NTC Program Progress Performance Report (PPPR) Information Form

For P.I.'s Use

On a semi-annual basis the NTC sponsored P.I. must report Program Progress Performance Report (PPPR) using the format specified in this PPPR Information Form. The form must be submitted electronically to the corresponding NTC Associate Director by 9/15/2015.

Cover Period: 4/1/2015 – 9/30/2015

NTC Funded Project Information (Round/Year 1, 2013-2014)	
University Name	Arizona State University
Project Title	Impact of Freight Movement Trends on Highway Pavement Infrastructure
Principal Investigator	Shane Underwood
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The form includes the following six parts:

- Part I – Accomplishments: What was done? What was learned?
- Part II – Products: What has the program produced?
- Part III – Participants & Collaborating Organizations: Who has been involved?
- Part IV – Impact: What is the impact of the program? How has it contributed to transportation education, research and technology transfer?
- Part V – Changes/Problems

Supplementary documents/materials can be attached to this form with the submission.

Part I – Accomplishments: What was done? What was learned?	
The information provided in this section allows the OST-R grants official to assess whether satisfactory progress has been made during the reporting period.	
Reporting Period	**4/1/2015 – 9/30/2015**
1. What are the major goals of the program?	The National UTC aims to promote strategic transportation policies, investment, and decisions that bring lasting and equitable economic benefits to the U.S. and its citizens. The Center is concerned with the integrated operations and planning of all modes serving the nation's passenger and freight transportation system, including the institutional issues associated with their management and investments. A balanced multi-modal approach will be used that considers freight and passenger travel mobility, reliability, and sustainability, as well as system operations during periods of both recurring and non-recurring incidents, including response to major emergencies. The modes in this theme include highway, transit, rail, and inter-modal interfaces including ports, terminals and airports. In particular, the center focuses on research, education, and technology transfer activities that can lead to (1) Freight efficiency for domestic shipping and for our international land, air, and sea ports; (2) Highway congestion mitigation with multi-modal strategies; and (3) Smart investments in intercity passenger travel facilities such as high speed rail. Major center activities are as following: • **Advanced & Applied Research Promoting Economic Competitiveness:** Our research activities are multimodal/intermodal and multidisciplinary in scope, with the aims of addressing nationally and regionally significant transportation issues pertinent to economic competitiveness and providing practice-ready solutions. • **Education, Workforce Development, Technology Transfer, & Diversity** The consortium is committed to providing high-quality transportation education and workforce development programs for a broad and diverse audience. Center's efforts will support the development of a critical transportation knowledge base and a transportation workforce that is prepared to design, deploy, operate, and maintain the complex transportation systems of the future.

2. What was accomplished under these goals?	The objective of this research project is to investigate the impacts of national freight traffic trends and projections on the pavement infrastructure. The proposed work is limited in scope to the pavement performance, but may provide insight into other parts of the transportation infrastructure. National databases and literature have been reviewed. Interstates have been prioritized and sub-divided into simulations segments. The sections have been analyzed using the MEPDG for baseline, pessimistic, and optimistic (with respect to freight projections) and the results compiled as indices. The final report was submitted.
3. How have the results been disseminated?	The results have be disseminated in the following venues: 1) At the 2014 Arizona Pavement/Materials conference 2) At the ASU Graduate Research Symposium 3) At the annual Roads and Streets conference in Tucson, Arizona as part of a UTC themed session in the University Research Track of the conference. 4) It is currently under review for a TRB paper/presentation 5) It will be presented at the 2015 Arizona Pavement/Materials conference
4. What do you plan to do during the next reporting period to accomplish the goals? (10/1/2014 – 3/10/2015)	The research project has concluded and we have submitted the final report.

