Program Progress Performance Report for University Transportation Centers

- **Federal Agency and Organization Element to which Report is Submitted**
  United States Department of Transportation, Research and Innovative Technology Administration

- **Federal Grant or Other Identifying Number Assigned by Agency**
  DTRT12-G-UTC07

- **Project Title**
  Mid-America Transportation Center: Region 7 UTC

- **Program Director (PD) Name, Title, and Contact Information**
  Dr. Laurence R. Rilett, Director, Mid-America Transportation Center, Professor, Civil Engineering
  lrilett2@unl.edu – 402-472-1992

- **Submission Date**
  January 29, 2016

- **DUNS and EIN Numbers**
  DUNS: 55-545-6995
  EIN: 47-0049123

- **Recipient Organization**
  The Board of Regents, University of Nebraska for the University of Nebraska-Lincoln
  312 N. 14th Street, Alexander West
  Lincoln, NE 68588-0430
  Telephone: 402-472-1825

- **Recipient Identifying Number or Account Number**
  25-1121-0003-001

- **Project/Grant Period**
  January 1, 2012 - January 31, 2017

- **Reporting Period End Date**
  December 31, 2015

- **Report Term or Frequency (annual, semi-annual, quarterly, other)**
  Semi-annual

- **Signature of Submitting Official (signature shall be submitted in accordance with agency-specific instructions)**

  [Signature]
  L.R. Rilett, Director, Mid-America Transportation Center
1. ACCOMPLISHMENTS

What are the major goals and objectives of the program?

The following is a list of the major goals and objectives that were outlined in the MATC Proposal and highlighted at the US DOT RITA site visit on April 12, 2012.

<table>
<thead>
<tr>
<th>Status</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Call for Problem Statements</td>
<td>Complete</td>
</tr>
<tr>
<td>Request for Proposals</td>
<td>Complete</td>
</tr>
<tr>
<td>Proposals under External Review (US DOT Reviewer, SHRP II Coordination, US DOT</td>
<td>Complete</td>
</tr>
<tr>
<td>Review Budgets for Duplication with Region 5 &amp; 6 UTC Research Programs</td>
<td>Complete</td>
</tr>
<tr>
<td>Final Proposal Ranking &amp; Selection</td>
<td>Complete</td>
</tr>
<tr>
<td>Research Projects under Contract</td>
<td>Complete</td>
</tr>
<tr>
<td>Technology Transfer Tech Briefs, Webinars, &amp; Presentations on Research Results</td>
<td>On Schedule</td>
</tr>
<tr>
<td>Applicable Slides, Handouts, Videos, Podcasts, etc. Posted/Linked on MATC Website</td>
<td>On Schedule</td>
</tr>
<tr>
<td>Final Reports Due &amp; All Research Projects Complete</td>
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</tbody>
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Leadership Activities

<table>
<thead>
<tr>
<th>Status</th>
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<tbody>
<tr>
<td>Coordination with Region 7 UTC Directors</td>
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<tr>
<td>Regional Successes &amp; Lessons Learned Workshop</td>
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Educational Activities

<table>
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<tr>
<th>Status</th>
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<tbody>
<tr>
<td>Grad/Undergrad MATC Course Development &amp; Implementation</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Supported Certificate Programs in Transportation</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Undergraduate Summer Internship Program (Summers 2012 - 2015)</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Transportation Scholars Program: Graduate Seminar Course</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Transportation Scholars Conference</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC/CUTC Student of the Year Program - Annually @ TRB</td>
<td>Forthcoming</td>
</tr>
<tr>
<td>MATC Summer Institute (Summers 2012 &amp; 2013)</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC After-School Program (Summers 2012 &amp; 2013)</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Support of &quot;GO/Vamos!&quot; Online K-12 Publication</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Transportation Student Chapter (ITE/ASCE/Etc.) related activities</td>
<td>On Schedule</td>
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<tr>
<td>Underrepresented Student MATC Summer Intern Program</td>
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<tr>
<td>MATC Scholars Program for Underrepresented Students (October 2012)</td>
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Technology Transfer Activities

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<tbody>
<tr>
<td>MATC Supported Specialty Conferences, Workshops, and Short Courses</td>
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<tr>
<td>Mid-Continent Research Symposium: August 15-16, 2013</td>
<td>On Schedule</td>
</tr>
<tr>
<td>LTAP Regional Meeting - MATC Workshop: September 2013</td>
<td>On Schedule</td>
</tr>
<tr>
<td>MATC Website Information Dissemination</td>
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<td>MATC Social Media Sites Information Dissemination</td>
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US DOT RITA: Reporting

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<tr>
<td>Posting Research Project Descriptions</td>
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<tr>
<td>UTC Program Progress Performance Reports (Quarterly)</td>
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<tr>
<td>Federal Financial Reports (Quarterly)</td>
<td>On Schedule</td>
</tr>
<tr>
<td>Annual Performance Indicators Report</td>
<td>On Schedule</td>
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</table>
What was accomplished under these goals?

