STRATEGIC PLAN

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University Transportation Centers Program
U.S. Department of Transportation
Research and Innovative Technology Administration

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Center for Transportation Research on Traffic and Operations Management in Rapidly Growing Urban Areas

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### SECTION I – PROGRAM OVERVIEW

#### I.A Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ABET</td>
<td>Accreditation Board for Engineering and Technology</td>
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<td>APTA</td>
<td>American Public Transportation Association</td>
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<tr>
<td>ASCE</td>
<td>American Society of Civil Engineers</td>
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<tr>
<td>CEE</td>
<td>Department of Civil and Environmental Engineering, UNLV</td>
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<tr>
<td>DOE</td>
<td>Department of Energy</td>
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<tr>
<td>E-Club</td>
<td>Entrepreneurship Club, College of Engineering</td>
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<td>FHWA</td>
<td>Federal Highway Administration</td>
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<td>FTA</td>
<td>Federal Transit Administration</td>
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<td>ITE</td>
<td>Institute of Transportation Engineers</td>
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<td>ITS</td>
<td>Intelligent Transportation Systems</td>
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<tr>
<td>MSE</td>
<td>Master of Science, Engineering</td>
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<td>MST</td>
<td>Master of Science in Transportation</td>
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<tr>
<td>NSF</td>
<td>National Science Foundation</td>
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<td>NSHE</td>
<td>Nevada System of Higher Education</td>
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<td>NDOT</td>
<td>Nevada Department of Transportation</td>
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<td>OTS</td>
<td>Nevada Office of Traffic Safety</td>
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<td>PI</td>
<td>Principal Investigator</td>
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<td>PCA</td>
<td>Portland Cement Association</td>
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<td>RITA</td>
<td>Research and Innovative Technology Administration, USDOT</td>
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<td>RTC</td>
<td>Regional Transportation Commission of Southern Nevada</td>
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<tr>
<td>SAFETEA/LU</td>
<td>Safe, Accountable, Flexible, and Efficient Transportation Equity Act - A Legacy for Users</td>
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<tr>
<td>TRB</td>
<td>Transportation Research Board</td>
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<td>TRC</td>
<td>Transportation Research Center, UNLV</td>
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<td>UNLV</td>
<td>University of Nevada, Las Vegas</td>
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<tr>
<td>UNSOM</td>
<td>University of Nevada School of Medicine, Reno / Las Vegas, NV</td>
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<tr>
<td>USDOT</td>
<td>U.S. Department of Transportation</td>
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<tr>
<td>UTC</td>
<td>University Transportation Center, UNLV</td>
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I.B Center Theme

The theme of this UTC is Development of Transportation Systems for Rapidly Growing Urban Areas. Rapidly growing urban areas in Nevada can be characterized as follows:

1. The geographical boundaries of the urban area are continually expanding in all directions resulting in what is typically known as “urban sprawl”. There are several issues associated with urban sprawl: How can sprawl be controlled from the planning perspective for land use? How can a sustainable transportation system be provided to accommodate economic development? What innovative financing mechanisms should be adopted to provide sufficient funding for the development and maintenance of transportation infrastructure? Specifically, what optimal strategies should be adopted in order to facilitate smart growth in the area? How often should household travel surveys be conducted? How can the travel forecasting and planning models be modified to address the pressing issues facing the diversity of rapid development?

2. There are extended traffic congestion periods and the number of choking points in the transportation network is continually increasing from year to year. How can traffic conditions be monitored in order to improve system performance? How can the mobility of the transportation systems be improved while enhancing the safety of the systems? What would be the best ways to monitor and control the air quality of the area? What are the new technologies that can be developed for the area? How can innovative and advanced technology for traffic control and management strategies that are used in other developed areas be introduced to this area in an optimal time sequence? How should traffic controls, such as signal timing, be monitored and updated in a timely and systematic manner in order to accommodate the increasing travel needs?

3. The demographic characteristics of the residents in the area are continually changing. More retired people are moving in. The numbers of tourists and other visitors are increasing. How can transportation infrastructure and systems be designed and operated to address the needs of special populations, such as retired senior citizens and visitors? Specifically, should roads be built wider, curves be smoother, and yellow signals be longer? Should special bus services be provided with more flexibility? What type and amount of traveler information should be provided? Can special events and conventions be evacuated faster?

In response to the above issues, the mission of the center is, therefore, to provide rapidly growing urban areas with efficient, safe, and sustainable transportation by:

- Carrying out research to develop and implement advanced methodologies and technologies for transportation in rapidly growing urban areas, in concert with the “mobility” strategic objective identified in the USDOT Strategic Plan 2003-2008, which aims to “Advance accessible, efficient, intermodal transportation for the movement of people and goods.”

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• Educating and training professionals and the future transportation workforce.
• Seeking collaborative research involvement with other academic institutions such as University of Nevada Reno, Arizona State University, University of California Berkeley, and the University of Southern California/Long Beach.
• Providing extension and outreach services to public agencies such as NDOT, city and county departments of public works and private sector consulting companies.

The UNLV-based Center will serve as an important resource in developing leaders and professionals with the expertise to help meet America’s need for the safe and efficient movement of people and goods.

Statements of Scope

1. **Scope – Research.** Several major research goals are developed that are in concert with the Center’s theme and mission as well as with the national strategy for transportation research.

   The goals that have been developed include:

   a. Development of strategies to assist with the planning of sustainable transportation infrastructure associated with rapidly growing urban communities.
   b. Development of strategies for safe and efficient traffic operations and management in rapidly growing urban communities.
   c. Addressing mobility and safety issues related to population groups with special needs such as the elderly, children, new drivers, and individuals with illnesses and disabilities.
   d. Development of an information database to quantify the critical parameters and characteristics of high traffic density roadways.

2. **Scope – Assistance.** Assistance to and from national, state, and local transportation agencies, public and private sector organizations, and citizen advocacy groups is crucial to the mission of the Center. The Center will strive to have open lines of communication with representatives of transportation related public and private sector organizations, as well as those from advocacy groups and not-for-profit organizations. The center is in the process of finalizing formation of the Policy Advisory Board whose composition is outlined in the Appendix C. The Policy Advisory Board will meet twice a year and will receive the center’s annual report, discuss and review the strategic plan and research goals of the center. A Technical Advisory Committee will be selected from among the advisory board members or their representatives and will be responsible for reviewing problem statements and proposals submitted to the center for funding. The committee shall review these proposals, prioritize them and recommend proposals to be funded by the center.

