation education and outreach programs. Her academic-year effort is provided as a non-federal match at 12.5% or one class equivalent, escalated at 1.5% annually, and totals \$122,857 over four years.

Dr. Lee will contribute his in-kind faculty time as non-federal match at 5 hours a week to this project, which is \$17,500 for the first year, escalated at 1.5% and totals \$71,591 over four years.

Dr. Jeihani will provide 0.4 CAL, 3.45%/year as a non-federal match, totalling \$15,400.

Postdoctoral Researcher (federal): Federal funds are requested to support a postdoctoral researcher in Years 1 and 2. The Postdoctoral Researcher will conduct day-to-day technical research activities under the supervision of the PI, including field data collection, LiDAR/sensor data processing, technology demonstration support, data analysis, research-to-education translation, and dissemination of results. Salary is calculated at \$35/hour. In Year 1, the Postdoctoral Researcher is budgeted at 14 hours/week for 52 weeks: $\$35/\text{hour} \times 14 \text{ hours/week} \times 52 \text{ weeks} = \$25,480$. In Year 2, the Postdoctoral Researcher is budgeted at 20 hours/week for 52 weeks: $\$35/\text{hour} \times 20 \text{ hours/week} \times 52 \text{ weeks} = \$36,400$. The two-year postdoctoral salary total is \$61,880.

Graduate Research Assistant (non-federal match): Graduate Research Assistant support is provided as cost share by the National Transportation Center. The GRA will assist the PI and Postdoctoral Researcher with research activities, field data collection support, data processing, demonstration preparation, documentation, and dissemination of results. GRA support is calculated at \$25/hour. In Year 1, the budget includes three GRA students at $\$25/\text{hour} \times 20 \text{ hours/week} \times 52 \text{ weeks}$, one student for $\$25/\text{hour} \times 20 \text{ hours/week} \times 2 \text{ weeks}$, plus one additional student at $\$25/\text{hour} \times 20 \text{ hours/week} \times 48 \text{ weeks}$, for a total of \$77,000. In Year 2, the budget includes two GRA students at $\$25/\text{hour} \times 20 \text{ hours/week} \times 52 \text{ weeks}$, plus one additional student at, for a total of \$52,000 at $\$25/\text{hour} \times 20 \text{ hours/week} \times 48 \text{ weeks}$. The two-year GRA cost-share total is \$153,000.

Personnel	Year 1	Year 2	Year 3	Year 4	Total
PI summer salary - federal (Dr. Yuliang Zhou; 1 month; 1.5% escalation)	\$10,097	\$10,248	\$10,402	\$10,558	\$41,304

Postdoctoral Researcher - federal (\$35/hr)	\$25,480	\$36,400	\$0	\$0	\$61,880
PI academic-year release time – non-federal (Dr. Yuliang Zhou; 1.9 ACAD; 1.5% escalation)	\$19,184	\$19,471	\$19,763	\$20,060	\$78,478
Dr. Celeste Chavis academic-year effort - non-federal (CAL 12.5% or one class; 1.5% escalation)	\$30,032	\$30,482	\$30,940	\$31,404	\$122,857
Dr. Youngjae Lee (In-kind Faculty Effort, 5h/week) non-federal	\$17,500	\$17,763	\$18,029	\$18,299	\$71,591
Dr. Mansaureh Jeihani (0.4 CAL matching, 3.45% /year) - non-federal	\$7,700	\$7,700			\$15,400
Graduate Research Assistant support - non-federal (\$25/hr)	\$77,000	\$76,000			\$153,000

B. Fringe Benefits

Morgan State University fringe benefits are calculated in accordance with institutional policy. The budget applies a 9% fringe rate for summer faculty salary, postdoctoral researcher wages, and graduate research assistant support. Academic-year faculty effort provided as a match is calculated at the regular faculty academic-year fringe rate of 42%.

Federal fringe benefits total \$9,287 over four years, including PI summer fringe and postdoctoral researcher fringe. Non-federal matching fringe benefits total \$98,332 over four years and are associated with faculty academic-year effort and GRA support.

