University of Vermont National University Transportation Center
Strategic Plan

Submitted to the
US Department of Transportation
Research and Innovative Technologies Administration (RITA)

University of Vermont
UVM Transportation Center
Office of the Provost
June 2007
1 Program Overview

In August of 2005, the U.S. Congress designated the University of Vermont (UVM) a National University Transportation Center (National UTC) in federal legislation entitled the “Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users,” (SAFETEA-LU). The designation authorized the U.S. Department of Transportation (US DOT) to invest up to $16 million in federal funds over five years (2005-2009) to allow UVM to build its core faculty, programs, and technologies in service of the interdisciplinary transportation sector. The University of Vermont and collaborative partners will match the grant funds for a total program investment of up to $32 million.

The National UTC designation for the University of Vermont was championed by US Senator James Jeffords in recognition of UVM’s proven excellence in interdisciplinary research, sustainability education, and outreach/service programs, as well as its mission to actively support sustainable economic development and technological innovations in the State of Vermont. As a National UTC, UVM will share that expertise throughout the country, serving interests in academia, the transportation industry, state government, the US DOT national transportation priorities, and the National Academy of Sciences Transportation Research Board (TRB).

The University of Vermont has placed the new Transportation Center in the Office of the Provost, ensuring coordination of Center priorities with overall UVM academic and research priorities and encouraging long-term, interdisciplinary collaboration. This placement also ensures high-level UVM facilitation of public-private partnerships. Overall development of the UVM National UTC has been guided by UVM leadership in consultation with both internal and external stakeholders, specifically assessing UVM’s current transportation-related programs and expertise while recognizing growth opportunities throughout campus.

This extensive process of stakeholder consultation in 2005 – 2006 suggested a clear policy-relevant program niche for UVM’s National UTC to study complex, interdisciplinary models and appropriate technologies that fully integrate and analyze the social, economic, and environmental challenges of transportation systems in northern communities. This led to the
UVM National UTC “theme” of “Sustainable Systems and Advanced Technologies for Northern Communities.”

On July 17, 2006, the UVM National UTC was officially opened in Farrell Hall by UVM President Daniel Fogel, US Senator James Jeffords, Vermont Governor Jim Douglas, and Acting US Secretary of Transportation Maria Cino. Dr. Lisa Aultman-Hall was introduced as the Center’s founding director. Dr. Aultman-Hall served as the Director of the Connecticut Transportation Institute at the University of Connecticut from 2003 to 2006. Although her faculty positions (University of Connecticut and University of Kentucky) and graduate education have all been in civil engineering departments, her research has always extended beyond disciplinary boundaries into environmental engineering, geography and planning. This motivates her dedication to establishing the UTC at UVM as a strong cross-campus hub for excellence in transportation research and education.

The UVM and Vermont context was carefully considered by center advisors as they recommended specific topics and activities for the UVM Transportation Center. The following summary was presented by Dr. Aultman-Hall to Center advisors in Fall 2006. These relevant attributes of UVM are important background for this plan:

- Although UVM is the leading public university of fewer than 14,000 students in federal R&D dollars, and the flag-ship University of the state, the College culture is based in a liberal-arts tradition and educational model.
- The UTC reports to the Provost with an explicit charge to be interdisciplinary and to grow campus research.
- UVM is dedicated to being the “environmental university”.
- The Center is physically housed with VCET (Vermont Center for Emerging Technologies, an incubator center for high-tech companies) and the VACC (Vermont Advanced Computing Center, a new center with a focus on 3D visualization).
- UVM has a strong medical school, with a telemedicine program.
- UVM has a small, but growing engineering school, housed in the same College as the mathematical sciences, with a new focus on complex systems analysis.
- UVM has a large Natural Resources College with an environmental focus.
- There are a limited number of graduate programs in Arts and Science.
- Vermont has a keen interest in economic development in terms of growing the “creative economy”, environmental technology, tourism and its international ties to Montreal/Quebec.

Although UVM has numerous strong research activities related to transportation (Table 1), it has not previously had a large transportation focus, nor has it had a Transportation Center of any
form. Given this relatively “blank slate”, this UTC grant is a tremendous opportunity to create a truly relevant and interdisciplinary Transportation Center. The vision has not been constrained by any prior structure or focus. Instead the structure and focus of the Center has been based on the faculty and stakeholder input regarding where UVM’s strengths overlap with the most critical transportation research needs, both nation-wide and local.

Table 1: Existing UVM Transportation-Related Projects and Expertise - 2006-2007

<table>
<thead>
<tr>
<th>Project</th>
<th>College</th>
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<tbody>
<tr>
<td>Transportation Systems Modeling and Simulations</td>
<td>College of Engineering and Mathematical Sciences</td>
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<td>Transportation Sensor Technologies</td>
<td>College of Engineering and Mathematical Sciences</td>
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<tr>
<td>Environmental Particles Lab</td>
<td>College of Engineering and Mathematical Sciences</td>
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<tr>
<td>Integrated Models of Sustainable Transportation Planning and Land-Use</td>
<td>The Rubenstein School of Environment and Natural Resources</td>
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<tr>
<td>Spatial Analysis and Geographic Information Systems</td>
<td>The Rubenstein School of Environment and Natural Resources</td>
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<td></td>
<td>College of Arts and Science</td>
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<tr>
<td>Transportation and Historic Preservation</td>
<td>College of Arts and Science</td>
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<tr>
<td>Center for Rural Studies</td>
<td>College of Agriculture and Life Sciences</td>
</tr>
<tr>
<td>Telemedicine: Video-In-Ambulance Technology</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>Transportation Network Analyses</td>
<td>School of Business and Administration</td>
</tr>
<tr>
<td>National Highway and Traffic Safety Administration Summer Youth Program</td>
<td>College of Engineering and Mathematical Sciences</td>
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During the Fall of 2006, Dr. Aultman-Hall continued strategic planning with the UVM UTC stakeholders. This current, and second, version of the Strategic Plan is therefore the culmination of an intense planning and coordination process. The broad overall mission of the
UVM National UTC was defined. The mission is to develop integrated interdisciplinary research and education programs that advance the state and regional passenger and freight transportation system such that they promote a sustainable economy, healthy communities, appropriate land use development and re-development, equitable mobility, minimal environmental impacts and efficient energy use. This mission complements the broader mission of the overall UTC program “to advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research and technology transfer at university-based centers”.

