Program Progress Performance Report for University Transportation Centers
SOLARIS INSTITUTE

Safety and Operations of Large-Area Rural/Urban Intermodal Systems Institute

Submitted to:
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology (OST-R)

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Report Term: Semi-annual

Program Director:

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SOLARIS Director
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Submitting Official:

Same as above

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Reno, NV 89557

Recipient Account Number:
1320-117-13SU

Signature of Submitting Official:

______________________________________
1. Accomplishments

1.1 What are the major goals and objectives of the program?
The major goals and objectives of the program as outlined in the proposal include the following categories.

Research
SOLARIS’s research is focused on safety in addition to other U.S. DOT strategic areas. The three main research areas involve: 1) Traffic Safety Data Management and Crash Mitigation; 2) Technologies for Safe Traffic Operations and Managements; and 3) Safe and Sustainable Infrastructure. SOLARIS will conduct applied research in all of these areas to produce methodologies and tools that can be implemented to tackle long-standing and emerging transportation issues. The expected outcomes of each research topic are listed below:

Traffic Safety Data Management and Crash Mitigation

- Improved quality of safety data through better data collection and inventory
- Implementation of scientifically sound crash data analysis methodologies and software tools
- Reduction of injury and fatal crashes in both rural and urban areas
- Maximization of the rate of return for all safety project investments

Technologies for Safe Traffic Operations and Management

- Congestion mitigation to reduce travelers’ frustration and to promote safe driving
- Reduction in air pollution and noise to promote livable communities
- Efficient freight movement to improve the regional and national economy

Sustainable and Safe Transportation Infrastructure

- Improved safety, mobility, and environment for tribal lands and rural towns
- Innovative materials that will prolong the life of pavements and bridges
- Expanding and integrating advanced traffic modeling technologies into infrastructure risk analysis under earthquake and other disastrous events

Rigorous Project Selection Process
To aid in the project selection process, SOLARIS organized a Technical Advisory Committee composed of professionals from public and private agencies. The Technical Advisory
Committee is responsible for reviewing, ranking, and recommending research projects. The committee selected 15 projects in the first round out of 28 proposals.

**Leadership**
SOLARIS is composed of several nationally and internationally known transportation programs and academic leaders. The resources from the five institutions composing the consortium make SOLARIS a highly qualified team that can significantly contribute to the advancement of transportation research. Four ways in which SOLARIS will measure the effectiveness of its leadership include studying innovative ideas that strengthen long-term vision and goals; delivering new models and tools that are readily implementable into practice, disseminating research through journal publications and conference presentations; participating in academic and professional organizations. The leadership group includes Center Director Zong Tian, Center Coordinator Erika Marquez, and Associate Directors Pitu Mirchandani from Arizona State University and Rafiqul Tarefder from University of New Mexico.

**Education and Workforce Development**
Education and workforce development are important to the success of SOLARIS. The universities in the consortium currently have both undergraduate and graduate programs that focus on transportation. SOLARIS plans to enhance these transportation programs by providing course material in sustainability and mobility for large sparse rural-urban regions. Another educational and workforce development goal for SOLARIS is to hold workshops, conferences, and continuing education courses in order to educate the public, industry, and academic communities. Summer Camps, internships, and fellowships will also be conducted in order to attract a new generation of professionals to transportation. SOLARIS plans to conduct outreach activities for underprivileged Native American communities in order to attract new students into the engineering profession. In addition, a scholarship for Native Americans wishing to major in engineering has been put in place and recruitment is currently in progress.

**Technology Transfer**
SOLARIS has established a plan in order to provide technology transfer. This plan includes the publication of reports, peer-reviewed journals, and conference papers; showcases; seminars; webinars; and international cooperation and collaboration. So far, UNR has hosted visiting scholars to present at seminars for transportation professionals and students. PhD and Master candidates are also presenting at seminars every week at UNR.

**Collaboration**
SOLARIS has outlined the framework by which collaboration within the consortium, public agencies, educational and professional organizations, and industry and other private companies will be developed. This collaboration framework aims at providing collaborative brainstorming,
research, decision making, and activities related to education and technology transfer. The following list provides detailed information about the different collaborative categories.

**Collaboration within the Consortium**
Some of the collaborative efforts involving the five institutions of SOLARIS include the sharing of transportation courses via interactive classrooms and distance learning technologies. This will provide students with a broad set of transportation-related courses, which no single university would be able to offer. SOLARIS will create a method in which faculty members from the different institutions can serve as graduate committee members. In addition, collaborative research between the institutions will best use institutional resources and expertise on delivering high quality research products.