Fringe Item	Year 1	Year 2	Year 3	Year 4	Total
PI summer fringe - federal (9%)	\$909	\$922	\$936	\$950	\$3,717
Postdoctoral Researcher fringe - federal (9%)	\$2,293	\$3,276	\$0	\$0	\$5,569
PI academic-year fringe - non-federal (42%)	\$8,057	\$8,178	\$8,301	\$8,425	\$32,961
Dr. Celeste Chavis fringe - non-federal (42%)	\$12,613	\$12,803	\$12,995	\$13,190	\$51,600
Dr. Jeihani fringe - non-federal (42%)	\$3,234	\$3,234			\$6,468
Graduate Research Assistant fringe - non-federal (9%)	\$6,930	\$6,840			\$13,770

C. Travel

Travel funds support project outreach, partner coordination, student engagement, field coordination, and dissemination. The federal travel budget totals \$14,000 over four years. Travel will follow Morgan State University travel policies and sponsor requirements.

MSU to High Schools / Community Colleges (\$8,000- federal): Funds support local travel for school visits, community college engagement, Morgan pathway activities, and partner coordination in the Baltimore and Washington, D.C. metropolitan areas.

Mileage / Site Visits and Conferences (\$6,000- federal): A travel budget of \$3,000 in Year 1 and \$3,000 in Year 2 is requested to support project site visits and conference travel, for a total of \$6,000. Travel may include attendance at a transportation or rail-related conference, project site visits, and field data collection coordination. The conference trip estimate includes ground transportation (\$175), airfare (\$500), hotel (\$400 for two nights at \$200/night), per diem (\$189 at \$63/day for three days), and registration (\$500), for a subtotal of \$1,764. PI project site visits are estimated at four one-day visits, including mileage (\$400) and per diem (\$252 at \$63/day), for a subtotal of \$652. Postdoctoral Researcher site visits are estimated at three one-day visits, including mileage (\$396) and per diem (\$189 at \$63/day), for a subtotal of \$585.

Travel Purpose	Year 1	Year 2	Year 3	Year 4	Total
MSU to high schools / community colleges- federal	\$2,000	\$2,000	\$2,000	\$2,000	\$8,000

Mileage/site visits and conferences such as ITS America- federal	\$3,000	\$3,000	\$0	\$0	\$6,000
---	---------	---------	-----	-----	---------

D. Equipment

Equipment funds support technology-enabled rail safety demonstrations and rail workforce training activities. Federal equipment funds total \$160,000 and will support LiDAR sensors and hardware accessories. Non-federal equipment and license donation total \$195,000 and include PST simulator and locomotive simulation resources.

LiDAR Sensors and Hardware Accessories (\$160,000 federal): Funds will support LiDAR sensors and related hardware for temporary, research-grade sensing demonstrations, controlled educational activities, and railroad crossing safety detection and warning concepts. The equipment will support education and training and will not be installed as permanent operational rail infrastructure.

PST Simulator and License Contributions (\$195,000 non-federal): PST will provide in-kind simulator and license donation, including an AAR-105 locomotive control stand donation, locomotive engineer simulation licenses, and trainer station license support. These resources will support locomotive simulator learning, human-machine interaction activities, rail operations scenarios, and student workforce preparation.

Equipment Item	Year 1	Year 2	Year 3	Year 4	Total
LiDAR sensors and hardware accessories - federal	\$160,000	\$0	\$0	\$0	\$160,000
PST Simulator AAR-105 Locomotive Control Stand donation - non-federal	\$80,000	\$0	\$0	\$0	\$80,000
PST Locomotive Engineer Simulation Licenses donation - non-federal	\$65,000	\$0	\$0	\$0	\$65,000
PST Trainer Station License donation - non-federal	\$50,000	\$0	\$0	\$0	\$50,000

E. Contractual

A consultant service of \$130,000 in Year 1 and \$130,000 in Year 2 is requested for Mead & Hunt, for a total of \$260,000. Mead & Hunt will serve as a consultant to provide technical support for rail safety demonstration planning, railroad crossing safety concepts, site-based planning, technology demonstration design, field data interpretation support, and the translation of demonstration results into educational and workforce training materials.