UVM’s specific internal goals with the National University Transportation Center are:

1) to build graduate transportation research;
2) to build a truly interdisciplinary team of transportation researchers that contribute solutions to critical transportation problems; and
3) to have a sustainable, diversely funded Center at the end of the grant period.
## 1-A Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>CALS</td>
<td>UVM College of Agriculture and Life Sciences</td>
</tr>
<tr>
<td>CEMS</td>
<td>UVM College of Engineering and Mathematical Sciences</td>
</tr>
<tr>
<td>COM</td>
<td>UVM College of Medicine</td>
</tr>
<tr>
<td>CAS</td>
<td>UVM College of Arts and Sciences</td>
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<tr>
<td>Extension</td>
<td>UVM Extension Program</td>
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<tr>
<td>CUTC</td>
<td>Council of University Transportation Centers</td>
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<td>EPSCoR</td>
<td>Experimental Program to Stimulate Competitive Research</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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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>ITS</td>
<td>Intelligent Transportation Systems</td>
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<tr>
<td>MIT</td>
<td>Massachusetts Institute for Technology</td>
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<tr>
<td>NHTSA</td>
<td>National Highway and Traffic Safety Association</td>
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<td>RFP</td>
<td>Request For Proposals</td>
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<td>RITA</td>
<td>Research and Innovative Technology Administration of the USDOT</td>
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<td>RSENR</td>
<td>UVM Rubenstein School of Environment and Natural Resources</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 of the National Research Council/ National Academy of Engineering</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USDOT</td>
<td>United States Department of Transportation</td>
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<tr>
<td>USEPA</td>
<td>United States Environmental Protection Administration</td>
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<tr>
<td>UTC</td>
<td>University Transportation Centers Program in the RITA</td>
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<tr>
<td>UVM</td>
<td>University of Vermont</td>
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<tr>
<td>VCET</td>
<td>Vermont Center for Emerging Technologies</td>
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<tr>
<td>VTRANS</td>
<td>State of Vermont Agency of Transportation</td>
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1-B Center Theme

The theme of the University of Vermont National University Transportation Center is “Sustainable Systems and Advanced Technologies for Northern Communities.”

This theme represents a timely and relevant niche for University of Vermont advanced research, educational opportunities, and innovation potential. The theme builds upon UVM’s national reputation as a leading environmental university, and its role as an economic development engine for the State of Vermont and region. The theme will include work on at least four modes of transportation: highway; public transit; bicycling and walking. The theme also leverages the UTC’s growing partnerships with programs such as the Vermont Center for Emerging Technologies, an innovative business incubator located on the UVM campus, and the Vermont Advanced Computing Center (VACC).

The UVM UTC theme will also encourage program investments tied directly to the national priorities set for transportation research and technology by the US Department of Transportation. As recommended by the US DOT University Transportation Centers program, the UVM theme for its investments and projects may also serve multiple national surface transportation research priorities. In particular, UVM has interests in projects that complement and coordinate with the national priorities identified in the April 2002 report by the National Highway Research and Technology Partnership, “Highway Research and Technology: The Need for Greater Investment” as well as the USDOT FHWA Surface Transportation Environment and Planning (STEP) cooperative research program. The work proposed within the theme relates directly to goals 2 and 5 of the FTA’s 2005 Strategic Research Plan to increase transit ridership and protect the environment while promoting energy independence. The April 2002 report, for example, highlighted priorities in policy analysis, planning, and systems modeling that dovetail with the goals of the UVM National UTC. This includes programs focused on improving national understanding of the interactions between transportation and society, enhancing data-driven decision-making tools for transportation opportunities and challenges, studying and developing emerging technologies used in transportation planning and environmental protection, improving the monitoring of evolving trends in transportation use and technologies, advancing multimodal transportation planning to ease congestion and improve safety and efficiency, and studying integrated human health, land
use, and transportation issues as they affect future transportation policy.
The first four signature project topics selected in the strategic planning process lend themselves to established priorities in both the FHWA and the FTA within the USDOT:

1. Integrated Transportation and Land Use Models: Complex Systems Approaches and Advanced Policy Applications

2. Emissions and Performance of Alternative Vehicles in Northern Climates

3. Sustainable Transportation for Tourism

4. Non-motorized Transportation, Livability and Isolation in Northern Climates
1-C Center Director’s Summary

Planning of the UVM National University Transportation Center in 2005-2006 was undertaken by Acting Director, UVM Provost and Senior Vice President, Dr. A. John Bramley with the assistance of Dr. Melody Burkins. As the most senior official over research, education, and programs at the University of Vermont, Dr. Bramley guided early development of this UVM National University Transportation Center Strategic Plan so that it mirrors and directly enhances the long-term vision of UVM’s President Daniel Mark Fogel for the entire institution. This has, and will, ensure all present and future Center activities are an integral part of priority planning and investment strategies at the University of Vermont. Moreover, the placement of the UTC in the Provost’s Office as a campus-wide Center will ensure the UVM UTC has the ability to tackle interdisciplinary transportation issues that are critical to the 21st Century. These problems, illustrated in Figure 1, demand interdisciplinary educational preparation, and indeed interdisciplinary research. Transportation is not only integral to many of the problems facing the 21st century society, but more importantly a vital piece of the solution.