3. **Scope – Education.** A major goal related to education is the development of human capital and future leaders in the area of transportation systems. Another goal is fostering career opportunities for the continued professional growth of practitioners in transportation systems. Undergraduate students at UNLV have the opportunity to take several senior elective courses
including traffic engineering, geometric design, and geographic information systems. All senior students take a required design sequence over two semesters. Teams of three or more students select projects, develop a scope of work, meet regularly with their clients and advisors, write a final report, and present an oral report to a panel of judges. The interaction of students with both faculty and practitioner advisors while working on open-ended projects with real life constraints creates eye opening experiences for students.

Graduate students are required to concentrate in a specialized area of Transportation Engineering and be involved in research projects. Such research typically requires one to three years to complete and often culminates with the final presentation of a thesis or dissertation, the award of the appropriate degree, and the dissemination of research findings through published papers. Students involved in these programs, whether at the undergraduate or graduate level, learn teamwork and leadership skills that will pave the way for successful careers as professional engineers in transportation planning, design, construction, operations, and academia.

Undergraduate students may be financially supported by scholarships and work-study opportunities. Graduate students are eligible for assistantships and may compete for fellowships. Students financially supported by the Center are expected to participate in one or more of the research projects sponsored by the Center. A large proportion of graduate students are full-time employees with local government units or consultants. Some of these students complete a research program leading to either a special report or thesis. The Center can provide research topics for such students.

4. **Scope - Collaboration.** Ideas and suggestions come from many sources. Perhaps the most important are the stakeholders in the safe and efficient transportation of people and goods. These include representatives of federal, state, and local government agencies, such as NDOT, Regional Transportation Commission of Southern Nevada (RTC), Office of Traffic Safety (OTS), and private sector consulting companies. Other important sources are educational institutions, professional organizations such as American Society of Civil Engineers (ASCE), Institute of Transportation Engineers (ITE) and American Public Transportation Association (APTA).

5. **Scope – Technology Transfer and Outreach Program (TTOP).** The purpose of TTOP is to enhance the overall effectiveness of transportation agencies, especially local ones, by means of communication, consultation, technical support, and training programs. The knowledge base, research memoranda, and technical reports developed and produced by this Center will be available through published documentation in various media including the UTC website A program of short courses and conferences will provide opportunities for practicing engineers and other interested practitioners to become aware of innovations, advances, and decision tools from centers throughout the US and elsewhere. TTOP’s primary audience will be the cities, counties, highway districts, and transit providers of Nevada.
I.C Center Director’s Summary

It is envisioned that the UTC will complement and expand on the existing education, research, and outreach activities at the Transportation Research Center (TRC). The growth and development of the UTC will be based on the Center’s Vision, Mission, and Goals. The anticipated outcomes from the UTC program are presented following the section on Vision, Mission, and Goals.

1. Vision, Mission, and Goals

a. Vision
The UTC will strive to become a nationally recognized center of excellence for research in planning, operations and management of sustainable transportation systems in rapidly growing urban areas. The center will serve as a vital source of knowledge and training for leaders and professionals who are prepared to meet the nation’s need for the safe, secure, and efficient movement of people and goods.

b. Mission
- Perform research to advance expertise and application of technology in traffic operations and management in rapidly growing urban areas
- Assist national, state and local transportation agencies in meeting their needs to provide safe, efficient, and sustainable transportation systems
- Educate and train leaders and professionals prepared to meet the region’s and nation’s need for safe, efficient and sustainable transportation systems
- Seek collaborative research efforts with institutions and organizations with similar goals
- Provide extension and outreach services to public and private sector organizations

c. Goals
To perform research and educational activities in the following areas:
- Development of strategies to assist with the planning and management of sustainable transportation infrastructure in fast growing communities
- Enhanced mobility and improved traffic operations in metropolitan areas
- Mobility and safety issues to meet specific needs of increasing population groups such as the elderly, children, new drivers, and individuals with severe illnesses and disabilities
- Development of human capital and future leaders in the area of transportation systems
- Support of career growth and development of practitioners in transportation systems
- Continuing education/transfer of technology
2. Anticipated Outcomes

At the conclusion of the grant period, the following outcomes are anticipated:

- Significant contributions to transportation education and research excellence particularly in the following areas:
  - traffic operations and management in rapidly growing urban areas
  - planning and development of sustainable infrastructure in fast growing communities
  - mobility and safety issues of special needs population groups

- Collaborative relationships between local, state, federal and private sector organizations and the universities

- Expanded curricular offerings in transportation, particularly at the graduate level will be added. The new classes will include Transportation Safety, Intelligent Transportation Systems, and Freight Transportation.

- Scholarships and fellowships that encourage the best students to pursue educational and career opportunities in transportation to meet the nation’s needs for technology and management

- Topical extension and outreach activities to disseminate the outcomes of research efforts and to address the needs of practitioners. At least one workshop will be conducted each year for researchers and practitioners.

At the end of the UTC grant period, the TRC & UTC will be well prepared to continue to provide desired outcomes in the following areas of program activities:

- Continued support from UNLV,
- Continued funding from The Regional Transportation Commission of Southern Nevada (RTC) and NDOT
- Established new partnerships with academic and research organizations to address topics of mutual interest outside the realm of traditional transportation engineering programs,
- Expanded partnerships with private sector organizations and practitioners,
- Expanded physical space in a new state of the art Science and Engineering Building at UNLV,
- Expanded curricular offerings related to transportation, especially at the graduate level
- Expanded offerings in appropriate extension and outreach arenas, in partnership with other program providers such as Nevada T² program.
- Development and maintenance of an information database on the UTC website describing past and current research activities that document the critical parameters and characteristics of high traffic density roadways.
SECTION II - PROGRAM ACTIVITIES

II.A Research Selection

The goal of the Research Selection program is to develop an objective process for selecting and reviewing research that balances the multiple objectives of the program.

