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 3/10/2015.

Cover Period: 10/1/2014 – 3/10/2015

NTC Funded Project Information (Round/Year 2, 2014-2015)	
University Name	Arizona State University
Project Title	Behavioral Study for Managed Lane Pricing with Refund Option
Principal Investigator	Yingyan Lou (PI)
PI Contact Information	Yingyan.lou@asu.edu 480-965-6361

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	**10/1/2014 – 3/10/2015**
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?	***<u>Goal 1:</u> Advanced & Applied Research Promoting Economic Competitiveness*** This research project aims to address the use of managed lane facilities as one solution to freeway congestion problems. The problem itself is a nationally and regionally significant transportation issue pertinent to economic competitiveness. **Scheduled Activities for This Period** 1. Task 2: Perform survey 2. Task 3: Data analysis and modeling 3. Task 4: Report writing **Work Performed in This Period** ***Task 2 Perform Survey*** <u>Full-scale deployment</u>: Based on the results from the pretesting (Jun – July 2014), the survey questionnaire was further revised. Additional questions were created; more opportunities for survey participants to leave comments were included; and the language was further polished. The full survey was deployed on 10/1/2014 and lasted for two months. Subjects were recruited via mailing lists and social networks. A total of 2274 responses were received. ***Task 3 Data Analysis and Modeling*** <u>Descriptive analysis</u>: Descriptive analysis was performed to reveal sample demographics, common opinions regarding priced MLs with refund option, and key factors affecting travelers' choices of ML usage and refund claim. <u>Identify potential behavioral models</u>: Discrete choice models, including multinomial and nested logit models are identified as appropriate models for usage of priced manage lane with refund options. ***Task 4 Report Writing*** <u>Final report</u>: The writing of the final report is in progress. It is scheduled to be delivered by the end of March 2015. **Key Findings** Results from the sample data have shown that the main trip purposes on I-10 in the Phoenix area include recreational and social activities (37.95%), commuting to work (19.19%), and personal errands (16.91%). 98.52% participants are familiar with the high occupancy vehicle (HOV) lane in the area, but only 47.39% are

	familiar with the concept of high occupancy toll (HOT) lane. 37.38% participants claimed to have used the HOV lane during their last trip on I-10; and 23.48% participants use I-10 HOV lane more than 2-3 times a week. The survey has found that 80.95% participants are satisfied with the HOV facility. The survey revealed that 20.85% participants have used HOT lane in other areas; 23.79% are interested in using HOT lanes; and 28.08% are interested in a refund option for HOT lanes. This shows that a refund option could be a strategy to make HOT lanes more appealing to the general public, although further analysis is needed to evaluate the significance of the impact. ***<u>Goal 2</u>: Education, Workforce Development, Technology Transfer, & Diversity*** This project has supported one thesis-based master student, Melissa Archer, at ASU. Ms Archer will graduate in April 2015. Additionally, two undergraduate students were involved in this research project as part of their Honor's research. This is an enhanced education experience for all three students. All three students involved are female, supporting the diversity goal of the center. The students have obtained skills in transportation survey development, programming, research protocol development, and technical writing.
3. How have the results been disseminated?	The results have been presented at 1. The 2015 ITE/IMSA Arizona Spring Conference, Mesa, Arizona, February 2015. 2. The 5th Annual Graduate Research Symposium, School of Sustainable Engineering and The Built Environment, Arizona State University, March 2015. The research is scheduled to be presented at 3. The 7th International Symposium on Travel Demand Management, Tucson, Arizona, April 2015. The team also plans to submit the research results to the 2016 TRB annual meeting. The team is also in the process of contacting Maricopa Association of Governments to share the research results.
4. What do you plan to do during the next	N/A. The project will conclude by the end of March 2015.

reporting period to accomplish the goals?	