![Figure 1: 21st Century Transportation Systems](image)

Lisa Aufmman-Hall 2007
In the Spring of 2006, Dr. Bramley chaired a national search for the UVM National University Transportation Center Director and the process led to the hiring of Dr. Lisa Aultman-Hall. Although Dr. Aultman-Hall, has served as a civil engineering faculty member at two previous institutions, her research experience in traffic safety, bicycle transportation, route choice, freight transportation planning, and vehicle tailpipe emissions research have demanded interdisciplinary work. Dr. Aultman-Hall and the current UVM Provost, Dr. John Hughes, are above all committed to creating a truly relevant hub for transportation research at UVM which includes researchers from at least five Colleges. Dr. Aultman-Hall has a passionate belief that innovative interdisciplinary vision and methods are required to re-focus our global and community transportation systems. Moreover, in a small state with a limited state DOT budget, Dr. Aultman-Hall believes that interdisciplinary excellence will be the foundation for ensuring a diversely funded sustainable Center after the UTC grant period. Future partnerships and funding from the USDOT, the state DOT and other transportation agencies such as TRB are planned for the Center. However, sustaining the Center will require moving beyond funding proposals to only traditional transportation agencies. These may include the NSF, EPA, NIH, DOE, and private foundations.

The UVM UTC research program itself will achieve distinction by focusing on awarding project funds to a limited number of “signature projects”. At the end of the five year grant period, these four to six projects will have produced valuable results as measured by increased publications, conference presentations, and graduate student theses. Moreover, the interdisciplinary teams themselves should be working on additional projects sparked by their work at the UTC. In five years, the UVM National UTC will have enhanced educational programs at the University of Vermont by creating a transportation graduate certificate program, funding fellowships and offering seminars and workshops that support students and faculty becoming more engaged in national transportation priorities. It is essential that educational programs be cross-campus and interdisciplinary. In five years, the UVM National UTC will have created partnerships with key stakeholders to accomplish technology transfer to the public in New England communities (including youth), transportation agencies (including local agencies) and transportation professionals. By the end of the grant period, the UTC will have become an important resource to policy-makers and other decision-makers directly engaged in the future of sustainable transportation. In five years, the UVM National UTC will have developed creative and
productive partnerships that build upon its theme and expand the impact of its programs far beyond the UVM campus. The Center itself will have also attained a high level of financial sustainability through internal and external investments in program operations and grant funded research that ensure long-term success of the program well beyond the initial five-year grant. Sustainability is based on the premise that excellent contributions and work are valued and thus will be further supported with future investment.

In consultation with the UVM UTC advisors and faculty, Dr. Aultman-Hall has established the following vision statements for the Center:

Vision 1: The UTC will be recognized as a model interdisciplinary Transportation Center that, in partnership with communities and both public and private partners, promotes Vermont's transportation-related innovations nationally and internationally.

Vision 2: In this role, the UTC will provide expertise for state decision makers, pursue applied research to solve existing transportation problems, and conduct leading edge fundamental research to advance the overall transportation industry. Research will be supported by UTC Signature Research Project grants, UTC small grants to faculty, graduate student fellowships and externally funded research generated by UTC-led proposals.

Vision 3: The UTC will be a distinct independent academic organization. The UTC will be recognized for its ability to act as an informed unbiased honest broker and source of expertise for communities and public agencies pursuing sustainable transportation solutions.

Vision 4: The UTC will develop and maintain models, including innovative complex systems-based transportation-land use models that will serve as powerful technology-based decision tools for stakeholders to consider energy, environment and economic development factors as they pursue responsible long- and short-range transportation planning.

Vision 5: The Graduate Transportation Certificate Program will include numerous students from all Colleges on campus in an on-going and energetic interdisciplinary forum that increases the number of talented new professionals attracted to careers in the transportation sector.

Vision 6: The UTC will actively promote transportation workforce development including attracting new talent to the interdisciplinary transportation field. The UTC and its partners will provide continuing education programs, workshops and conferences for broad audiences.

Vision 7: The UTC will have a strong partnership with the Vermont Agency of Transportation, the USDOT, the EPA, the DOE, and other Transportation Centers, especially those in New England. Moreover, the UTC will serve as a bridge between
these traditional transportation groups and other private and public stakeholder groups such as those primarily concerned with energy, public health, the environment, and economic development.

2 Program Activities

The University of Vermont National University Transportation Center will support programs that advance local, regional, and national goals for sustainable, interdisciplinary, and leading-edge transportation research, education, and innovative, advanced technologies. Specifically, all programs supported by the Center will maintain and provide annual measures of performance and achievements towards the national US DOT University Transportation Center program goals for Research Selection, Research Performance, Education, Human Resources, Diversity, and Technology Transfer.

2-A Research Selection

Goal: The UVM National UTC will ensure an objective process for selecting and reviewing research that balances multiple objectives of the program.

Baseline Measures: Progress towards the UTC Research Selection Goal will be measured by:

(a) the number of transportation research projects conducted, reported\(^1\) as:

i. the number of basic research projects,

ii. the number of advanced research projects,

iii. the number of applied research projects, and

(b) the total budgeted costs for those projects.

In addition the UTC will track the number of proposals submitted for its programs, as well as the Colleges of the faculty PIs as an indication of interdisciplinary involvement.

Research Selection Program Outcomes and Planned Activities:

There will be three categories of research projects pursued during the national UTC grant:

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\(^1\) Projects may be reported in more than one category, if applicable.
1) **Signature Research Projects (Round 1)** – 3-year grants of up to $2.5M starting in Fall 2007 with topics and teams selected based on pre-proposals in fall 2006. Full workplans reviewed late spring 2007. There will be only four projects.

2) **Signature Research Projects (Round 2)** – 3-year grants of up to $750K starting Fall 2007 or Fall 2008 selected from full proposal submitted in April 2007. There will be only two projects.

3) **Small Faculty Grants** – 1-year grants of up to $50K starting in each of Fall 2007, Fall 2008 and Fall 2009. There will be up to 15 total grants.