1. Baseline Measures.

The UTC baseline will initially be set to zero.

2. Research Selection Program Outcome.

The UTC will develop a research project selection process that takes three important considerations into account:

- To establish and maintain links between Center endorsed projects and national and state programs, goals and priorities described in the USDOT Strategic Plan²
- To identify areas of basic, advanced or exploratory research, and applied or problem-solving research. Results from such research, as judged by peers in the field, may advance the body of knowledge and produce information of immediate value.
- To establish a peer review process designed to define the focus of project selection, to participate in project selection and review, and to become advocates for this Center.

3. Planned Activities.

3.a Required Activities.

- The first major activity of the center is the establishment of a Policy Advisory Board and the Technical Advisory Committee. The Policy Advisory Board is made up of national, state, and local community leaders from government and agency groups with interests and concerns with transportation. A board member from USDOT and NDOT will assure that the UTC meets the DOT mission. The specific organizations and commitments to date are listed in Appendix C. This group will participate in the annual review and refinement of the Center’s Strategic Plan. The Technical Advisory Committee will be made up of transportation and transportation-related professionals with expertise in transportation issues. This group will participate in selecting, prioritizing, and recommending research projects to be funded. The committee will also provide peer review and evaluation of completed projects.
- Faculty, staff, and students, both graduate and undergraduate, will write problem statements, develop written proposals and work plans for each proposed project.
- The Technical Advisory Committee will review proposals in order to set funding priorities in view of budget limitations. A flow chart of the research selection process is shown in Appendix D

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3.b Recommended Activities.
The Center will support national transportation needs by addressing high-priority areas identified by USDOT and its Operating Administrations. Two such USDOT-wide priority areas are advanced research and congestion chokepoints.

3.b.1 Advanced Research. Advanced research involves and draws upon basic research results to help understand causes, outcomes, and data requirements of transportation problems and to develop innovative solutions. The goal of advanced research is not an immediate solution but a better understanding of the nature of the problem and objectives for its potential solution. The Center will collaborate with NDOT and RTC in support of the Advanced Research Requirements of the several operating administrations of USDOT.

3.b.2 Congestion Checkpoints. The USDOT is actively pursuing research needed to implement the congestion mitigation strategy of the Secretary of Transportation. The Center will consider research projects designed to first, identify factors contributing to traffic congestion in urban areas and second, develop deployable solutions providing relief from traffic congestion. Such projects will call upon the expertise of several disciplines including engineering, science, and policy analysis.

4. Performance Indicators

Tracking performance indicators concerning research selection will be the responsibility of the Center’s administrative staff. Data for performance indicators 1 and 2, as set forth in Exhibit A of “Reporting Requirements for University Transportation Centers (3/06) will be collected for each project proposal and for those projects which are ultimately funded. Data for each proposal will include: the principal subject and focus areas; the classification of the project as either basic, advanced, or applied research; the total budgeted cost; and Project Investigator(s). In addition, UNLV maintains a Data Warehouse system that contains budget and expense information for each research project at UNLV. This data is important for the preparation of project progress reports for the Center’s project sponsors and clients.

II.B Research Performance

The goal of the Research Performance program is to develop an ongoing program of basic and applied research, the products of which are judged by peers or other experts in the field to advance the body of knowledge in transportation.

1. Baseline Measures.

The Baseline measures for Research Performance are listed in Appendix A.
2. Research Performance Program Outcome.

The UTC staff will be committed to the proposed process of selecting and reviewing research projects and to successfully completing them in a timely manner, within budget, and meeting the requirements related to the project’s scope.

- We will establish a research program responsive to the mission and goals of the center.
- We will develop products that, upon peer review, will be judged useful to the profession.
- We will develop a good working relationship with the entities sponsoring our work.
- We will develop a strong rapport with our two most important partners, the RTC and NDOT.

3. Planned Activities

The UTC will develop a research project performance program designed to facilitate the successful and timely completion of projects.

- The Center will provide administrative support to Principal Investigators (PI) in the development, completion, and implementation of their projects. A peer-review project panel will be formed by the PI and approved by the UTC Associate Director for each UTC-funded project. Project panels shall consist of three to four professional staff of NDOT, RTC and/or local transportation agencies. Quarterly meetings shall be scheduled for presentation of progress reports, review of problems encountered and their potential solutions, and an outline of upcoming project activity. Frequent, ongoing communication between the PIs, center staff and project panel as well as adherence to project schedules will be stressed.

- The Center will strive to maintain a good relationship with the advisory board and all funding agencies involved with the center. A concerted effort will be made to identify their needs and translate them into research project statements. Center staff will actively assist agencies and other clients by providing support for program development as requested. Furthermore, the Center is interested in exchanging information with all entities on any local transportation related issue.

- The research program experience gained over the past 15 years by the current TRC and complemented with research proposed for the UTC has provided a basis for a clear understanding of developing transportation problem statements and subsequent solutions. The experience gained by the TRC in solving local area problems may well leverage the Center in tackling problems with regional and national significance.

- Center administrative staff will provide support for the research effort. They will process requisite paper work for hiring, purchasing, travel requests, and reimbursement. They will process contract documents and other reports as required by UNLV and RITA.

- Center Administration will conduct monthly reviews of ongoing research projects in an effort to monitor progress, expenditures, adhere to milestone achievement, and sponsor communication.

- The Center will require PI’s to write status reports and a final report describing the results of their research per UTC program guidelines. The Center will also encourage them to publish their results in scholarly journals and conferences. Center staff will provide editorial assistance for all research reports and proposed publications.
4. Performance Indicators.

Center administrative staff will gather and tabulate information for UTC performance indicators 2 and 3 through maintenance of research reports and technical memoranda, books, and papers submitted, accepted, published, and presented. All published material will appear on the Center Web site.

II.C. Education

The goal of the Education program is to develop a multidisciplinary program of course work and experiential learning that reinforces the transportation theme of the center.

1. Baseline Measures.

The Baseline measures for Education are listed in Appendix A.