The consultant service will support education-oriented rail safety demonstration and workforce development activities. It will not support construction, repair, permanent installation of grade crossing infrastructure, or operational modifications to rail infrastructure.

Contractual Item	Year 1	Year 2	Year 3	Year 4	Total
Mead & Hunt consultant service - federal	\$130,000	\$130,000	\$0	\$0	\$260,000

F. Supplies

Supplies total \$24,000 in federal funds over four years and support materials, project supplies, and rail laboratory maintenance. In addition, MxV Rail will provide a track component donation valued at \$2,132 as non-federal match.

Materials and Supplies (\$12,000 federal): Funds support instructional materials, demonstration materials, printing, small tools, consumable supplies, student learning materials, and other project materials needed for rail pathway activities, curriculum modules, and technology-enabled demonstrations.

Rail Lab Maintenance (\$12,000 federal): Funds support maintenance and readiness of rail laboratory resources used for hands-on demonstrations, track component activities, rail infrastructure education, and student learning exercises.

MxV Rail Track Component Donation (\$2,132 non-federal): The donated rail track component will support hands-on infrastructure learning, rail lab demonstrations, and student exposure to rail track components and inspection concepts.

Supply Item	Year 1	Year 2	Year 3	Year 4	Total
Materials and supplies - federal	\$3,000	\$3,000	\$3,000	\$3,000	\$12,000
Rail lab maintenance - federal	\$3,000	\$3,000	\$3,000	\$3,000	\$12,000
MxV Rail track component donation – non-federal	\$2,132	\$0	\$0	\$0	\$2,132

G. Other Direct Costs

Other direct costs total \$2,198,161 over four years. These costs include tuition support for undergraduate, graduate, high school, and community college students; doctoral student stipend and tuition support; and NTC/NSTI recruiting and outreach support. These costs are central to the project's workforce development pathway and will help move students from rail awareness and fundamentals into Morgan rail course participation and continued rail education.

Undergraduate Student Tuition (\$1,395,741 - federal): Funds support 10 in-state undergraduate students per year who are participating in rail-related study and pursuing Morgan's rail track or railroad concentration. Undergraduate tuition is budgeted at \$4,233 per semester. The Year 1 calculation is $\$4,233 \times 2 \text{ semesters} \times 10 \text{ students} \times 4 \text{ years of support} = \$338,640$. Tuition is escalated at 2% annually, resulting in a four-year total of \$1,395,741. Tuition support will help reduce participation barriers and strengthen student progress toward rail workforce preparation.

Graduate Student Tuition (\$356,416 - federal): Funds support 5 in-state graduate students per year, budgeted at 30 credits per student per year. Graduate tuition is budgeted at \$576.50 per credit. The Year 1 calculation is $\$576.50 \times 30 \text{ credits} \times 5 \text{ students} = \$86,475$. Tuition is escalated at 2% annually, resulting in a four-year total of \$356,416. This support will help master's students participate in rail-related graduate education, applied learning, and workforce preparation activities.

High School Student Course Tuition Support (\$43,462 - federal): Funds support 10 in-state high school students per year for 3 credits per student per year. High school student course tuition is budgeted at \$351.50 per credit. The Year 1 calculation is $\$351.50 \times 3 \text{ credits} \times 10 \text{ students} = \$10,545$. Tuition is escalated at 2% annually, resulting in a four-year total of \$43,462. This support will allow eligible students to participate in Morgan rail courses or modules as a bridge from early rail exposure to university-level rail education.

Community College Student Course Tuition Support (\$86,925 - federal): Funds support 10 in-state community college students per year for 6 credits per student per year. Community college student course tuition is budgeted at \$351.50 per credit. The Year 1 calculation is $\$351.50 \times 6 \text{ credits} \times 10 \text{ students} = \$21,090$. Tuition is escalated at 2% annually, resulting in a four-year total of \$86,925. This support will connect community college rail fundamentals activities to Morgan rail course participation, transfer or certificate pathways, and continued rail education.