One of the ways the UTC at UVM will achieve distinction is by awarding project funds to a limited number of interdisciplinary “Signature Research Projects” started at the beginning of the grant period and running for three years. There are only two rounds of the signature project proposals, both undertaken in the academic year 2006-2007. Because these projects are 3 years long and involve significant funding, the UVM UTC can only select these projects once at the start of the current grant period (2007). However, we propose only to award one year of funding at a time - so if for example year 1 objectives are not accomplished we can elect to not award year 2 funding - as a result the UTC has required signature project proposals to contain clear year by year deliverables.

**Signature Research Projects (Round 1)**

As part of the strategic planning for the Center, on August 1, 2006 the UTC issued its first call for Signature Project **pre-proposals** within the Center’s “theme” of Sustainable Systems and Advanced Technologies for Northern Communities. Roundtables for faculty discussions of the Signature Project concept were held in September 2006. Awards to research projects through the UVM National UTC will be made through a competitive process in which submitted project pre-proposals or proposals will be ranked internally by a Committee of UTC researchers and members of the Provost’s Office with external advisory committee (see Section 3) input and then evaluated through external peer-review. At least three reviewers, including one from the USDOT, will be used for every proposal. The USDOT reviewer may not be the same person or persons serving on the external advisory committee as we will seek reviewer with expertise and experience as close to the proposal topic as possible. A total of six reviewers will be invited to review each proposal. At least half will be from other universities, many identified with the assistance of other UTCs. Remaining reviewers will include staff from state DOTs (Vermont...
and others), appropriate staff from non-profit agencies, and private groups when appropriate research expertise is available. A small honorarium may be paid to non-USDOT proposals reviewers. The evaluation criteria include the following questions that will be provided to peer-reviewers:

1. Is the project truly relevant to the UVM National UTC theme? Does the project fit within the topics recommend by UTC advisory groups?
2. Is the project relevant to broad, national strategic planning goals of the US Department of Transportation for research and development, including the UTC program?
3. Does the project have the potential to make fundamental research contributions, as well as offer technology transfer and community outreach?
4. Does the project have realistic interdisciplinary activities? Is the project team qualified to accomplish the project goals?
5. Does the project have matching support?
6. What is the intellectual merit of the proposed activity?

Research selection criteria will also include an evaluation of whether realistic plans for results within the three years of the grant award. Researchers must demonstrate that the research program has timely relevance to transportation and policy professionals. The research undertaken must have potential connections to economic development and technology transfer opportunities throughout Vermont and beyond.

By September 30, 2006, the UTC had received 35 pre-proposals from PIs in six different Colleges. During the remainder of the Fall semester, an extensive advisory process was undertaken aimed at selecting the best project foci to serve as the ‘foundation stones’ for the new Transportation Center. In late October and early November 2006, the pre-proposals were reviewed by an internal multidisciplinary committee of five individuals (the UTC director, two UVM senior research staff both with research backgrounds and Ph.D.s, one full professor, and one other research Center director. In November and December 2006, the topics and tasks in the objectives of the remaining 20 pre-proposals were presented to four meetings of the external advisory committee (the details of the committee structure and objectives are described later in the plan). In addition, the Director discussed the proposed topics by phone and in-person with numerous in-state and out-of-state stakeholders and transportation experts.

In January 2007, a subset of faculty investigators was invited to draft full workplans in the following four Signature Project areas:
1. Integrated Transportation and Land Use Models: Complex Systems Approaches and Advanced Policy Applications
2. Emissions and Performance of Alternative Vehicles in Northern Climates
3. Sustainable Transportation for Tourism
4. Non-motorized Transportation, Livability and Isolation in Northern Climates

The research objectives of these four Signature Projects were drawn from portions of 15 of the pre-proposals and the four teams of investigators have strong interdisciplinary membership. Collaborative workplan development is being facilitated by the UTC Director and staff. After approval of this UTC strategic plan by the USDOT, these workplans will be peer-reviewed by external reviewers (review form attached in Appendix C). A committee will make the final awards based on the reviews. This committee may include the Provost, the Vice President for Research and Graduate Education, and faculty who study transportation or the UTC Director. The final decision maker may vary from competition to competition based on which faculty propose in response to a particular call. For example, if the faculty director or faculty relatives of the director are proposing, we believe that that it would be a conflict of interest for the Director to make final decisions. Sufficient UTC budget has been allocated to fund all four projects, if the peer reviews indicate all proposals merit funding. The proposed projects are discussed here in order to more fully communicate the vision for how research and other activities will be focused within the Center’s theme and how this work serves the research needs of the FHWA and FTA.

The first project entitled Integrated Transportation and Land Use Models: Complex Systems Approaches and Advanced Policy Applications is proposed to have an interdisciplinary team of 12 researchers. The overall objectives are proposed to be:

a) integration of complex systems modeling techniques into traditional transportation models;
b) integration and improvement of existing microscopic land use and transportation system models such as Transims, UrbanSIM, TransCAD (note that this does not duplicate but rather integrates with two major USDOT projects already funded at UVM);
c) development of a sketch model alternative to the complex system approach in b) and comparison of the policy implications of the alternative output;
d) development of new improved policy-relevant metrics that can be estimated based on transportation model outputs:
   i) carbon footprints
   ii) local agriculture freight access
   iii) road runoff impact including the spatial extent of the impact
   iv) storm water impacts of paved versus unpaved roads
   v) network robustness and redundancy for applications including security.
The second proposed signature project is entitled *Emissions and Performance of Alternative Vehicles in Northern Climates*. This project includes on-road real world sampling of both light duty vehicles and transit busses. Furthermore, in addition to focusing on performance and emissions as related to the northern climate and temperatures, the project will evaluate the impact of road grade. This is not fully accounted for in the models currently used by the FHWA, DOTs and EPA. The project will also include ultra fine particle number counts which relate directly to the public health impacts of vehicle emissions, such as asthma and cardiovascular disease. Most existing research includes only gas emissions from tailpipes, focuses on total particle mass or uses only lab-based data. We will also measure gas emissions as these are particularly relevant to global climate change. In addition to on-road transit bus emissions measurements while operating on biodiesel, this project proposes purchase of a diesel engine for lab experimentation with alternative biodiesel fuels. Under these controlled conditions better results will be obtained. This portion of the project will be focused on quantifying the emissions variability as a function of bio-diesel composition for both light duty vehicles, as well as heavy duty vehicles such as transit busses.