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	**10/1/2014 – 3/10/2015**
1. Journal publications:	None.
2. Books or other non-periodical, one-time publications	None.
3. Other publications, conference papers and presentations	Presentations: High Occupancy Toll Lanes with a Refund Option: A Survey of the Phoenix-Metropolitan Area 1. The 2015 ITE/IMSA Arizona Spring Conference, Mesa, Arizona, February 2015. 2. The 5th Annual Graduate Research Symposium, School of Sustainable Engineering and The Built Environment, Arizona State University, March 2015. The research is also scheduled to be presented at 3. The 7th International Symposium on Travel Demand Management, Tucson, Arizona, April 2015.
4. Website(s) or other Internet site(s)	Both the pre-survey and the final survey are developed through fluid survey. Pre-survey: http://fluidsurveys.com/surveys/asutransengr/hot-refund-pretest/?TEST_DATA=&_cb=ePAcVFe97i Full survey: http://fluidsurveys.com/s/Refund_Option_for_Toll_Lanes/

5. Technologies or techniques	None.
6. Outreach activities	Presentations: High Occupancy Toll Lanes with a Refund Option: A Survey of the Phoenix-Metropolitan Area 1. The 2015 ITE/IMSA Arizona Spring Conference, Mesa, Arizona, February 2015. 2. The 5th Annual Graduate Research Symposium, School of Sustainable Engineering and The Built Environment, Arizona State University, March 2015. The research is also scheduled to be presented at 3. The 7th International Symposium on Travel Demand Management, Tucson, Arizona, April 2015. The team is also in the process of contacting Maricopa Association of Governments to share the research results.
7. Courses and workshops	None.
8. Inventions, patent applications, and/or licenses	None.
9. Other products	Two survey questionnaire were developed during the project. Pre-survey: http://fluidsurveys.com/surveys/asutransengr/hot-refund-pretest/?TEST_DATA=&_cb=ePAcVFe97i Full survey: http://fluidsurveys.com/s/Refund_Option_for_Toll_Lanes/ In addition to the survey questionnaires, the project also produced a revealed preference dataset with 2270 responses. The dataset is saved on ASU lab PCs, and may be shared per request.

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	**10/1/2014 – 3/10/2015**
1. What organizations have been involved as partners?	ASU School of Sustainable Engineering and The Built Environment ASU Parking and Transit Service
2. Have other collaborators or contacts been involved?	The project team has contacted Arizona ITE, ITS Arizona, Maricopa Association of Governments, ADOT, and local TV channels such as FOX10 News and ABC15 News to help disseminate the survey recruitment email.

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	**10/1/2014 – 3/10/2015**
1. What is the impact on the development of the principal discipline(s) of the program?	The project is expected to shed more light on the implication of risks and uncertainties on managed lane users' travel behaviors. Results from the study will provide a more realistic behavioral basis for future modeling and analysis of priced MLs.
2. What is the impact on other disciplines?	The findings of the project regarding managed lane users' risk-taking behaviors may have an impact on behavioral sciences.
3. What is the impact on the development of transportation workforce development?	So far, this project has been supporting one thesis-based master student at ASU. Additionally, two undergraduate students were involved in this research project as part of their Honor's research. This project has provided an enhanced education experience and exposure to transportation for all three students. All three students involved are female, supporting the diversity goal of the center. The students have obtained skills in transportation survey development, programming, research protocol development, and technical writing. The pre-survey has been deployed through ASU's School of Sustainable Engineering and The Built Environment email list, exposing faculty, staff, and students who are not in the field of transportation engineering.

4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?	None.
5. What is the impact on technology transfer?	The team is also in the process of contacting Maricopa Association of Governments to share the research results.
6. What is the impact on society beyond science and technology?	The activities performed in this research include a survey deployed through multiple email lists and social networks. They include ASU's School of Sustainable Engineering and The Built Environment email list, ASU's Parking and Transit Services email list, Arizona ITE and ITS Arizona mailing lists, and ADOT mailing list. The survey has likely exposed ASU employees, students, and professionals who are not in the field of transportation engineering to freeway congestion problems, and has likely brought to their attention managed lane facilities as a solution. The information and hypothetic scenarios provided in the survey are likely to raise their awareness of the connection between individual behaviors and the congestion problems, and may affect their future decision-making behaviors when it comes to traveling.
7. Additional impacts	None.

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	**10/1/2014 – 3/10/2015**
1. Changes in approach and reasons for change	None.
2. Actual or anticipated problems or delays and actions or plans to resolve them	The survey development and pretesting took longer than expected during the last reporting period. During this reporting period, the team has successfully completed the survey and the exploratory data analysis.
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.