Doctoral Student Stipend (\$197,847- federal): Funds support doctoral student participation in research, demonstration development, data preparation, student learning materials, technology demonstrations, and project documentation. Doctoral stipends are budgeted at \$24,000 per student per year. The Year 1 calculation is $\$24,000 \times 3 \text{ students} = \$72,000$. Stipends are escalated at 3% annually, with 3 doctoral students supported in Years 1 and 2 and 1 doctoral student supported in Years 3 and 4, resulting in a four-year total of \$197,847.

Doctoral Student Tuition (\$42,770- federal): Doctoral tuition is budgeted at \$576.50 per credit for 9 credits per semester and 2 semesters per year. The Year 1 calculation is $\$576.50 \times 9 \text{ credits} \times 2 \text{ semesters} = \$10,377$. Tuition is escalated at 2% annually, resulting in a four-year total of \$42,770. Together, doctoral stipend and tuition support totals \$240,617 and will strengthen the research-to-education translation component of the project.

NTC NSTI and Recruiting (\$75,000- federal): Funds support high school and community college outreach, student recruitment, pathway promotion, and coordination activities through Morgan's National Transportation Center and National Summer Transportation Institute outreach platform. The budget includes \$25,000 per year in Years 1 through 3, for a total of \$75,000.

Other Direct Cost Item	Year 1	Year 2	Year 3	Year 4	Total
Undergraduate student tuition (10 in-state students/year supported for 4 years) - federal	\$338,640	\$345,413	\$352,321	\$359,367	\$1,395,741
Graduate student tuition (5 in-state students/year; 30 credits/student) - federal	\$86,475	\$88,205	\$ 89,969	\$91,768	\$356,416
High school student course tuition support (10 in-state students; 3 credits/student/year) - federal	\$10,545	\$10,756	\$ 10,971	\$11,190	\$43,462
Community college student course tuition support (10 in-state students; 6 credits/student/year) - federal	\$21,090	\$21,512	\$ 21,942	\$ 22,381	\$86,925
Doctoral student stipend (3% escalation) - federal	\$72,000	\$74,160	\$ 25,462	\$26,225	\$197,847
Doctoral student tuition (2% escalation) - federal	\$10,377	\$10,585	\$ 10,796	\$11,012	\$42,770
NTC NSTI + recruiting (high schools and community colleges outreach) - federal	\$25,000	\$25,000	\$ 25,000	\$ -	\$75,000

H. Federal and Non-Federal costs

Federal direct costs total \$2,768,632 over four years. These costs support personnel, fringe benefits, travel, equipment, contractual support, supplies, student tuition support, doctoral student support, NTC/NSTI outreach and recruiting, rail technology demonstrations, and education materials.

Federal Indirect costs are calculated at 42% for other sponsored activities as shown in the project budget. Student tuition & stipend & equipment are excluded from the indirect cost base. The federal MTDC base is \$485,471, resulting in \$203,898 in federal indirect costs.

Non-federal direct costs total \$743,258 over four years. Matching funds consist of faculty academic-year release time, GRA support, associated fringe benefits, PST in-kind simulator and license donations, the MxV Rail track component donation.

Cost Type	Year 1	Year 2	Year 3	Year 4	Total
Federal direct costs	\$903,905	\$767,476	\$555,798	\$541,452	\$2,768,632
Federal indirect costs	\$86,008	\$91,075	\$18,622	\$8,193	\$203,898
Non-Federal direct costs	\$379,381	\$182,471	\$90,028	\$91,378	\$743,258

K. Total Direct and Indirect Costs

Cost Type	Federal Funds	Non-Federal Funds	Total
Total project cost	\$2,972,530	\$743,258	\$3,715,788

**U.S. Department of Transportation
Federal Railroad Administration**

**Certifications Regarding Debarment, Suspension and Other Responsibility Matters,
Drug-Free Workplace Requirements and Lobbying**

**PART A: Certification Regarding Debarment, Suspension and Other Responsibility Matters – Primary Covered Transactions
(Pursuant to 2 CFR Part 180)**

- (1) The grantee certifies to the best of its knowledge and belief, that it and its principles:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;
 - (b) Have not within a three-year period preceding this application been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) Have not within a three-year period preceding this application had one or more public transactions (Federal, State or local) terminated for cause or default.
- (2) Where the grantee is unable to certify to any of the statements of this certification, he or she shall attach an explanation to this application.