2. Education Program Outcome.

The transportation community is faced with a growing demand for all modes of transportation services for both people and goods. The population of the United States recently passed 300 million and continues rapid growth. The population of Clark County, Nevada is approaching 2 million and is projected to reach 3 million by 2020. Apparently, Nevada is the fastest growing state in the US. The main impact of this growth is more cars and trucks on our streets and highways.

Concurrently, the transformation community faces many challenges:

- Shortage of engineers in all disciplines.
- Declining undergraduate engineering enrollment.
- Development of new transportation technologies.
- Rapidly rising costs of construction, maintenance, and operations.
- Slow transportation revenue growth.
- High cost of motor fuels.
- Increasing traffic congestion and commuter travel times.
- Compromise between pedestrian and motorist safety.
- Increased concern for environmental protection and the mitigation of adverse environmental consequences.

We anticipate a growing demand for qualified transportation professionals. We plan to help in meeting this demand by developing and maintaining strong undergraduate and graduate programs in transportation and by offering an organized Continuing Education program that is responsive to updating the skills and knowledge base of practicing professionals. We expect to achieve the following outcomes:

- A dynamic educational program to provide all students a broad range of practical knowledge and experience in transportation.
- An educational program that emphasizes sustainability.
• An undergraduate program that includes education in ITS, GIS, and other emerging and developing technologies.
• Research programs in traffic operations, congestion management, traffic and pedestrian safety, public transportation, and sustainability in transportation.
• A program of short courses and seminars that appeals to practicing engineers hoping for a broader knowledge base and the expansion of opportunities in transportation.

3. Planned Activities.

We plan to continue and initiate several major activities that will help our Center achieve the proposed outcomes;
• Enhance current undergraduate and graduate courses through a continuing effort to identify and implement improvements based on the Accreditation Board for Engineering and Technology (ABET) assessment of outcomes.
• Keep undergraduate and graduate courses up-to-date with respect to research findings and technology developments.
• Identify and develop opportunities for multidisciplinary senior design projects in our capstone courses. These courses involve senior students from engineering and other disciplines working with faculty and professionals on developing practical solutions to real problems.
• Introduce new graduate courses including Intelligent Transportation Systems, Transportation Networks, Sustainability in Transportation, and a course in Freight Transportation. We also plan to make the Transportation Safety course as one of the principle electives for graduate students.
• Enhance our current MST (Master of Science in Transportation) degree program in an effort to attract graduate students with an interest in the non-engineering aspects of transportation planning and development.
• Charge our Technology Transfer Group with gathering information from participants on suggestions for professional courses in transportation.
• Identify needs and preferences of practicing engineers for course and research topic development.
• Provide travel funds for participating Center personnel to interact with other professionals.
• Maintain a Web site designed to provide the general public with information on transportation activities and concepts.

3.a Required Activities.

3.a.1 Course Work and Research. Our existing Transportation Research Center has provided research opportunities for undergraduate and high school students (during summers) for several years. UTC funded projects will be used to expand research opportunities to include more students. We will meet with representatives of other engineering and non-engineering departments to discuss interdisciplinary course development. This idea has been implemented to some extent in our senior design capstone courses. There is strong interest in both Mechanical and Electrical Engineering to expand this concept especially with local industry involvement in the
Entrepreneurship Club (E-Club) of the College of Engineering. The E-Club actively pursues the integration of entrepreneurship and the engineering curricula through seminars and the facilitation of senior design projects. We plan to be an active participant in the development of multidisciplinary courses and activities.

3.a.2 **Support of National Strategy.** We propose to support and participate in the national strategy for surface transportation research as identified in several publications:
* Highway Research and Technology: The Need for Greater Investment.
* National Research and Technology Program of the Federal Transit Administration.
* Department of Transportation Strategic Plan
* U.S. Department of Transportation Research, Development, and Technology Plan.

Input and expertise of the Policy Advisory Board will be used in continually reviewing the research initiatives and strategies include in the documents mentioned above.

3.a.3 **Student of the Year.** Our UTC plans to nominate one outstanding student of the year each year. The Student of the Year will receive an award of $1,000 and an expense paid trip to the annual Transportation Research Board meeting in Washington, D.C. during January. The UTC Advisory Board will assist Center staff in developing nomination, evaluation, and award procedures used to select the Student of the Year.

4. **Performance Indicators.**

We will meet the UTC reporting requirements for courses offered that are considered part of a transportation curriculum for both undergraduate and graduate degree programs. The number of undergraduate and graduate students participating in transportation research projects will be reported. The data will be tabulated by a UTC administrative assistant. All such data will be updated each semester.

We propose to utilize the ABET assessment process for evaluating and improving our courses each time they are offered. Our undergraduate program in Civil Engineering is fully accredited by ABET. Both the College and the Department of Civil and Environmental Engineering have Advisory Boards which meet on a regular basis. The Advisory Boards provide advice on adjustments to our curricula. We will ask the UTC Advisory Board for input concerning both current and newly proposed courses and curriculum modifications. The University currently requires that all courses are evaluated by the students during the last week of the semester. In addition to this evaluation, we will conduct exit interviews of graduating students for information on the effectiveness of our programs.
II.D Human Resources

The goal of the Human Resources program is to foster growth in the number of students, faculty, and staff who are attracted to and substantively involved in the undergraduate, graduate, and professional programs of the center.

1. Baseline Measures.

The Baseline measures for Human Resources are listed in Appendix A. During Calendar Year 2005, the currently operating TRC at UNLV worked with Transportation Engineering graduate students pursuing an MSE degree (Master of Science in Engineering) or the Ph.D. degree. A second Master’s program, the Master of Science in Transportation (MST) degree, is reserved for non-engineering majors.

2. Human Resources Program Outcome.

The College of Engineering maintains an Engineering Advising Center for all undergraduate students. In addition, the College has an active program involving visits to all high schools in Southern Nevada. These programs serve to alert young people about job opportunities in engineering and to the educational programs available in the College of Engineering. We plan to develop promotional material relative to the opportunities in transportation engineering that can be used in both the advising center and on high school visits. We currently recruit 3 to 5 high school students to spend several weeks during a summer working at our Transportation Research Center. Our goal is to expand this program.