Within the vehicle emissions and performance signature project, social scientists have been integrated with engineers to evaluate the public perceptions of alternative fuels and tailpipe emissions. The objective is to understand what people know, what they need to know, and how this impacts their consumer and travel behavior.

The third proposed signature project is entitled *Sustainable Transportation for Tourism* and includes faculty from engineering, science, social science and the University Extension. This team proposes to work together to develop level of service indicators to measure traffic congestion and pursue congestion mitigation in tourist areas. Traffic patterns in tourist areas are different than those found in typical urban areas. This group will also develop and evaluate a pilot program called the “green bus certification” system. The impact of this program on travel and consumer patterns, as well as the definition of what types of transit buses are “green” will be valuable to 1) northern communities that depend on tourism, 2) transit agencies and 3) the public. The topic of transportation and tourism is not widely covered at universities and we believe this research project will provide the impetus for further growth of this topic as a graduate focus at UVM. Moreover, this topic requires significant interdisciplinary involvement for success.
Finally, the UVM UTC proposes to partner with the New England Transportation Institute and the Resources Systems Group of White River Junction to study *Non-motorized Transportation, Livability and Isolation in Northern Climates* as a fourth signature project. The stakeholders believe it is essential to study how the climate in northern areas affects non-motorized transportation and the associated health benefits. Furthermore, we hypothesize that the sense of isolation in rural areas, particularly for older citizens, is impacted by the weather and seasons in northern climates. This group has a particular interest in understanding what type of public transit system can serve the needs of different northern landscapes, particularly when faced with rural low densities as an additional challenge. We believe it is essential as a congestion mitigation measure to include both bicycle and walking transportation in the work of our Center. This part of the project will focus on rural, urban and suburban areas. This project team includes representation from the College of Medicine which creates an important partnership for transportation and public health.

**Signature Research Projects (Round 2)**

In winter 2007, the Director issued a second RFP for proposals for two additional Signature Projects. A total of $1M of the USDOT UTC direct grant funds (or $1.52M total direct plus indirect) has been suggested as available over the two additional projects, the maximum direct funds per project is $500,000. Researchers at UVM worked this semester to propose these topics. At this time, the UTC has received the following project proposals: telemedicine; data mining of ITS data; storm water quality from porous pavements; modeling the national transportation energy system; and new mobility hubs / car sharing. This proposal process differs from round 1 in that all potential topics that fit within the Center theme were invited. Pre-proposals were not used. However, the review of full proposals will follow the same procedure outlined above.

The Signature Project selection process will NOT be repeated during this UTC grant. Because projects are three years in length, only the yearly continuation of each Signature project will be evaluated. For example, if the year 1 deliverables in a project are not accomplished year 2 funding may not be provided. This evaluation will be conducted annually by UTC staff in consultation with the external advisory committee based on quarterly or semester reports from project PIs. Project PIs will present interim findings to one meeting per year of the external
advisory group. Project accomplishments will be assessed against milestones and deliverables included in each proposal.

**Small Faculty Grants**

Each year for three years during the grant period, 1-year grants of up to $50K will be made to single investigators. The peer-review process described above will be used. The grants will start in each of Fall 2007, Fall 2008 and Fall 2009. There will be up to 15 total grants.

In Spring 2007, a call for proposals was issued that invited any UVM faculty member to submit research proposals for Small grants on any topic that fit within the UTC theme. The second and third calls will be issued in September 2007 and 2008 for proposals due in December 2007 and 2008. For these later calls, more specific focused topics will be invited based on input from the external advisory committee in Summer 2007 and 2008. The objective will be to include topics within the UTC theme, but also target foci which serve relevant transportation agency needs at the same time research capacity is built for UVM. The external advisory committee is particularly well-suited to identify these needs because unlike internal stakeholders, they have no vested interest in funding of the awards.

For both the small grants and signature projects it is essential that research problems be selected carefully to ensure overlap with both USDOT needs and UVM strengths. This national UTC grant to UVM is an opportunity to found a new innovative Transportation Center and it is UVM's intention that the research conducted will be the base from which to grow a sustainable Transportation Center to have research, education, outreach and workforce development in transportation in Vermont and the region. To contribute to this goal, significant external proposal development is planned. The Center's role in coordination and support for this proposals is central to growing diverse sustainable transportation research capacity.

**Required Activities:** As discussed in the preceding section, the UVM National UTC will meet the USDOT UTC requirement that proposal review panels include peers and other experts in the field of study being reviewed, with at least one relevant individual from the US DOT involved in the process. In addition, selection criteria will be clearly stated in the RFP to ensure that projects address the UVM National UTC theme, encourage diverse and interdisciplinary public-private partnerships, address UVM priorities for advancing cutting-edge, sustainable
environmental enterprise, ensure full 1:1 match of the federal funding granted to the project, and have a written plan for education and outreach of research results to the broadest audiences, from national transportation research leaders to local and community public audiences who have increasing interest in how federal tax dollars are spent on university-based research. These research selection activities are embedded in the procedure and process described above.

**Recommended Activities:** The US DOT RITA strongly encourages that each Center support national transportation research needs by addressing high priority areas identified by US DOT and its Operating Administrations. The planned activities described above illustrate how the UVM UTC will address topics of priority to the FHWA and FTA including the STEP and advanced research programs.