PART B: Certification Regarding Drug-Free Workplace Requirements (Pursuant to 49 CFR Part 32)

- A. The grantee certifies that it will or continue to provide a drug-free workplace by:
- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
 - (b) Establishing an ongoing drug-free awareness program to inform employees about—
 - (1) The dangers of drug abuse in the workplace;
 - (2) The grantee's policy of maintaining a drug-free workplace;
 - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
 - (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

- (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will—
 - (1) Abide by the terms of the statement; and
 - (2) Notify the employer in writing of his or her conviction for a violation of criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- (e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;
- (f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee is so convicted—
 - (1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
 - (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- (g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (e) and (f).

B. The grantee may insert in the space below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

Check ☐ if there are workplaces on file that are not identified here.

PART C: Certification Regarding Lobbying (Pursuant to 49 CFR Part 20)

CHECK ☒ IF APPLICABLE
 CERTIFICATION IS FOR THE AWARD OF A GRANT OR COOPERATIVE AGREEMENT EXCEEDING
 \$100,000
 OR
 A FEDERAL LOAN EXCEEDING \$150,000

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award document for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 USC 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

As the authorized certifying official, I hereby certify that the certifications in Parts A, B, and C (if C is applicable) are true.

Completed on submission by Grants.gov.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL

Ailing Zhang
Sr. Grants Manager

TYPED NAME AND TITLE

Completed on submission by Grants.gov.

DATE



Federal Railroad Administration

APPLICANT FINANCIAL CAPABILITY QUESTIONNAIRE

SECTION A: PURPOSE

Federal agencies are required to review and evaluate the potential risks posed by applicants prior to awarding Federal funds (2 C.F.R. § 200.205). The Federal Railroad Administration (FRA) considers a variety of factors and information in completing this risk assessment. FRA's evaluation may include the following: financial capability and/or stability of the applicant organization; quality of the organization's management and financial systems; history of past performance; and results of audits and/or reports.

Completion of this form is intended to assist FRA in evaluating the financial capability of the applicant organization. This form is to be completed by organizations applying for FRA programs that 1) have not previously completed this form or 2) have not had a current/active award with FRA within the last three years.

SECTION B: ORGANIZATION INFORMATION

1. NAME OF ORGANIZATION:

Morgan State University

2. NAME AND TITLE OF AUTHORIZED REPRESENTATIVE (individual who will accept the grant on behalf of your organization):

Prefix: Dr. First: Farin Middle: Last: Kamangar Suffix: Title: Associate Vice President for Research

3. YEAR ORGANIZATION WAS FOUNDED/INCORPORATED:

1867

4. EMPLOYER IDENTIFICATION NUMBER (EIN):

52-6002033

5. UNIQUE ENTITY IDENTIFIER:

KULSKCCZJT27

6. PRIMARY ADDRESS OF THE ORGANIZATION:

Street1: 1700 E. Cold Spring Lane
Street2:
City: Baltimore
County/Parish: MD
State: MD: Maryland
Country: USA: UNITED STATES
Zip / Postal Code: 21251-0001

7. DOES THE ORGANIZATION HAVE A CURRENT ORGANIZATIONAL CHART?

☒ Yes ☐ No

IF YES, PLEASE PROVIDE A COPY

Org Chart 5-15-25.pdf

Add Attachment

Delete Attachment

View Attachment

8. HAS YOUR ORGANIZATION RECEIVED FEDERAL ASSISTANCE FUNDS IN THE LAST 2 YEARS?

☒ Yes ☐ No

9. TOTAL OPERATING BUDGET IN THE PREVIOUS FISCAL YEAR:

\$ 505,900,000.00

SECTION C: ACCOUNTING SYSTEM

1. HAS ANY GOVERNMENT AGENCY RENDERED AN OFFICIAL WRITTEN OPINION CONCERNING THE ADEQUACY OF THE ACCOUNTING SYSTEM FOR THE COLLECTION, IDENTIFICATION AND ALLOCATION OF COSTS UNDER FEDERAL CONTRACTS/GRANTS?