Every semester, we have several undergraduate students working on research projects under the direction of graduate students and project managers. This experience convinces a few to enroll in graduate school. We plan to work on expanding this program and attracting more students to our research programs. We plan on involving more faculty from other departments throughout the university in our research programs.

3. Planned Activities.

- Increase the visibility of our transportation program by means of news releases, our Web site, newsletters and other means to make known the depth and breadth of our research program and our accomplishments.
- Recruit both undergraduate and graduate students to our programs.
- Increase the number of scholarships available to students interested in transportation careers.
- Assist undergraduate students in getting internships in the transportation area.
- Increase the number of graduate assistantships offered each year.
- Provide rewarding research experiences along with effective courses to make our programs attractive.
- Involve more faculty from throughout the university in our courses and our research programs.
• Encourage practicing professionals to participate in student mentoring activities and presentations at student functions.

4. Performance Indicators.

All requisite data for performance indicators 7, 8, and 9 will be tabulated by a UTC administrative assistant. We will design and administer appropriate instruments that assess the interest in and the overall effectiveness of various aspects of our transportation program.

II.E Diversity

The goal of the Diversity program is to recruit and attract students, faculty, and staff who reflect the growing diversity of the US workforce and are substantively involved in the undergraduate, graduate, and professional programs of the center.

1. Baseline Measures.

Baseline measures are not applicable to the Diversity goal due to privacy concerns.

2. Diversity Program Outcome.

The UTC will attempt to have a transportation program which represents both genders and a range of ethnic and racial groups.

3. Planned Activities.

• Collaborate with the college of engineering recruiting effort to attract underrepresented population groups including women, African American, Hispanic, Native American, and students of other racial backgrounds to enter engineering fields.
• Enlist the participation of the Society of Women Engineers, the Institute of Transportation Engineers, and the American Society of Civil Engineers, both the UNLV student chapters and the local professional branches, in developing a strategy to encourage students of all backgrounds to consider transportation as a career.
• Note that several of the planned activities regarding Human Resources will also serve to achieve Diversity as a goal.

4. Performance Indicators.

There are no Performance Indicators regarding Diversity.

II.F Technology Transfer.

The goal of the Technology Transfer program is to make research results readily available to potential users in a form that can be directly implemented, utilized, or otherwise applied.
1. Baseline Measures.

The Baseline measures for Technology Transfer are listed in Appendix A. During calendar year 2005, the currently operating TRC at UNLV participated in hosting 3 programs which attracted 250 registrants.

2. Technology Transfer Program Outcome.

We will strive to develop a technology transfer program that is both responsive and valuable to users but which also meets the objectives of USDOT and local agencies. We plan to offer conferences, seminars, and short courses. Also a website that will have reports of all research completed with funding through the center will be formed and maintained by the center.

3. Planned Activities.

- The TRC has co-sponsored and participated in an Annual Fall Transportation Conference at which TRC staff has presented research results. The UTC will participate in this annual conference.
- We will continue to involve Senior Design teams in transportation design projects.
- We will conduct a survey of practicing transportation professionals in Nevada asking for input in the formulation of topics and issues for conferences, seminars, and short courses.
- We will publish a quarterly newsletter describing the current activities and outcomes of our research and technology transfer programs.
- We will require all researchers to write status and final reports on their projects and encourage them to publish and present papers at appropriate venues.

3.a Required Activities.

3.a.1 Internet Home Page. The currently operating TRC maintains an up-to-date Internet home page. We will develop an Internet home page for the UTC that can be accessed directly. We will strive to make our Website user friendly, attractive, and a source of transportation information.

3.a.2 High Priority Topics. We plan to participate in as many UTC meetings sponsored by USDOT as possible, including the two required CUTC meetings per year. Information disseminated at such meetings will provide our UTC staff with valuable insights concerning research needs and problem statements.

4. Performance Indicators.

All data needed to respond to Performance indicators 10 and 11 will be the responsibility of Center administrative staff. Our UTC Web site will keep track of the number of visitors to the site. The site will provide a means for visitors to ask questions about our research efforts and our degree programs.
SECTION III - MANAGEMENT APPROACH

III.A Institutional Resources

The resources provided by UNLV to the UTC and TRC include research and training facilities, human resources, physical facilities, and institutional support capabilities. The institutional resources provided by UNLV include the following:

1. Research Funding and Facilities
   • Matching funds (cash, not in-kind) to the extent of $100,000 annually
   • Access to computing facilities at UNLV including those operated by the Office of Information Technology, the Howard Hughes College of Engineering and the National Supercomputer Center for Energy and Environment
   • Access to the research support facilities such as the Machine shop and storage facilities
   • Institutional support (as is typically provided to research programs) for grants and projects administration and management through Offices such as Sponsored Programs, Grants & Contracts, Procurement, Disbursements, Payroll, Human Resources, etc.

2. Human Resources
   The human resources available to the UTC include those dedicated to the TRC and the UTC, as well as those who provide support to a broader range of units at the university.
   • Associate Director, UTC Program will provide the primary leadership for the operation of the Center. The Associate Director reports to the Executive Director who has overall responsibility to direct transportation research at the TRC. Their efforts will be supported by not only funds from the UTC, but also from other sources through UNLV
   • Faculty members primarily from the UNLV College of Engineering will work on research efforts through the center. Their efforts will be partially supported by the UTC.
   • Dedicated personnel include several professional staff and students who will be supported primarily through the UTC

3. Physical Space
   • Physical space for the center’s personnel and equipment. This will be in addition to the existing space made available to the TRC.
   • A state-of-the-art Science and Engineering Building that is presently under construction at UNLV will provide the Center with space to expand when it is completed in late 2008 or early 2009.