**Collaboration with Public Agencies**
The different institutions composing SOLARIS have a strong collaborative effort with many transportation agencies. These agencies include the USDOT; the Departments of Transportation from Arizona, Nevada, and New Mexico; the Regional Transportation Commission (RTC) of Washoe County; the RTC of Southern Nevada; Maricopa County Department of Transportation, Maricopa Association of Governments, Cities of Phoenix, Tucson, and Tempe in Arizona; and the City of Las Vegas.

**Collaboration with Educational and Professional Organizations**
Outreach activities for K-12 schools and tribal colleges will focus on recruiting students that are interested in transportation research and education. The faculty members of the consortium are active in various professional organizations such as ASCE, ITE, TRB, APTA, INFORMS, and ITS America. In addition, the faculty members have or are currently serving as committee chairs in some of these organizations.

**Collaboration with Industry and Private Companies**
Partnerships with industry, industry-related organizations, and private companies are encouraged by SOLARIS in order to develop, promote and support transportation research and education. These types of collaboration efforts will effectively promote technology transfer activities.

### 1.2 What was accomplished under these goals?

**Research**
The rigorous project selection process involved the technical advisory committee ranking the proposals based on established criteria. Some of these criteria included relevance to the center theme, technical merit, significance and practice readiness, collaboration, budget, team qualifications, and PI’s past performance of the proposed research. The Technical Advisory Committee met in May to make the final project selection decisions and selected 15 projects.
for research. Project summaries have been posted and updated on the SOLARIS website as well as in RiP.

**Leadership**
As discussed in the second kick-off meeting, the immediate task of hiring administrative staff by mid February 2014 was concluded in May 2014. Erika Marquez joined the center as Center Coordinator. In addition, the website was updated to outline this leadership position as well as to include Associate Directors from ASU and UNM. Center Director Zong Tian continued his role as a conference co-chair for the 7th International Conference on Traffic and Transportation Studies (ICTTS) held in Shaoxing, China. Zong Tian will also continue to serve as the chair of the Special Interest Group (C2) of the World Conference on Transport Research Society (WCTRS).

**Education and Workforce Development**
The UTC Scholarship for Native Americans was distributed to tribal area high schools in Nevada, including Lowry High School, McDermitt Combined School and Elko High School. It was also sent to a Wadsworth County School Board Member and to the Bureau of Indian Affairs for distribution to their national list serves. The deadline for application is Feb. 1, 2015. Center Director and staff are contacting school officials to plan a field visit and present SOLARIS to graduating classes.

**Technology Transfer**
The center has been conducting weekly seminars. In these seminars, guest speakers and graduate students present their current research activities. Brian Hoeft, director of Freeway and Arterial Systems of Transportation (FAST) made a presentation on May 8. Dr. Yinhai Wang from the University of Washington made a presentation during the weekly seminars in late September 2014. Guest speakers are scheduled once a month. The seminar schedule and past presentations are posted on the SOLARIS website. In May and June, five graduate students attended the ITE Intermountain Section and District 6 Annual Meetings where they made six presentations. Students and faculty are successful in getting numerous papers accepted for presentation at the upcoming TRB Annual Meeting. The details will be reported in the next progress report.

**Collaboration**
The collaboration efforts SOLARIS has been part of during this reporting period include the following:

**Collaboration within the Consortium**
UNR and UNLV are discussing the possibilities of offering web-based graduate level classes available for students at both universities. This would best use the available resources and faculty expertise in both institutions.
Collaboration with Public Agencies
The Nevada Department of Transportation Board approved matching funds of $1 million for projects to be conducted by consortium members within Nevada, including the University of Nevada, Reno, the University of Nevada, Las Vegas, and the Dessert Research Institute. UNR researchers continue to work with the RTCs in both Washoe County and Las Vegas to address imminent transportation issues and improve transportation system efficiency, such as implementing new signal timing for arterial streets.

Collaboration with Educational and Professional Organizations
Nothing to report for this period.

Collaboration with Industry and Private Companies
The Center for Advanced Transportation Education and Research (CATER) at UNR is working with Econolite Inc. to establish an advanced traffic signal control lab. Econolite has agreed to donate their Centracs control software for research purposes.

1.3 What opportunities for training and professional development has the program provided?
The weekly seminars are open to the general public, particular to local and state transportation agencies and graduate students.