**Performance Indicators:** Updates to baseline and other measurements of Research Selection will be compiled annually and reported publicly on the website of the UVM National UTC, in publicly-available Annual Reports by the Center, and in official reports to the USDOT RITA program overseeing National UTC achievements. Information on all criteria and indicators required by the USDOT UTC program will be gathered and maintained centrally by UVM National UTC staff. The UVM fiscal year will be used as the UTC year so that tracking data may be extracted from the required faculty performance reporting documents which are submitted by all faculty in late Spring. Contracting and budgeting information will also be conducted in coordination with the larger UVM Office of Sponsored Programs (responsible for all University of Vermont contract oversight) and the UVM Office of Grants and Contracts Accounting (responsible for all University of Vermont invoicing and reporting oversight).

### 2-B Research Performance

**Goal:** To create an ongoing program of basic and applied research whose products are judged by peers or other experts in the field to advance the body of knowledge in transportation.

**Baseline Measures:** Progress towards the UTC Research Performance Goal will be measured by:

(a) the number of peer-reviewed transportation research reports and published, and
(b) the number of transportation research papers accepted for presentation at academic / professional meetings.

Research Performance Outcomes: Over the next five years, the UVM National UTC is aiming to accomplish a minimum of a five-fold increase in the number of transportation-related, peer-reviewed research reports and books published, transportation-related research papers and presentations accepted for academic / professional meetings, and external awards for transportation-related research and education programs.

Planned Activities: In addition to the work conducted by faculty and graduate students who are awarded UTC Signature research projects and small research grants, the Center will employ professional and support staff to complement research teams. The following staff described in detail in section 3 will work directly on research tasks: research engineer; senior research analyst; research analyst and technician. These staff will assist with paper and report writing and also facilitate the preparation of external grant proposals.

Travel support for conferences will be provided to Center faculty.

Workshops and conferences will be hosted or co-hosted by the UTC which will expand the research networks and dissemination of UVM UTC related work. These are described in section 2F of this plan.

Research proposals are required to have timelines with milestones and explicit deliverables. This is necessary in order to allow UTC staff to monitor projects. Short interim reports from PIs will be required by semester (three times per year). From these reports the UTC will extract performance measures needed for UTC and internal reporting. Furthermore, in multi-year projects, subsequent year funding will only be awarded if milestones and deliverables are met.

As noted in the preceding section, evaluation of signature research projects underway will be conducted annually by UTC staff in consultation with the external advisory committee based on quarterly or semester reports from project PIs. Project PIs will present interim findings to one meeting per year of the external advisory group. Project accomplishments will be assessed against milestones and deliverables included in each proposal.
UVM currently has no formal procedures for final report review. External peer reviewers are difficult to recruit and often busy schedules result in less than ideal reviewing. To address this limitation two approaches will be taken to review of final reports. First, small grant project final reports will be thoroughly reviewed by internal UTC staff with the assistance of state DOT transportation professionals when possible. Changes will be required before final report publication. For signature project final reports, an external peer reviewer with focused expertise will be recruited and paid an honorarium for review comments. Graduate student research funded through fellowships and other research assistantships will be reviewed using the University of Vermont School of Graduate Studies formal procedures for Master’s and PhD thesis review. Journal and conference paper review will be according to the established procedures of the organization. Research teams will be required to provide a copy of all papers to the UTC and to acknowledge their funding source.

**Performance Indicators**: Baseline measures for research performance will be extracted by Center staff from the required faculty annual reporting documents at the UVM.

### 2-C Education

**Goal**: A multidisciplinary program of course work and experiential learning that reinforces the transportation theme of the Center.

**Baseline Measures**: Progress towards the UTC Education Goal will be measured by:

(a) the number of courses offered that UVM considers to be a part of the transportation curriculum by:
   a. number of undergraduate courses
   b. number of graduate courses

(b) the number of students participating in transportation research projects\(^2\) by:
   a. number of undergraduate students
   b. number of graduate students

\(^2\) this number counts only individual students: one student participating in two research projects counts as one student).
**Education Program Outcomes:** In the next five years, the UVM National UTC will have an educational program that both encourages existing students to explore interdisciplinary programs at the Center and that also attracts prospective students to the University of Vermont for interdisciplinary, transportation-related education and research.

**Planned Activities:** To achieve the goals and outcomes described above, the UVM National UTC will support the following in collaboration with the relevant academic units:

(a) new courses (included one described below) will be part of an interdisciplinary graduate certificate program in transportation established under the guidelines of the UVM Graduate College;

(b) an interdisciplinary graduate fellowship coordinated directly with courses related to transportation;

(c) a Student of the Year Program, with a $1000 award and funding to cover student travel to award ceremony in Washington, DC at winter meeting of Transportation Research Board; and

The UTC fellowship recipients will be nominated by UVM faculty. The students may be incoming or continuing UVM graduate students in any College. The value of the award is set at $15,000 total for the fall and spring semester. This level will qualify all students for the full out-of-state tuition differential (used as an in-kind match), but in many Colleges additional funding is expected to come from the student’s department or advisor to make total funding packages competitive. Up to 15 awards per year will be made. Awardees will be selected by a committee of UTC faculty or staff based on two criteria: GPA and relevance of the student’s proposed research to the UTC theme.

Students will gain transportation exposure including research activity in two ways. First, they will work as an intern for either their faculty advisor or for the UTC. Second, students will be required to enroll in a new interdisciplinary course in transportation which was piloted in Fall 2006 entitled “Critical Issues for Transportation in the 21st Century”. In this course, students participate in seminars on the problems and potential solutions facing each mode of transportation. Students groups are formed where students from different disciplines work together on the class projects. For example in Fall 2006 student groups studied the critical problems facing ferry transportation agencies, transit agencies in small communities and university campus transportation planners. Discussions are underway to develop other new
transportation courses including transportation logistics in the College of Business; transportation policy in the Public Administration Program. A new course on transportation air quality was offered this year in the School of Engineering by a faculty member recruited for the UTC.