Currently, all MATC-planned activities are underway, in progress, or are in the planning stages. Please see the percent complete and status columns shown above for established progress on these activities.

What opportunities for training and professional development has the program provided?

As indicated in the table above, there are multiple opportunities for training and professional development within the planning and development phases.

Opportunities for contact hours with participants during the period of July 1 – December 31, 2015, included the Roads, Rails and Racecars After-School Program, the MATC 2015 Scholars Program, and other MATC professional development activities. Summaries of these activities are provided below.

Road, Rails and Race Cars (RRRC):

MATC continued to support the preparation and implementation efforts of the RRRC engineering after-school club for elementary and middle school students and the summer program for middle school students from July through December, 2015.

2015-2016 Academic Year Programming:

The fall semester portion of the 2015-2016 academic year of RRRC was implemented at three (3) sites from August through October: Culler Middle School, Lefler Middle School, and Goodrich Middle School. From October through December, RRRC was implemented at four (4) sites: the three schools mentioned previously and Mickle Middle School. All of these sites are located in Lincoln, NE. Each site offered the club one day per week.

RRRC at Lefler Middle School was offered on Mondays from 3:10 p.m. - 4:00 p.m., beginning on August 31, 2015, and ending on December 7, 2015. A total of thirteen (13) implementation dates were completed during this fall iteration, with the total attendance being 157 by 33 students; typical weekly participation was approximately 12.08 students. Topics covered included: Introduction to Structural Engineering with an index bridge activity, Introduction to Construction Engineering with a paper table activity, Introduction to Geotechnical Engineering with a building dams activity, Introduction to Transportation Systems Engineering with a road construction activity, Introduction to Environmental Engineering with a sustainable building activity, End of Quarter 1 Celebration with Jeopardy Game, Introduction to Earthquake Engineering with an earthquake tower activity, Designing for Hurricanes/Tsunamis with a designing houses/stilts activity, Designing for Oil Spills and Car Crashes with a cleaning up an oil spill activity, Introduction to Water Resources Engineering and Flooding with a building a wetland activity, a guest speaker from the College of Engineering related to choosing a career in engineering, Designing for Fire Safety with a fire escape activity, and the End of Quarter 2 Celebration with a Jeopardy game.

RRRC at Mickle Middle School was offered on Mondays from 3:10 p.m. - 4:10 p.m., beginning on October 26, 2015, and ending on December 7, 2015. A total of seven (7) implementation dates were completed during this fall iteration, with total attendance being 65 by 24 students; typical weekly participation was approximately 9 students. Topics covered included: Introduction to Structural Engineering with an index bridge activity, Introduction to Construction Engineering with a paper table
activity, Introduction to Geotechnical Engineering with a building dams activity, Introduction to Transportation Systems Engineering with a road construction activity, a guest speaker from the College of Engineering related to choosing a career in engineering, Introduction to Environmental Engineering activity with a sustainable building activity, and End of Quarter 2 Celebration with Jeopardy Game.

RRRC at Culler Middle School was offered on Wednesdays from 3:10 p.m. - 4:00 p.m., beginning on September 2, 2015 and ending on December 9, 2015. A total of fourteen (14) implementation dates were completed during this fall iteration, with the total attendance being 155 by 23 students; typical weekly participation was approximately 11 students. Topics covered included: Introduction to Structural Engineering with an index bridge activity, Introduction to Construction Engineering with a paper table activity, Introduction to Geotechnical Engineering with a building dams activity, Introduction to Transportation Systems Engineering with a road construction activity, a guest speaker from Nebraska Department of Roads who discussed designing roads for safety, Introduction to Environmental Engineering with a sustainable building activity, End of Quarter 1 Celebration with Jeopardy Game, Introduction to Earthquake Engineering with an earthquake tower activity, Designing for Hurricanes/Tsunamis with a designing houses/stilts activity, Designing for Oil Spills and Car Crashes with a cleaning up an oil spill activity, Introduction to Water Resources Engineering and Flooding with a building a wetland activity, a guest speaker from the College of Engineering related to choosing a career in engineering, Designing for Fire Safety with a fire escape activity, and the End of Quarter 2 Celebration with a Jeopardy game.