1.4 How have the results been disseminated?
• Two students submitted papers to the ITE Intermountain Section Annual Meeting and received the first and second best student paper awards, respectively. They presented at the meeting on May 15-17, 2014.
• One winning student presented a poster at the ITE Western and Midwestern District meeting on June 29-July 2 while Center Director Zong Tian delivered two presentations.
• Center Associate Director Pitu Mirchandani attended the International Symposium on Locational Decisions in Italy where he gave a talk on June 16-20. He also taught a short course on Intelligent Transportation Systems at Denmark Technical University and gave a presentation at the ROUTE 2014 conference. In July, he also attended the International Conference of Transportation Professionals in China where he participated in a panel discussion and held a transportation and sustainability workshop.
• Center Director Zong Tian presented at the Alternative Intersections and Interchanges Symposium in Salt Lake on July 20-23, 2014.
• Zong Tian delivered a keynote speech in August at the 9th International Conference on Traffic Transportation Studies in China.
• In April, Zong Tian visited the University of New Mexico, a key consortium member, to discuss collaborations on research and education. During the same visit, he made a presentation to the local ITE Chapter at their monthly luncheon meeting.

1.5 What do you plan to do during the next reporting period to accomplish the goals and objectives?
The following tasks are planned in order to accomplish the goals and objectives of SOLARIS.

• Stay updated on funded projects and their progress.
• Update SOLARIS website and RiP as necessary.
• Attend TRB meetings to present papers and posters based on research.
• Conduct a seminar on SMRT, a signal timing tool developed at CATER, to California Department of Transportation (Caltrans) engineers.
• Present at the UC Berkeley Regional UTC seminar.
• Attend the Fall Transportation Conference sponsored by ITE/ASCE in Las Vegas.
• Visit tribal high schools for student recruitment.

2. Products

2.1 Publications, conference papers, and presentations
• Students at SOLARIS are presenting weekly at seminars at UNR. In addition, two student papers have received awards at the ITE Intermountain Section Annual Meeting. Papers have also been accepted for presentation to the TRB Annual Meeting in January 2015.

2.2 Website(s) or other internet site(s)
The SOLARIS website is located at http://www.unr.edu/solaris. This website is used to disseminate any information related to the program.

2.3 Technologies or techniques
The SMRT tool will be promoted to agencies to improve the current practice on signal timing and coordination.

2.4 Inventions, patent applications, and/or licenses
Nothing to report for this period.

2.5 Other products
• The first SOLARIS Newsletter was released in September 2014 to UTC members, NDOT and RITA staff, consortium members, the dean and chair for the College of Engineering/Civil Engineering at UNR.
3. Participants & Collaborating Organizations

3.1 Who has worked on the program?

The members of SOLARIS include the University of Nevada, Reno (UNR); the University of Nevada, Las Vegas (UNLV); Arizona State University (ASU); the University of New Mexico (UNM); and the Desert Research Institute (DRI). Table 1 lists the individuals who have worked on the program during this reporting period.

Table 1: SOLARIS Staff Working on the Program

<table>
<thead>
<tr>
<th>Name</th>
<th>Program/Project Role</th>
<th>Number of hours worked during the reporting period</th>
<th>Contribution to Program/Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zong Tian</td>
<td>Program Director</td>
<td>180</td>
<td>Oversees overall operations of the program. Responsible for coordinating with stakeholders and developing and implementing the SOLARIS Strategic Plan.</td>
</tr>
<tr>
<td>Pitu B. Mirchandani</td>
<td>Associate Director at ASU</td>
<td>100</td>
<td>Serves as liaison between SOLARIS and ASU.</td>
</tr>
<tr>
<td>Rafiqul A. Tarefder</td>
<td>Associate Director at UNM</td>
<td>80</td>
<td>Serves as liaison between SOLARIS and UNM.</td>
</tr>
<tr>
<td>Mohamed Kaseko</td>
<td>UNLV Coordinator</td>
<td>40</td>
<td>Serves as liaison between SOLARIS and UNLV.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Funding Support</th>
<th>UNR</th>
<th>ASU</th>
<th>UNM</th>
<th>UNLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborated with individual in foreign country</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Country(ies) of foreign collaborator</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Traveled to foreign country</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>If traveled to foreign country(ies), duration of stay</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3.2 What organizations have been involved as partners?

Table 2 lists the organizations that have partnerships with SOLARIS and Table 3 lists the members of the Technical Advisory Committee.
Table 2: Organization Creating Partnerships with SOLARIS