Undergraduate fellowships of $500 or $1000 for seniors in any College are also proposed. These students would be required to enroll in a transportation class where they will conduct group research on the perceived and actual transportation problems for a selected target group in the community. Through this exposure it is hoped the best students will be attracted to graduate school in a transportation field. A new second year undergraduate Honors transportation course was approved by UVM in December 2006. It was proposed by three faculty associated with the UTC. The course is based on the case study method of teaching and is intended to attract the very best UVM students, the Honors students, to focus more on transportation in their education and ultimately career.

**Performance Indicators:** Updates to baseline measures for Education Programs will be compiled annually and reported publicly on the website of the UVM National UTC, in publicly-available Annual Reports by the Center, and in official reports to the USDOT RITA program and others overseeing National UTC achievements. Measurements will be made in coordination with the UVM Institutional Studies Office, whose mission is to gather, analyze, interpret, and distribute data regarding student, faculty, staff, salary and curricular programs. The UVM Institutional Studies office directly supports the management, planning, budget, and policy activities of the University and its standard activities include routine annual reports and special requests as well as survey research, cohort analysis, salary analysis, demographic analysis, modeling, and enrollment projection.

### 2-D Human Resources

**Goal:** An increased number of students, faculty, and staff who are attracted to, and substantially involved in, undergraduate, graduate, and professional programs of the Center.

**Baseline Measures:** Progress towards the UTC Human Resources goal will be measured by:

(a) The number of advanced degrees awarded by the University of Vermont that are considered transportation-related at the:
a. Master’s Level
b. Doctoral Level

(b) For the advanced degrees listed above, the number of students\(^3\) who were enrolled towards achieving a:
   a. Master’s degree in the most recent academic year
   b. Doctoral degree in the most recent academic year

(c) For the advanced degrees listed above, the number of students who graduated with a:
   a. Master’s degree in the most recent academic year
   b. Doctoral degree in the most recent academic year

**Human Resources Program Outcomes:** Over the next five years, the UVM National UTC will increase the number of students, both graduate and undergraduate, in transportation-related coursework and degrees. The goal of the UTC is to increase student involvement at least 5 times the baseline level. UVM will also increase the number of transportation-related advanced degree programs, both Master’s and Doctoral, in comparison to the 2005-2006 academic year baseline levels.

**Planned Activities:** The UVM National UTC will work closely with the academic leadership of the University, including key deans and directors, to recruit and advertise UVM’s interdisciplinary coursework and research. The web site, posters and brochures are planned. In particular, the faculty at UVM intend to reach out to excellent undergraduate schools in New England without graduate programs. In this way, we intend to attract very talented students to focus on transportation studies at UVM. A key tool in creating this interdisciplinary graduate student network at UVM will be the Graduate Certificate program discussed in a previous section and the graduate fellowships. The Certificate program will be housed in the Graduate School and therefore available to graduate students in any College. The Certificate requires 3 core courses in which students from different disciplines will study transportation issues together. The courses will also be used towards the student’s degree program. Thus far, the following Colleges have expressed strong interest in this program and have students in the first

\(^3\) For this measurement, the institution will count individual students, e.g.: one student pursuing or receiving a dual or multiple degrees is measured as only one student.
new transportation course in either Fall 2006 or Fall 2007: Arts and Science (Geography, and Chemistry); Agriculture and Life Sciences (Public Administration, Communications, Community Development and Applied Economics), Engineering and Mathematical Sciences; Natural Resources; and Nursing ad Health Sciences. The Certificate is based on the premise that integrated interdisciplinary approaches are necessary to create human resources for the future transportation system.

The UVM National UTC investment will both increase and attract a new workforce of highly-educated professionals interested in transportation issues, a priority for the US DOT. The UVM National UTC intends to provide public and private leaders in Vermont and beyond with qualified personnel and problem solvers needed to address modern transportation issues and critical for the future success of sustainable transportation projects and programs.

Limited UTC grants funds are proposed to bring visiting faculty fellows from other universities to the UVM campus in Burlington, VT for their sabbatical years. In this way, UVM faculty will build partnerships with established transportation faculty at other universities. These relationships are intended to lead to interdisciplinary collaborations and future proposal preparation.

The UTC grant will be used to partially support new transportation faculty hires in up to three Colleges at UVM. These faculty will be hired for both transportation research and teaching expertise and thus their potential to increase the over transportation research capacity at UVM, especially externally funded research.

**Performance Indicators:**

The number of students, faculty, and staff involved in UTC research and other activities will be tracked by sub-project.

Updates to baseline and other measures and Performance Indicators for Human Resources will be compiled annually and reported publicly on the public website of the UVM National UTC, in publicly-available Annual Reports by the Center, and in official reports to the US DOT RITA program overseeing National UTC achievements. Baseline data measurements will be made in coordination with the UVM Office of Institutional Studies whose responsibility is to gather,
analyze, interpret, and report data regarding student, faculty, staff, salary and curricular programs. The UVM Office of Institutional Studies directly supports the management, planning, budget, and policy activities of the University and its standard activities include routine annual reports and special requests as well as survey research, cohort analysis, salary analysis, demographic analysis, modeling, and enrollment projection.

The UTC will track the career development of new faculty it helps hire for UVM. The UTC will conduct surveys to evaluate whether the visiting sabbatical faculty result in useful research growth for UVM faculty. This is very important as expansion of this program may be possible with other funding.

2-E Diversity

Goal: To increase the number of 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.

Baseline Measures: Progress towards the UTC Diversity Goal will be measured by internal UVM performance measurements and are not required to be reported to the US DOT RITA program office given privacy concerns.

Diversity Program Outcome: The UVM National UTC intends to encourage diversity throughout Center programs by showing measurable increases to the numbers of diverse undergraduate students, graduate students, and professionals involved in Center activities and programs.