III.B Center Director

Since the UTC will be a component program of the TRC, the Executive Director of the TRC will also have the primary responsibility for running the UTC program and provide the leadership towards achieving the long-term mission and vision of the center. He/She will be the main contact and spokesman for the center and his/her responsibilities include,
• Coordinating the activities of the Policy Advisory Board and the Technical Advisory Committee related the UTC Program
• Establishing the Center’s mission and vision
• Developing and updating the Center’s strategic plan
• Formulating the organizational structure
• Creating operational policies and procedures
• Recruiting qualified and energetic individuals to work at the Center, and providing them with challenging and useful work
• Procuring the requisite physical, financial and operational resources necessary for the success of the Center
• Representing the interests of the Center and serving as the Center’s spokesperson
• Participating in up to two annual meetings held by USDOT with the directors of all of the University Transportation Centers

The Associate Director (UTC) will be the principle assistant to the Executive Director on UTC matters. He/She will assist the Executive Director in carrying out the day-to-day administrative activities of the Center, ensuring the adherence to the UTC reporting requirements and any other activities as assigned by the Executive Director. The structure of the leadership and organization will be reviewed annually to ensure that the TRC and the UTC continue to be effective in carrying out their respective programs.

III.C Center Faculty and Staff

The administrative structure of the center is given in Appendix E. The following is a list of the key faculty and staff associated with the UTC.

• **Dr. Mohamed Kaseko**, the Interim Executive Director at the TRC, will be responsible for the overall leadership the UTC program, including oversight of the peer-reviewed project selection process, interaction with advisory boards, and financial management. This is the main contact person for communication with RITA. This position, to be held by a tenured or tenure-track full time faculty, is funded primarily by the university, with a portion of the academic year, equivalent to one-eighth of annual salary and one-and-half months of summer salary being paid from the UTC program funds. A national search for the permanent director is on-going and it is hoped that the new Executive Director will be on board by the Fall 2007 or Spring of 2008.

• **Dr. Robert Abella**, Associate Director, UTC, will be the principle assistant to the Executive Director on matters related to the UTC program, providing assistance on the day-to-day administrative activities and reporting requirements of the UTC program. This position is funded partially (50 percent Full Time Equivalent) by the UTC program funds.

• **Dr. Hualiang Teng**, will be assisting director in the development of research activities.

• **Dr. Walter Vodrazka**, will assist as a consultant for technology transfer.

• **Dr. Mukund Dangeti**, Transportation Systems Analyst, will be responsible for managing the computing resources and needs of the UTC including the maintenance of the program’s Web
site. This position is funded partially (25 percent Full Time Equivalent) by the UTC program funds.

- **Mr. Vinod Vasudevan**, Transportation Systems Analyst, will be responsible for managing the databases and data needs of the UTC including working with safety and crash data needed to support the UTC program. This position is funded partially (25 percent Full Time Equivalent) by the UTC program funds.

- **Ms. Marin DuBois**, Grants Coordinator, will be responsible for managing grants and budgets including all UTC funded projects. She will prepare financial and budgetary documents and reports, and will be responsible for support services for the UTC program including preparing employment documents, graduate assistantship requests, travel, purchasing, disbursements, and human resources. This position is funded partially (67 percent Full Time Equivalent) from the UTC program funds.

### III.D Multiparty Arrangements

The matching funds for the UTC program are provided through an agreement with the RTC, and internally by UNLV.

1. **Resource Concentration at the Grantee University.**
   Since there are no multiparty agreements for the use of the UTC program funds, it is anticipated that the UTC resources will remain primarily at UNLV.

### III.E Matching Funds

The UTC program grant requires a one-to-one match of the funding provided by RITA. All of the matching funds for the UTC will be in the form of “cash” match (i.e., not “in-kind” contributions). The matching funds for the UTC will come from the following sources:

- $100,000 annually from UNLV (Office of the Vice President for Research & Graduate Studies and the Dean, Howard R. Hughes College of Engineering)
- up to $500,000 annually from the Regional Transportation Commission of Southern Nevada

Additional funds have been sought from other funding partners such as NDOT and University of Nevada School of Medicine. It is anticipated that these funds will become available in the near future.

1. **Eligibility as Matching Funds.**
   The matching funds that are in place at this time are from non-federal sources.

2. **Special Role for UTC Program.**
   NDOT may provide additional matching funds out of State Planning & Research (SP&R) funds on a project-by-project basis.
SECTION IV – BUDGET DETAILS

University Transportation Center (UTC) Budget Plan

IV.A Budget Summary

Name of Grantee: Board of Regents NSHE obo University of Nevada, Las Vegas

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>Budgeted Amount</th>
<th>Explanatory Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Director Salary</td>
<td>$34,667</td>
<td></td>
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<tr>
<td>Faculty Salaries</td>
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<td>Included in Research Awards</td>
</tr>
<tr>
<td>Administrative Staff Salaries</td>
<td>$120,668</td>
<td></td>
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<tr>
<td>Other Staff Salaries</td>
<td>$27,000</td>
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<tr>
<td>Student Salaries</td>
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<td>Included in Research Awards</td>
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<tr>
<td>Staff Benefits</td>
<td>$40,165</td>
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<tr>
<td><strong>Total Salaries and Benefits</strong></td>
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<tr>
<td>Research Awards</td>
<td>$418,298</td>
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<tr>
<td>Scholarships/Tuition</td>
<td>$20,000</td>
<td>Only scholarships are included here</td>
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<tr>
<td>Permanent Equipment</td>
<td>$20,000</td>
<td>Research awards may also be used to purchase equipment</td>
</tr>
<tr>
<td>Expendable Property, Supplies, and Services</td>
<td>$13,331</td>
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<tr>
<td>Domestic Travel</td>
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<tr>
<td>Foreign Travel</td>
<td>$5,000</td>
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<tr>
<td>Other Direct Costs (Specify)</td>
<td>$15,000</td>
<td>To pay consultant to assist in transfer of technology programs</td>
</tr>
<tr>
<td><strong>Total Direct Costs</strong></td>
<td><strong>$505,629</strong></td>
<td>Excludes salaries and benefits</td>
</tr>
<tr>
<td>F&amp;A (Indirect) Costs</td>
<td>$131,871</td>
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<tr>
<td><strong>TOTAL COSTS</strong></td>
<td><strong>$860,000</strong></td>
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<tr>
<td>Federal Share</td>
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<tr>
<td>Matching Share (RTC-Local)</td>
<td>$330,000</td>
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</tr>
<tr>
<td>Matching Share (UNLV-Applicant)</td>
<td>$100,000</td>
<td></td>
</tr>
</tbody>
</table>

*Includes Federal and Matching Shares
IV.B Budget Narrative

1. Salaries and benefits include:
   - The Director’s one-and-half months of summer support, and 25% FTE during the academic year
   - The UTC Program Manager’s salary and benefits (50% FTE)
   - Salaries and benefits for Faculty and Staff for other UTC administrative activities

2. Research Awards
   These funds will be allocated to researchers to support approved research projects that address the theme, mission and goals of the center. Researchers may use these funds for faculty, student and staff salaries and benefits; equipment purchase; student tuition and fees; travel; and other expendable supplies and services. The funds will also cover appropriate indirect costs.