<table>
<thead>
<tr>
<th>Organization Name</th>
<th>Location of Organization</th>
<th>Partners Contribution to Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada Department of Transportation</td>
<td>Nevada</td>
<td>X</td>
</tr>
<tr>
<td>Regional Transportation Commission of Washoe County</td>
<td>Nevada</td>
<td>X</td>
</tr>
<tr>
<td>Regional Transportation Commission of Southern Nevada</td>
<td>Nevada</td>
<td>X</td>
</tr>
<tr>
<td>Las Vegas Global Economic Alliance</td>
<td>Nevada</td>
<td>X</td>
</tr>
<tr>
<td>New Mexico Department of Transportation</td>
<td>New Mexico</td>
<td></td>
</tr>
<tr>
<td>Maricopa Association of Governments</td>
<td>Arizona</td>
<td>X</td>
</tr>
<tr>
<td>Arizona Department of Transportation</td>
<td>Arizona</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Expertise</td>
<td>Position/Agency</td>
</tr>
<tr>
<td>------------------------</td>
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<td>------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Nevada</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tracy Larkin (Chair)</td>
<td>Operations, Design</td>
<td>Deputy Director, NDOT</td>
</tr>
<tr>
<td>Mike Fuess</td>
<td>Traffic Operations</td>
<td>Assistant District Engineering, District 2, NDOT</td>
</tr>
<tr>
<td>Ken Mammen</td>
<td>Safety</td>
<td>Chief Safety Engineer, NDOT Planning</td>
</tr>
<tr>
<td>Steve Merrill</td>
<td>Design/GIS</td>
<td>Chief Engineer, Location Division, NDOT</td>
</tr>
<tr>
<td>Troy Martin</td>
<td>Structure</td>
<td>Engineer, Bridge Division, NDOT</td>
</tr>
<tr>
<td>Nathan Morian</td>
<td>Pavement</td>
<td>Engineer, Materials Division, NDOT</td>
</tr>
<tr>
<td>Randy Travis</td>
<td>Traffic Information/Planning</td>
<td>Chief, Traffic Information, NDOT</td>
</tr>
<tr>
<td>Manju Kumar</td>
<td>Operations, Planning</td>
<td>Research Coordinator, NDOT</td>
</tr>
<tr>
<td>Jim Poston</td>
<td>ITS/Operations</td>
<td>Engineer, RTC of Washoe County</td>
</tr>
<tr>
<td>Scott Gibson</td>
<td>Pavement</td>
<td>Engineer, RTC of Washoe County</td>
</tr>
<tr>
<td>Fred Ohene</td>
<td>Traffic Operations</td>
<td>Assistant General Manager, RTC Southern Nevada</td>
</tr>
<tr>
<td>Raymond Hess</td>
<td>Transportation Planning</td>
<td>Manager, Planning Division, RTC Southern Nevada</td>
</tr>
<tr>
<td>Tom Skancke</td>
<td>High Speed Rail</td>
<td>President/CEO, Las Vegas Global Economic Alliance</td>
</tr>
<tr>
<td><strong>New Mexico</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mohammad Moabed</td>
<td>Pavement/Traffic</td>
<td>Former District 2 Engineer, NMDOT</td>
</tr>
<tr>
<td>Parveez Anwar</td>
<td>Pavement Materials</td>
<td>Engineer, NMDOT</td>
</tr>
<tr>
<td><strong>Arizona</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sarath Joshua</td>
<td>ITS/Safety</td>
<td>Program Manager, Maricopa Association of Governments</td>
</tr>
<tr>
<td>Scott E. Nodes</td>
<td>Traffic/Design</td>
<td>Arizona DOT</td>
</tr>
<tr>
<td><strong>Academia (External)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert Bertini</td>
<td>ITS/Traffic</td>
<td>Professor, Portland State University</td>
</tr>
</tbody>
</table>
3.3 Have other collaborators or contacts been involved?
Nothing to report for this period.

4. Impact
Research projects have not yet been completed, as such the impact of this program cannot be measured during this reporting period.

4.1 What is the impact on the development of the principal discipline(s) of the program?
Nothing to Report

4.2 What is the impact on other disciplines?
Nothing to Report

4.3 What is the impact on the development of transportation workforce development?
Nothing to Report

4.4 What is the impact on physical, institutional, and information resources at the university or other partner institutions?
Nothing to Report

4.5 What is the impact on technology transfer?
Nothing to Report

4.6 What is the impact on society beyond science and technology?
Nothing to Report

5. Changes/Problems

5.1 Changes in approach and reasons for change
Nothing to Report

5.2 Actual or anticipated problems or delays and actions or plans to resolve them
The project selection process and commencement was delayed due to the process required by the Nevada DOT Transportation Board to approve the inter-local agreement for providing the $1 million match to the UTC program.

5.3 Changes that have a significant impact on expenditures
No significant impact is perceived.
5.4 Significant change in use or care of animals, human subjects, and/or biohazards
Nothing to Report

5.5 Changes of primary performance site location from that originally proposed
Nothing to Report

5.6 Additional information regarding products and impacts
Nothing to Report

6. Special Reporting Requirements
The University of Nevada, Reno’s Office of Sponsored Projects will submit Federal Financial Reports as needed.