☒ Yes ☐ No

1a. IF YES, PROVIDE NAME, AND ADDRESS OF AGENCY PERFORMING REVIEW:

Agency Name:

Street1:

Street2:

City:

County/Parish:

State:

Country:

Zip / Postal Code:

1b. ATTACH A COPY OF THE LATEST REVIEW AND ANY SUBSEQUENT CORRESPONDENCE, CLEARANCE DOCUMENTS, ETC.

[Add Attachments](#)

[Delete Attachments](#)

[View Attachments](#)

2. WHICH OF THE FOLLOWING BEST DESCRIBES THE ORGANIZATION'S ACCOUNTING SYSTEM?

☐ MANUAL ☐ AUTOMATED ☒ COMBINATION

3. IS THE ORGANIZATION'S FINANCIAL MANAGEMENT PERFORMED IN-HOUSE (BY EMPLOYED STAFF) OR OUTSOURCED WITH CONTRACTED INDIVIDUALS?

☒ IN-HOUSE ☐ OUTSOURCED/CONTRACTED ☐ COMBINATION

4. DOES THE ORGANIZATION ANTICIPATE ANY SIGNIFICANT CHANGES TO ACCOUNTING SYSTEM IN THE NEXT 12 MONTHS?

☐ Yes ☒ No

IF YES, PLEASE EXPLAIN:

5. DOES THE APPLICANT HAVE EFFECTIVE INTERNAL CONTROLS IN PLACE TO ENSURE THAT FEDERAL FUNDS ARE USED SOLELY FOR AUTHORIZED PURPOSES?

☒ Yes ☐ No

6. DOES THE ORGANIZATION HAVE WRITTEN GRANTS MANAGEMENT POLICIES AND PROCEDURES FOR THE FOLLOWING:

6a. ACCOUNTING/FINANCIAL?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	6b. PROCUREMENT?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
6c. PROPERTY MANAGEMENT?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	6d. PERSONNEL?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
6e. TRAVEL?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

7. DOES THE ORGANIZATION MAINTAIN TIMESHEETS (OR TIME AND ACTIVITY REPORTS) FOR EMPLOYEES THAT TRACK ACTUAL EFFORT BY PROJECT COST OR OBJECTIVE?

☒ Yes ☐ No

8. DOES THE ORGANIZATION HAVE A CURRENT AND APPROVED INDIRECT COST RATE?

☒ Yes ☐ No

9. DOES THE ACCOUNTING/FINANCIAL SYSTEM INCLUDE CONTROLS TO PREVENT INCURRING OBLIGATIONS IN EXCESS OF:

9a TOTAL FUNDS AVAILABLE FOR A GRANT? ☒ Yes ☐ No

9b TOTAL FUNDS AVAILABLE FOR A BUDGET COST CATEGORY (e.g. Personnel, Fringe Benefits, etc.) ☒ Yes ☐ No

10. ARE THE INDIVIDUALS RESPONSIBLE FOR ADMINISTERING GRANT FUNDS FAMILIAR WITH THE CURRENT REGULATIONS AND GUIDELINES ON ADMINISTRATION, COST PRINCIPLES AND AUDIT REQUIREMENTS FOR FEDERAL GRANTS (INCLUDING 2 C.F.R. 200)?

☒ Yes ☐ No

SECTION D: HISTORY OF PERFORMANCE

1. HAS THE ORGANIZATION EVER HAD A FEDERAL AWARD SUSPENDED OR TERMINATED FOR NON-COMPLIANCE?

☐ Yes ☒ No

SECTION E: FINANCIAL STATEMENTS

1. DID THE ORGANIZATION HAVE A FINANCIAL STATEMENT AUDIT IN ITS MOST RECENT FISCAL YEAR?

☒ Yes ☐ No

1a. WHEN IS THE ORGANIZATION'S FISCAL YEAR END?