RRRC at Goodrich Middle School was offered on Mondays from 3:10 p.m. to 4:00 p.m., beginning on September 3, 2015, and ending on December 10, 2015. A total of thirteen (13) implementation dates were completed during this fall iteration, with the total attendance being 117 by 23 students; typical weekly participation was approximately 9 students. Topics covered included: Introduction to Structural Engineering with an index bridge activity, Introduction to Construction Engineering with a paper table activity, Introduction to Geotechnical Engineering with a building dams activity, Introduction to Transportation Systems Engineering with a road construction activity, Introduction to Environmental Engineering with a sustainable building activity, End of Quarter 1 Celebration with Jeopardy Game, Introduction to Earthquake Engineering with an earthquake tower activity, Designing for Hurricanes/Tsunamis with a designing houses/stilts activity, Designing for Oil Spills and Car Crashes with a cleaning up an oil spill activity, Introduction to Water Resources Engineering and Flooding with a building a wetland activity, a guest speaker from the College of Engineering related to choosing a career in engineering, Designing for Fire Safety with a fire escape activity, and the End of Quarter 2 Celebration with a Jeopardy game.

Additional RRRC tasks completed during the Fall 2015 semester included attending meetings, developing a curriculum schedule for Quarters Two (2) and Three (3), recruitment efforts, and communication with mentors, teachers, and other pertinent staff. One (1) after school club team meeting, consisting of one teacher and the MATC educational programs coordinator, was held in December of 2015. The focus of this meeting was preparation and development for the upcoming quarters, as well as discussing funding opportunities. Further, multiple calls and emails were made throughout this term to the RRRC team members to assist with preparation for the club implementation and support with the facilitation of clubs.
The after school club employed: one (1) returning educational programs coordinator, five (5) returning teachers, and seven (7) new and returning undergraduate and graduate engineering student mentors. On weekly average, each school had one (1) teacher and three (3) undergraduate engineering student mentors. At Goodrich, there are two teachers who are alternating working with the club throughout the 2015-2016 school year. During this report period, the first teacher worked from September to November, and the second teacher worked from November to December. In total, forty-seven (47) program days were completed during the fall iterations, with the total attendance being 494 by 103 individual students.

2016 Programming:
Summary of Work Planned for the Upcoming Report Period
The RRRC program will continue throughout the 2015-2016 academic year for middle school students. During this period, the club will be implemented at five (5) sites: Lefler Middle School, Culler Middle School, Goodrich Middle School, Mickle Middle School, and Maxey Elementary School. Each site will have at least: one (1) teacher, two (2) graduate or undergraduate engineering student mentors, and one (1) educational programs coordinator. Further, curriculum focus will include introducing various branches of engineering with a continued emphasis on transportation. Future focus of the after-school clubs will also center on the attainment of future club grants, on manuscript writing for academic journal submission, and on metric development for club outcome analysis.

For images of the RRRC academic year clubs and summer program in action, and to view PowerPoints and materials of RRRC lessons and activities, please visit the following page:

https://www.facebook.com/STEMAfterSchoolProgram?ref=hl

MATC 2015 Scholars Program:
The MATC Scholars Program is a three-day conference designed to promote graduate study among underrepresented minorities and women in STEM fields, which is accomplished through targeted seminars, workshops, and networking opportunities. Thirty-four (34) undergraduate students were selected from Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and other partner institutions from across the country to attend the 2015 program, which took place October 29-31, 2015. Faculty, students, and staff convened on October 29, 2015 for informational sessions covering the graduate school experience and advice on how to succeed. During the rest of the program, sessions continued, students toured campus, and heard success stories from graduate and post-graduate students of similar backgrounds. At the end of the conference, students and faculty participated in post-surveys that showed 100% of students would recommend the program to other students. Throughout the program, the MATC Facebook page was updated to highlight the day’s events and memorable moments through pictures and text.

More information about the 2015 Scholars Program can be found at:
http://matc.unl.edu/education/scholars-program2015.php
MATC Professional Development Activities, Conferences, and Workshops:

As part of MATC’s education and workforce development initiatives, the consortium member universities support student and faculty travel to a wide variety of meetings and conferences across the country to promote and discuss the implementation of research. These connections help students progress both academically and professionally.

The table below highlights professional development opportunities pursued by staff, students, and faculty over the reporting period.