3. Scholarships
   - UTC Student of the year ($1,000 plus travel to the TRB)
   - The rest of the funds to be awarded as fellowships to two graduate students (MSE/MST and PhD), and selected undergraduate students who select Transportation electives and/or do senior design projects with significant transportation components.

4. Equipment
   The equipment budgeted is for part of the general infrastructure for the center. Additional equipment may be purchased through the research awards as part of specific project requirements.

5. Expendable Property, Supplies, and Services
   For general consumable supplies and services.

6. Travel
   To cover travel for the Director, Program Manager and other Staff for UTC related meetings and activities. The funds may also be used to support other travel such as conference and workshop attendance.

7. Indirect Cost
   This is 48.5% of the direct costs (minus tuition and equipment) charged to the RITA Grant.
APPENDIX A: BASELINE MEASURES FOR UNIVERSITY TRANSPORTATION CENTERS (UTCs)

NOTE: This is the first Strategic Plan submittal for the UTC at UNLV.

Goal 1: Research Selection

1. Number of transportation research projects selected for funding = 0.

   Since the UTC program is new for the TRC, there are no active UTC funded projects underway.

Goal 2: Research Performance

2. Since there were no UTC funded-research projects, there were no UTC transportation research reports published.

Goal 3: Education

3. Number of courses offered that you consider part of a transportation curriculum. Report courses shown in the university course catalog as being offered, whether or not they were conducted during the academic (calendar) year being reported.

   Undergraduate: 16
   Graduate: 22

   (Note: Six transportation courses are dual-level undergraduate/graduate courses.)

4. Number of students participating in transportation research projects. Count individual students (one student participating in two research projects counts as one student).

   Undergraduate: 10
   Graduate: 18

   (Note: Three high school students participated in research projects.)

Goal 4: Human Resources

5. Number of advanced degrees programs offered that you consider transportation-related.

   Master’s Level: 2 (MSE and MST)
   Doctoral Level: 1
6. Number of students enrolled in those transportation-related advanced degree programs.

   Master’s Level: 16
   Doctoral Level: 5

7. Number of students who received degrees through these transportation-related advanced degree programs.

   Master’s Level: 7
   Doctoral Level: 2

**Goal 5: Technology Transfer**

8. Number of transportation seminars, symposia, distance learning classes, etc. conducted for transportation professionals.

   3

9. Number of transportation professionals participating in these events.

   250
APPENDIX B: TRANSPORTATION-RELATED COURSE DESCRIPTIONS

Undergraduate Transportation-Related Course Descriptions

EGG 307 - Engineering Economics, 3 credits. Engineering economic analysis for the evaluation of technical alternatives and necessary economic trade-offs made in planning, designing, and operating engineering systems.

CEE 110 - Introduction to Civil Engineering Design, 3 credits. Introduce the Design process including teamwork, problem definition, objectives, criteria development, evaluation, decision matrix, and communications. Laboratory

CEE 121 - Elementary Surveying, 3 credits. Focus on vertical and horizontal control methods, topographic and construction surveys, use of transit, note taking. Laboratory

CEE 198 - Ethics and Professional Practice of Engineering, 1 credit. Engineer’s Code of Ethics, public speaking, and other requirements of professional practice.

CEE 225, 325, 425 – Cooperative Training I, II, and III, 1 credit each. Individual off-campus learning experiences in civil engineering work settings.

CEE 301 – CAD Tools for Civil Engineering Design, 3 credits. Introduction to civil engineering design tools including COGO, surveying, roadway, and site layout.

CEE 346 – Civil Engineering Materials and Lab, 3 credits. Introduction to the properties and uses of aggregates, Portland cement concrete, bituminous materials, wood, and metals for use in civil engineering works.

CEE 362 – Transportation Engineering, 3 credits. Introduction to the design, operations, objectives, characteristics, and social, environmental, and economic relationships of transportation systems including water, air, and land facilities.


CEE 463 – Traffic Engineering, 3 credits. Study highway and traffic planning and principles of traffic operations.

CEE 464 – Airport Design, 3 credits. Fundamental engineering principles employed in the planning, location, design, and operation of airport facilities: ground access, drainage, aircraft, noise, and the environment.

CEE 466 – Geometric Design of Highways, 3 credits. Design the visible elements of highways such as horizontal and vertical alignment and cross-section in accordance with design controls.
CEE 467 – Computer Applications in Transportation Engineering, 3 credits. Apply computer models, programs, and information systems in solving planning, design, and operations problems in transportation engineering.

CEE 468 – GIS Applications in Civil Engineering, 3 credits. Introduce basic Geographic Information Systems software and hardware and their use in solving civil engineering problems. Emphasis is on applications to planning, design, operations, and maintenance of civil systems.

CEE 497 – Senior Design Project I, 3 credits. This capstone design course immerses students in the design process from project definition to project planning. Stresses team work and oral and written communications.

CEE 498 – Senior Design Project II, 2 credits. This capstone design course continues the design process. Students participate in the development of their selected project through analysis, synthesis, evaluation, and recommendations. Stress on oral, written, and graphical communications.

Graduate Transportation-Related Course Descriptions

CEE 610 - Highway Construction Materials, 3 credits. See CEE 410.

CEE 663 – Traffic Engineering, 3 credits. See CEE 463.

CEE 664 – Airport Design, 3 credits. See CEE 464.

CEE 666 – Geometric Design of Highways, 3 credits. See CEE 466.