06/30/2026

2. IF THE ORGANIZATION HAD AN AUDIT IN ITS MOST RECENT FISCAL YEAR, IS THE REPORT AVAILABLE PUBLICLY?

☒ Yes ☐ No

IF YES, PLEASE PROVIDE LOCATION: (e.g. FEDERAL AUDIT CLEARINGHOUSE OR WEBSITE)

Federal Audit Clearinghouse

IF NO, PLEASE PROVIDE A COPY

Add Attachment

Delete Attachment

View Attachment

3. DID YOUR ORGANIZATION EXPEND \$750,000 OR MORE IN FEDERAL FUNDS IN THE MOST RECENT COMPLETED FISCAL YEAR?

☒ Yes ☐ No

SECTION F: ADDITIONAL INFORMATION

1. USE THIS SPACE FOR ANY ADDITIONAL INFORMATION (INDICATE SECTION AND ITEM NUMBERS IF A CONTINUATION).

SECTION G: APPLICANT CERTIFICATION

I CERTIFY THAT THE ABOVE INFORMATION IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE. (THE INDIVIDUAL CERTIFYING THIS FORM SHOULD BE FAMILIAR WITH THE ORGANIZATION'S MANAGEMENT AND FINANCIAL SYSTEMS.)

1. NAME OF THE CERTIFYING OFFICIAL

Prefix:

Dr.

First:

Farin

Middle:

Last:

Kamangar

Suffix:

1a. SIGNATURE

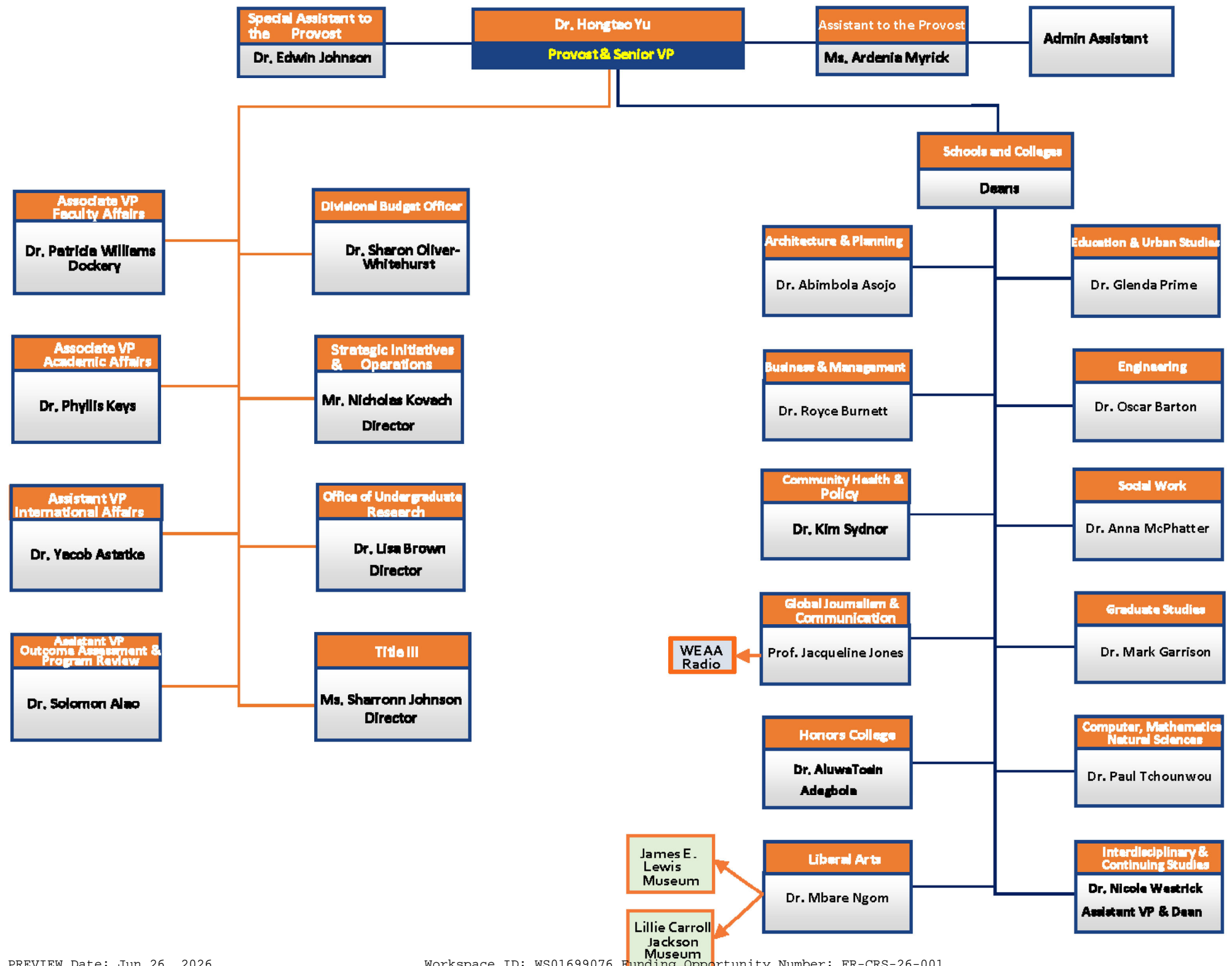
Completed by Grants.gov upon submission.