<table>
<thead>
<tr>
<th>Name</th>
<th>Destination</th>
<th>Conference Name</th>
<th>Dates</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nassim Sabahfar</td>
<td>Miami, FL</td>
<td>International Airfield &amp; Highway Pavement Conference</td>
<td>6/6-10/2015</td>
<td>Kansas State University</td>
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<td>Hemin Mohammed</td>
<td>Omaha, NE</td>
<td>ITS Heartland 2015 Annual Meeting</td>
<td>4/27-28/2015</td>
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<td>Vishal Reddy</td>
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<td>Midwestern District of ITE Annual Meeting</td>
<td>6/28-7/1/2015</td>
<td>University of Kansas</td>
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<td>Mazharall Udaipurwala</td>
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<td>Shivraj Patil</td>
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<td>Michele Santos</td>
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<td>6/28-7/1/2015</td>
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<td>Keishla Pagan-Ortiz</td>
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<td>6/28-7/1/2015</td>
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<td>Hojr Momeni</td>
<td>Ames, IA</td>
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<td>8/19-20/2015</td>
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<td>Ishani Dias</td>
<td>Ames, IA</td>
<td>2015 Mid-Continent Transportation Research Symposium</td>
<td>8/19-20/2015</td>
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<td>Himanshu Patel</td>
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<td>Syeda Aziz</td>
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<td>2015 Mid-Continent Transportation Research Symposium</td>
<td>8/19-20/2015</td>
<td>Kansas State University</td>
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</tbody>
</table>
How have the results been disseminated?

All MATC activities are primarily in the implementation phase and some recurring projects are in the planning phase for the next year. Primarily, electronic distribution and social media have been used. PowerPoint presentations have also been given.

MATC has connected with 82 newspaper, TV, and radio organizations located in all eight partner institutions and across the nation, and will be developing a press release template to announce respective project results and highlights for each location. The goal is to develop a product that easily translates into a story for media personnel to quickly and effectively report the activities in which MATC is engaged so that MATC and US DOT RITA are visible and accurately represented to the public. In the current reporting period, staff have spent time planning and producing the content for the upcoming MATC Newsletter. The next MATC Newsletter is slated to be distributed in the upcoming months.

What do you plan to do during the next reporting period to accomplish the goals and objectives?

There will be no change in the agency-approved application for this effort. Implementation of the activities outlined in the table above for all research, education, workforce development, and technology transfer projects will continue toward completion on-schedule.

2. PRODUCTS

Publications, conference papers, and presentations:

Highlights of the Roads, Rails and Racecars After-School Program

https://www.facebook.com/STEMAfterSchoolProgram?ref_type=bookmark

Website(s) or other Internet site(s):

Currently, MATC maintains 7 online sites that distribute information utilizing the internet. Links to each site, as well as report period information, can be found below:

MATC Website:

By clicking the following link: http://matc.unl.edu, you will be directed to MATC’s website. Below is highlighted information from Google Analytics about the website’s traffic from July 1 - December, 2015. By understanding and capitalizing this knowledge, we are able to make our homepage engaging, relevant, and resourceful to our viewers.

| Visits: 10,090 | Page views: 16,106 | Pages per visit: 1.60 | Average visit duration: 1:08 |

SlideShare:

Our total views have increased by 1,230 since our last metric. This increase has expanded our global reach; the top 5 countries that view our presentations are: the United States, India, Germany, Ukraine, and France. Below you will find a snapshot of MATC’s SlideShare activity and the link to view the page.

http://www.slideshare.net/matcRegion7UTC/presentations/

| Total Views: 3,233 | Downloads: 74 | Tweets: 0 |
Facebook:
The Mid-America Transportation Center (MATC) has the following statistics and can be viewed by clicking on the link below.

https://www.facebook.com/pages/Mid-America-Transportation-Center-MATC/141238439284182

| Views: 582 | Likes: 48 | Reach: 2,346 | Total countries: 20 | Languages: 11 |

Twitter:
The Mid-America Transportation Center’s twitter handle is @MATCNews. The page can be viewed by clicking the following link, and highlighted numbers for MATC’s Twitter activity are below.

http://twitter.ie/MATCNews

| Followers: 157 | Following: 561 | Tweets: 143 |

YouTube:
MATC’s YouTube feed can be viewed by clicking the following link. This site will feature one participating Region 7 University per quarter. http://www.youtube.com/user/midamericatrans?feature=results_main

| Videos: 82 | Views: 1,811 | Minutes Watched: 5,044 |

LinkedIn:
The newly created Mid-America Transportation Center LinkedIn group can be found at http://www.linkedin.com/groups/MidAmerica-Transportation-Center-4484370?trk=myg_ugrp_ovr. We have compiled a list of individuals to invite. Our goal is to post valuable and relevant information that align with the interests of the group. We will also be posting our research, tech transfer, educational information, and other MATC updates within other transportation LinkedIn groups.

Currently, marketing and media plans are being established to further advance and grow each site’s exposure and content based on the programs established.