CEE 667 – Computer Applications in Transportation Engineering, 3 credits. See CEE 467.

CEE 668 – GIS Applications in Civil Engineering, 3 credits. See CEE 468.

CEE 700 – Research Methods in Civil and Environmental Engineering, 3 credits. Present and discuss the research skills needed for professional careers including ethics, review of literature, issues and hypotheses, prepare proposals, present results, and write papers.

CEE 712 – Intelligent Transportation Systems, 3 credits. An introduction to Intelligent Transportation Systems (ITS) including ITS technologies and applications in highway and transit; component inter-relationships; and ITS planning, design, architecture, and policy.

CEE 731 – Pavement Materials and Design, 3 credits. Study of rigid and flexible pavement materials, pavement design, and pavement management systems.

CEE 760 – Transportation Planning, 3 credits. Present networks and minimum path trees; trip generation, distribution, traffic assignment, and modal split algorithms; and data collection, model building, and model calibration.
CEE 761 – Transportation Demand Analysis, 3 credits. Present the theoretical concepts and analytical methods for urban and rural travel demand forecasting models.

CEE 762 – Operations Research Applications in Civil Engineering, 3 credits. Apply operations research techniques to the solution of civil systems with emphasis on transportation problems.

CEE 763 – Advanced Traffic Engineering, 3 credits. Analysis of traffic signal operations using several computerized models. Present theory of traffic flow, travel demand modifications, capacity evaluations, and measures of effectiveness.

CEE 764 – Air Transportation, 3 credits. Study aviation system planning an operations, aircraft economics, fleet planning and scheduling, and safety.

CEE 765 – Public Transportation Systems, 3 credits. Analyze mass transit systems including planning, management, operations, demand, route design, and schedules.


CEE 767 – Human Factors in Transportation Engineering, 3 credits. Study human factors and ergonomic principles that affect the planning, design, operation, and management of transportation systems.

CEE 768 – Applied Geographic Information Systems, 4 credits. Study of specialized topics in GIS systems including data structures, algorithms, data visualization, and decision making.

CEE 769 – Transportation Safety, 3 credits. The objectives of the course are to help students assess and evaluate the importance of transportation safety and the safety improvement process. The course will involve analysis of data, identification of problem areas, development of recommendations and prioritization, and evaluation of the effectiveness of the safety improvement processes.

CEE 791 – Independent Study in Civil Engineering, 1-3 credits. Study a topic of interest in transportation engineering.

CEE 795 – Special Topics in Civil Engineering, 1-6 credits. Present an experimental or newly developing topic in transportation engineering.

CEE 796 – Design Project in Civil Engineering, 1-3 credits. Research, analysis, and writing on a design project.

CEE 797 – Thesis in Civil Engineering, 3-6 credits. Research, analysis and writing of thesis.

# APPENDIX C: COMPOSITION OF THE UTC POLICY ADVISORY BOARD

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>Name/Title/Location</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Agencies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FHWA, HQ Washington, DC</td>
<td></td>
<td>1</td>
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<tr>
<td>FHWA, NV Regional Office</td>
<td>Valerie Rodman</td>
<td>1</td>
</tr>
<tr>
<td>FTA, Washington, DC</td>
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<td>1</td>
</tr>
<tr>
<td>National Highway Transp. Safety Admin. (NHTSA), Washington, DC</td>
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<td>1</td>
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<tr>
<td><strong>State Agencies</strong></td>
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</tr>
<tr>
<td>Nevada Dept of Transportation</td>
<td>Director, Carson City, NV</td>
<td>1</td>
</tr>
<tr>
<td>Nevada Office of Traffic Safety (OTS)</td>
<td>Chuck Abbot, Carson City, NV</td>
<td>1</td>
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<tr>
<td><strong>Regional Agencies</strong></td>
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<tr>
<td>Regional Transportation Commission of Southern Nevada (RTC)</td>
<td>Jacob Snow, General Manager</td>
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</tr>
<tr>
<td></td>
<td>Fred Ohene, Assistant General Manager</td>
<td>1</td>
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<tr>
<td><strong>Local agencies</strong></td>
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</tr>
<tr>
<td>Clark County, NV</td>
<td>Director, Dept of Public Works</td>
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</tr>
<tr>
<td>City of Las Vegas, NV</td>
<td>Director, Dept of Public Works</td>
<td>1</td>
</tr>
<tr>
<td>City of North Las Vegas, NV</td>
<td>Director, Dept of Public Works</td>
<td>1</td>
</tr>
<tr>
<td>City of Henderson, NV</td>
<td>Director, Dept of Public Works</td>
<td>1</td>
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<tr>
<td><strong>Private Industry</strong></td>
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<tr>
<td>National: Qualcomm</td>
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<td>1</td>
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<tr>
<td>Local: Orth-Rodgers</td>
<td>Rich Romer</td>
<td>1</td>
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<tr>
<td>Carter-Budgess</td>
<td>Jim Caviola</td>
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<tr>
<td><strong>Academia</strong></td>
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<tr>
<td>UNLV – Vice President for Research</td>
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<tr>
<td>UNLV – Dean, College of Engineering</td>
<td>Eric Sandgreen</td>
<td>1</td>
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<tr>
<td>Out of State: UC Berkeley</td>
<td>Betty Deakin</td>
<td>1</td>
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<tr>
<td>Univ. of Central Florida</td>
<td>Essam Radwan</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL MEMBERSHIP</strong></td>
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<td>20</td>
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</table>
APPENDIX D: A FLOW CHART OF THE RESEARCH SELECTION PROCESS

Call for Problem Statements (PS)

Receiving PS

Pre-Screening of PS by Dean and Executive Director

Review of Prescreened PS by Advisory Committee

Notification of Selected PS and Call for Full Proposals

Receiving of Full Proposals

Review of Full Proposals by Advisory Committee

Notification of Research Awards for Selected Projects

Finalizing Contract Documents
APPENDIX E: CENTER ADMINISTRATIVE FLOW CHART

Dean, College of Engineering

Executive Director

Associate Director, TRC

Professional Staff

Associate Director, UTC Program

Administrative Support Staff