1b. DATE

Completed by Grants.gov upon submission.

1c. TITLE

Associate Vice President for Research



The following attachment is not included in the view since it is not a read-only PDF file.

Upon submission, this file will be transmitted to the Grantor without any data loss.

single-audit-report-fy2025..pdf

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 06/30/2028

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Assistance Listing Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Consolidated Rail Infrastructure and Safety Improvements Program	20.337	\$	\$	\$ 2,972,530.00	\$ 743,258.00	\$ 3,715,788.00
2.						
3.						
4.						
5. Totals		\$	\$	\$ 2,972,530.00	\$ 743,258.00	\$ 3,715,788.00

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	Consolidated Rail Infrastructure and Safety Improvements Program	N/A	N/A	N/A	
a. Personnel	\$ 35,577.00	\$ 46,648.00	\$ 10,402.00	\$ 10,558.00	\$ 103,185.00
b. Fringe Benefits	3,202.00	4,198.00	936.00	950.00	9,286.00
c. Travel	5,000.00	5,000.00	2,000.00	2,000.00	14,000.00
d. Equipment	160,000.00	0.00	0.00	0.00	160,000.00
e. Supplies	6,000.00	6,000.00	6,000.00	6,000.00	24,000.00
f. Contractual	130,000.00	130,000.00	0.00	0.00	260,000.00
g. Construction	0.00	0.00	0.00	0.00	0.00
h. Other	564,127.00	575,630.00	536,460.00	521,944.00	2,198,161.00
i. Total Direct Charges (sum of 6a-6h)	903,906.00	767,476.00	555,798.00	541,452.00	\$ 2,768,632.00
j. Indirect Charges	86,008.00	91,075.00	18,622.00	8,193.00	\$ 203,898.00
k. TOTALS (sum of 6i and 6j)	\$ 989,914.00	\$ 858,551.00	\$ 574,420.00	\$ 549,645.00	\$ 2,972,530.00
7. Program Income	\$	\$	\$	\$	\$

Authorized for Local Reproduction

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1A

SECTION C - NON-FEDERAL RESOURCES					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8.	Consolidated Rail Infrastructure and Safety Improvements Program	\$ 743,258.00	\$	\$	\$ 743,258.00
9.					
10.					
11.					
12. TOTAL (sum of lines 8-11)		\$ 743,258.00	\$	\$	\$ 743,258.00

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 989,914.00	\$ 247,480.00	\$ 247,478.00	\$ 247,478.00	\$ 247,478.00
14. Non-Federal	\$ 379,381.00	94,846.00	94,845.00	94,845.00	94,845.00
15. TOTAL (sum of lines 13 and 14)	\$ 1,369,295.00	\$ 342,326.00	\$ 342,323.00	\$ 342,323.00	\$ 342,323.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT					
(a) Grant Program		FUTURE FUNDING PERIODS (YEARS)			
		(b)First	(c) Second	(d) Third	(e) Fourth
16.	Consolidated Rail Infrastructure and Safety Improvements Program	\$ 989,914.00	\$ 858,551.00	\$ 574,420.00	\$ 549,645.00
17.					
18.					
19.					
20. TOTAL (sum of lines 16 - 19)		\$ 989,914.00	\$ 858,551.00	\$ 574,420.00	\$ 549,645.00

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:
23. Remarks:	

Authorized for Local Reproduction

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 2