Part II – Products: What has the program produced?	
Publications are the characteristic product of research projects funded by the UTC Program. OST-R may evaluate what the publications demonstrate about the excellence and significance of the research and the efficacy with which the results are being communicated to colleagues, potential users, and the public, not the number of publications. Many research projects (though not all) develop significant products other than publications. OST-R may assess and report both publications and other products to Congress, communities of interest, and the public.	
Reporting Period	**4/1/2015 – 9/30/2015**
1. Journal publications:	A technical paper has been submitted to the TRB meeting
2. Books or other non-periodical, one-time publications	None
3. Other publications, conference papers and presentations	None
4. Website(s) or other Internet site(s)	http://ntc.umd.edu/node/55 Project description listed on University of Maryland website.
5. Technologies or techniques	None
6. Outreach activities	Planned outreach to transportation professionals at Arizona Roads and Streets Conference

7. Courses and workshops	None
8. Inventions, patent applications, and/or licenses	None
9. Other products	The outcome from the project was a visual map of the problematic locations for freight movement on pavement infrastructure.

Part III – Participants & Collaborating Organizations: Who has been involved?	
OST-R needs to know who has worked on the project to gauge and report performance in promoting partnerships and collaborations.	
Reporting Period	**4/1/2015 – 9/30/2015**
1. What organizations have been involved as partners?	Organization Name: ADOT, TXDOT, NMDOT, CalTrans, FDOT, LDOT, MnDOT, OkDOT, ODOT (Oregon DOT) Partner's contribution: All organizations made personnel available to answer questions on pavement infrastructure and data availability (HMA thicknesses, Base thicknesses, Binder type, ESALs, specifications, etc.).
2. Have other collaborators or contacts been involved?	• None

Part IV – Impact: What is the impact of the program? How has it contributed to transportation education, research and technology transfer?	
DOT uses this information to assess how the research and education programs: • **increase the body of knowledge and techniques;** • **enlarge the pool of people trained to develop that knowledge and techniques or** • **put it to use; and,** • **improve the physical, institutional, and information resources that enable those people to get their training and perform their functions.**	
Reporting Period	**4/1/2015 – 9/30/2015**
1. What is the impact on the development of the principal discipline(s) of the program?	The visual map provides the first view of the impact of freight projections on interstate routes. This visualization tool permits policy makers and planners to have a visual representation of the major transportation corridors and critical locations where projected freight trends may have the strongest negative impact on the transportation infrastructure. This research product and the associated analysis will impact the field of transportation engineering by quantifying the effect of projected freight trends on pavement infrastructure. This issue has been primarily evaluated from the perspective of congestion, but economic impacts extend beyond time loss and can have large economic and environmental impacts on infrastructure. By extending the scope of the freight impact problem this work establishes the motivation for future studies that investigate alternative or novel geometric design strategies and new materials technologies.
2. What is the impact on other disciplines?	This research will impact disciplines focusing on national, regional, mega-regional, and local planning. Extension of the freight impact problem to include consideration of hard infrastructure provides the methodological basis to investigate the true impact from multi-modal freight strategies (rail, water, and road).

3. What is the impact on the development of transportation workforce development?	This study has provided funding for a graduate student in Transportation engineering.
4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?	Unsure
5. What is the impact on technology transfer?	These results will affect the decision making scope when considering impacts from freight movement. Understanding the freight movement effect on pavement infrastructure can lead to development of case studies for life cycle cost and life cycle assessment of freight strategies. These case studies can be disseminated to transportation professionals.
6. What is the impact on society beyond science and technology?	The study results were incorporated into the instruction provided by the PI for the Summer Transportation Institute (a program that engages high school students from low income rural areas in Arizona in Transportation careers).
7. Additional impacts	A more holistic view of the freight movement, the projected magnitude of freight movement, and its impacts on pavements could lead to the adoption of better design and construction standards along strategic corridors. Better designed and better constructed pavements reduce long-term wear and maintenance. These reductions lead to less direct agency cost, less environmental impacts due to fewer construction processes, and fewer social impacts due to construction related congestion. Thus an improved transportation infrastructure improves the sustainability of the transportation network.

Part V – Changes/Problems	
If not previously reported in writing to OST-R through other mechanisms, provide the following additional information or state, "Nothing to Report, if applicable:	
Reporting Period	**4/1/2015 – 9/30/2015**
1. Changes in approach and reasons for change	Nothing to Report
2. Actual or anticipated problems or delays and actions or plans to resolve them	Nothing to Report
3. Changes that have a significant impact on expenditures	Nothing to Report
4. Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards	Nothing to Report
5. Change of primary performance site location from that originally proposed	Nothing to Report