Technologies or techniques:
There is nothing new to report regarding the Center’s technologies or techniques. All current research and workforce development activities are under implementation.

Inventions, patent applications, and/or licenses:
All current research and workforce development activities are under implementation.

Other products:
As the project selection process is complete, the following research projects listed according to university have been selected for funding. The links to their research project descriptions in TRID can be found below:
<table>
<thead>
<tr>
<th>University Name</th>
<th>Project Title</th>
<th>Lead PI</th>
<th>Access in TRID</th>
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<tbody>
<tr>
<td>Iowa State University</td>
<td>Methods for Removing Concrete Decks from Bridge Girders</td>
<td>Phares, Brent</td>
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<td>Iowa State University</td>
<td>Evaluation of Thermal Integrity Profiling for Deep Foundations</td>
<td>Ashlock, Jeramy</td>
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<td>Iowa State University</td>
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<td>Hans, Zachary</td>
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<td>Iowa State University</td>
<td>Validation of Traffic Simulation Model Output for Work Zone and Mobile Source Emissions Modeling and Integration with Human-in-the-Loop Driving Simulators</td>
<td>Hallmark, Shauna</td>
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<td>Sustainable Asphalt Pavements Using Bio-Binders from Bio-Fuel Waste</td>
<td>Williams, R. Christopher</td>
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<td>Iowa State University</td>
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<td>Study of the Regulatory Issues Affecting Truck Freight Movement in Region VII</td>
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<td>Modeling Multi-Modal Freight Transportation Network Performance Under Disruptions</td>
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<td>Kansas State University</td>
<td>Evaluation of Bonding Agent Application on Concrete Patch Performance</td>
<td>Riding, Kyle</td>
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3. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What other organizations have been involved as partners?

During the current reporting period, the Mid-America Transportation Center has worked with 81 unique organizations across the United States and around the world to develop the research, education, workforce development, and technology transfer activities that are currently underway at the center. Each organization and its location is listed below, along with information describing the specific area or capacity in which the respective organization is committed to supporting the center. For more detailed information on how each organization is working with the center, please email the MATC program coordinator, Lavania Thandayithabani, at lthanday@unl.edu.

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<th>MATC Program Affiliation</th>
<th>Organization Name</th>
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The Mid-America Transportation Center works with numerous individuals at each of the organizations listed above. To contact individuals at any of the organizations, please email Lavania Thandayithabani at lthanday@unl.edu.
Have other collaborators or contacts been involved?

MATC’s research activities are highly multi-disciplinary, featuring 89 faculty members from various disciplines including, but not limited to, chemistry, economics, civil engineering, mechanical engineering, computer science, and electrical engineering. The Principle Investigators (PIs) and Co-Principle Investigators (Co-PIs) for MATC’s research portfolio are listed below:

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4. IMPACT

What is the impact on the development of the principal discipline(s) of the program?

Activities conducted during the current reporting period are expected to have an impact upon the transportation engineering discipline in the future. The results from a number of research projects have been developed into courses for the public that will shape future knowledge of specific transportation-related technologies.
What is the impact on other disciplines?

Many of MATC’s educational activity outputs offer an interdisciplinary experience in which students, faculty, and staff from various institutions may interact and gain professional networking opportunities with transportation sector leaders. These activities increase channels of communication between participants in the workforce and individuals from many academic fields while facilitating a more interconnected body of future transportation professionals and creating a highly responsive and skilled next generation within the field.

What is the impact on the development of transportation workforce development?

A number of educational and technology transfer activities utilize MATC-sponsored research to develop the transportation workforce.

What is the impact on physical, institutional, and information resources at the university or other partner institutions?

There is currently nothing new to report regarding MATC’s impact on physical, institutional, and information resources at the university or other partner institutions.

What is the impact on technology transfer?

MATC research projects at all campuses will be disseminated in the form of instructional courses and direct implementation. Additionally, researchers are currently cultivating partnerships that will enable successful technology transfer in the future.

What is the impact on society beyond science and technology?

We anticipate that K-12 students participating in the after-school programs and summer institute program will significantly benefit from their experiences. The interdisciplinary projects completed during program activities bolsters students’ conceptual and practical skills in mathematics, science, and technology. By the time many students reach high school, they have formed ideas about their academic competence in STEM subjects, often deciding that those subjects are not for them. Involvement in the Roads, Rails and Race Cars club encourages students to reconfigure their expectations of math and science as well as extends their interest beyond classroom experiences.

5. CHANGES/PROBLEMS

There are no changes or problems to report.

6. SPECIAL REPORTING REQUIREMENTS

There is nothing to report.