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. The second round of proposals is set to begin in the Fall.

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 the 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.
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. In addition, links to principal investigators presenting research through webinars is posted on the website. Currently, we are working towards posting video of distinguished lecturers and graduate seminars on the website as well.

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
A quarterly progress report was completed in January to confirm projects are on schedule with a sufficient completion rate.

Leadership
Center Coordinator Erika Marquez and Associate Directors Pitu Mirchandani (ASU) and Rafiqul Tarefder (UNM) continue their roles at SOLARIS. Dr. Nader Ghafoori has been selected as the UNLV Coordinator. 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
Planning for a Transportation Summer Camp at the University of Nevada, Reno began in February in collaboration with RTC and local professionals. The camp is scheduled to take place in July 2015. In addition, the application for the UTC Scholarship for Native Americans was opened to accept applications year round. Another notice was sent to an Elko County tribe member.
Technology Transfer
The center has been conducting weekly seminars. In these seminars, guest speakers and graduate students present their current research activities. Distinguished Lecturers this period included: Huagu Zhou, professor at Auburn University, made a presentation on October 16; Gilbert Chlewicki from Advanced Transportation Solutions in Washington D.C. presented on February 9. Guest speakers are scheduled once a month during the semester. The upcoming seminar schedule and past presentations are posted on the SOLARIS website.

In addition, various consortia members have presented their research at different conferences and events. Specifics below.

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

Collaboration within the Consortium
UNR and UNLV are still 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 Desert 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
SOLARIS is working with RTC and local professionals to organize a Transportation Summer Camp this July. The camp includes presentations from industry and academic professionals as well as graduate student guided field trips and exercises. It is open to students ages 14-18.
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. The lab construction is set to begin in April.

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?
• Desert Research Institute researchers Vic Etyemezian and George Nikolich presented their research at a conference in Las Vegas in November.
• Students and faculty attended the TRB Annual Meeting in January where Dr. Zong Tian presented a poster on Signal Phasing Schemes.
• Five UNR PhD candidates presented their research at the TRB Annual Meeting in January.
• Dr. Pitu Mirchandani, Pengfei Li and Xuesong Zhou (ASU) presented their “MetroSim” research at the TRB Annual Meeting.
• In February, Dr. Zong Tian presented a demo on his Signal Management and Retiming Tool (SMRT) research at Stantec in Orange County, CA.
• In March, Dr. Zong Tian presented a demo on SMRT at the ITE/MSA Spring Conference in Phoenix, AZ.

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.
• Complete request for proposals for second round of project selection.
• Update SOLARIS website and RiP as necessary.
• Attend CUTC annual meeting in June.
• Move forward with summer camp planning.
• Continue fostering professional relationships for Distinguished Lecturer seminar series.
2. **Products**

2.1 **Publications, conference papers, and presentations**
- Students at SOLARIS are presenting weekly at seminars at UNR.
- Student posters were presented at the TRB Annual Meeting in January 2015.
- PhD candidate paper was accepted for publication in the Journal of Transportation Research Record.
- Dr. Pitu Mirchandani, Pengfei Li and Xuesong Zhou’s symposium paper was accepted for publication in the Journal of Transportation Research Record.

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. It is updated as needed.

2.3 **Technologies or techniques**
The SMRT tool will continue to 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**
Nothing to report for this period.

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>Zong Tian</th>
<th>Pitu B. Mirchandani</th>
<th>Rafiqul A. Tarefder</th>
<th>Nader Ghafoori</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program/Project Role</td>
<td>Program Director</td>
<td>Associate Director at ASU</td>
<td>Associate Director at UNM</td>
<td>UNLV Coordinator</td>
</tr>
<tr>
<td>Number of hours worked during the reporting period</td>
<td>180</td>
<td>100</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Contribution to Program/Project</td>
<td>Oversees overall operations of the program. Responsible for coordinating with stakeholders and developing and implementing the SOLARIS Strategic Plan.</td>
<td>Serves as liaison between SOLARIS and ASU.</td>
<td>Serves as liaison between SOLARIS and UNM.</td>
<td>Serves as liaison between SOLARIS and UNLV.</td>
</tr>
<tr>
<td>Funding Support</td>
<td>UNR</td>
<td>ASU</td>
<td>UNM</td>
<td>UNLV</td>
</tr>
<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>X</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>X</td>
</tr>
<tr>
<td>California Department of Transportation</td>
<td>California</td>
<td>X</td>
</tr>
<tr>
<td>Econolite Control Products Inc.</td>
<td>California</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 3: Technical Advisory Committee Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Expertise</th>
<th>Position/Agency</th>
</tr>
</thead>
<tbody>
<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>Name</td>
<td>Position</td>
<td>Organization</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------</td>
<td>--------------------------------------------------</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?
The California Department of Transportation (Caltrans) and Econolite Inc. have been identified as new collaborators on projects and grant activities.

4. Impact
Research projects have not yet been completed, as such the impact of this program cannot be measured during this reporting period. However, faculty and students have made several key presentations at national and regional conferences. Our research in the signal control area has attracted interests from various agencies, which could become potential sponsors.

4.1 What is the impact on the development of the principal discipline(s) of the program?
More awareness to Transportation Engineering within the college and community due to the various activities that have been created under the grant, including invited speakers, presentations and the upcoming camp.

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?
Exchange of information has been made possible through Distinguished Lecturer Seminars, which include professional and academic entities, held at the University of Nevada, Reno. The summer camp is aimed at high school students, allowing the possibility of recruiting a new generation into Transportation Engineering.

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?
Several presentations have been made at national and regional conferences, including TRB, ITE District 6, and ITE-Arizona.
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 plants to resolve them
The commencement of certain projects was delayed due to the process required by the Nevada DOT Board to approve the inter-local agreement for providing the $1 million match to the UTC program. Extensions for select projects will likely be required.

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.