Planned Activities: For encouragement of diversity in coordination with the larger UVM diversity initiatives, at least one Center staff member in addition to the Center Director will have the responsibility to support, oversee, and implement advancement of the diversity goal for the UVM National UTC in their job description. This person will coordinate closely with the UVM Office of Multicultural Affairs and the UVM President’s Strategic Plan for Diversity to encourage diversity in all programs related to the Center throughout the University. Diversity goals in underrepresented populations in the transportation-related fields of engineering and math will work closely with the UVM College of Engineering and Mathematics.
The UTC proposes that relationships with undergraduate colleges, perhaps urban undergraduate colleges, with more diverse populations than Vermont be developed to ensure a diverse pool of graduate applicants. The Provost is strongly encouraging that any faculty hiring within the transportation focus area include diverse hires as a requirement for his support of faculty growth in this area.

The UTC will work to improve coordination and expansion of UVM’s established NHTSA Summer Transportation Institute that serves as potential recruitment for pre-college students interested in transportation professions.

**Performance Indicators:** Because of privacy concerns raised by grantees that received UTC program grants in prior years, RITA no longer requires the collection of performance measurements regarding diversity.

### 2-F Technology Transfer

**Goal:** To increase the availability of research results to potential users in a form that can be directly implemented, utilized, or otherwise applied.

**Baseline Measures:** Progress towards the UTC Technology Transfer goals will be measured by:

(a) number of transportation seminars, conferences, symposia, distance learning classes, etc., conducted for the public and practicing professionals, and

(b) number of practicing professionals participating in the events listed in (a)

**Technology Transfer Outcomes:** The Center will also be active as a hub and partner for continuing education and professional development of local and regional transportation professionals. It is the goal of the new UTC at UVM to become the expert source of transportation information in our theme area by the end of this grant. This goal will be accomplished by interacting with and conducting outreach aimed not only at transportation professionals, but also New England communities and the public, including non-profit agencies working for more sustainable transportation in northern communities. The UVM UTC has
started discussions with the Local Technical Assistance Program in VT, UVM Continuing Education and the Cooperative Extension. The intention is that the number of transportation related activities in these programs related to the UTC theme will increase over the life of the UTC grant. The Technology Transfer and research dissemination portions of the UTC program will increase the amount of information disseminated to transportation professionals, interdisciplinary interests surrounding the transportation profession (engineering, environment, economics, etc.), the business and entrepreneurial communities, and the general public regarding innovative systems and technology advancements in transportation.

**Planned Activities:** The UTC is currently searching for a communications assistant and a program coordinator to lead these activities for the UTC. A comprehensive website has been outlined and started. The transportation holdings of the UVM library will be improved including inclusion of the Transportation Research Board publications which have not previously been included at UVM.

No professional development workshops yet have been formally proposed. The target audience for these activities are current transportation professionals of those who have started requiring transportation expertise to pursue their own activities in a more interdisciplinary environment. An example, of this professional scope expansion might be the recent interaction of non-motorized transportation professionals with public health professionals. We expect no more than 10-12 workshops per year and that all will be jointly funded with direct UTC funding being a maximum of 50%. Discussions with external partners on the following workshop topics have begun:

- Vermont Local Roads (LTAP)
  - Local road safety audits
  - Bicycle and Pedestrian Facility Design
  - Creating a Local Road Plan
  - ITS in Vermont

- Clean Cities Program (DOE)
  - Anti-idling education
  - Alternative Fuel Vehicle Rodeo
  - Stakeholder Roundtables

- Continuing Education (UVM)
  - Ecological Community Design
Several conferences are proposed over the five year period and are under discussion with the UTC as a lead partner. These include the following:

1. Transportation and Historic Preservation: Context Sensitive Solutions in an Era of Budget Constraints (Partners: UVM Historic Preservation Program, Vermont Agency of Transportation, and other state DOTs)
2. TRB Rural Public & Intercity Bus Conference (Partners: TRB, UVM Community Development and Applied Economics, Center for Rural Studies)
3. Complex Systems and Sustainable Mobility (Partners: UVM Center for Complex Systems, University of Michigan, UVM College of Engineering and Mathematical Science)
4. Transportation and Economic Development (Partners: Rocky Mountain Institute, UVM, State of Vermont)
5. Summer Institute of the Center for Excellence in Rural Safety (Partners: University of Minnesota, New England Transportation Institute)

The UTC will produce a quarterly newsletter that will include research results from its Signature Projects aimed at a non-technical, but professional level audience. In addition, to its own research results, the UTC intends to be a source of information on related topics. For example, if the signature project on tailpipe emissions goes forward, the UTC would endeavor to disseminate background more basic information related to vehicle emissions than might be collected during the leading-edge experiments. This type of dissemination sets the context for leading edge university research and also increases the public and professional interest in the research.

The UVM Center will maintain an up-to-date Internet home page which contains UTC reporting measures in addition to other articles, data and resources. The UVM UTC will participate in occasional meetings of UTC and/or DOT experts on high-priority topics, and provide expert advice to DOT on technical or education topics.

**Performance Indicators:** Updates to baseline and other measures will be compiled annually and reported publicly on the website of the UVM National UTC, in publicly-available Annual Reports by the Center, and in official reports to the US DOT RITA program overseeing National
UTC achievements. Coordination of information will be led by the Center’s Program Coordinator.
3 Management Approach

The Center Director will be responsible for oversight of all programs and programs requirements of the UTC Program grant, including personnel. Center management is explained in further detail below, but UVM and US DOT recognize that – should details of this model change over the life of the UTC grant – US DOT RITA will be updated in writing and the changes will appear in annual planning and budget documents.

There has not previously been a Transportation Center or Institute at the UVM, therefore the proposed UTC structure has been designed to first meet the requirements of the national UTC grant, but second to build a lasting transportation research and education capacity at UVM. It is anticipated that by the end of the grant period the USDOT UTC grant will be only one of numerous funded programs and activities at the UVM Transportation Center.

The Center will be guided by three groups of advisors. First, as required by UVM’s internal guidelines for Research Centers, the UTC will have an advisory group of Deans from the Colleges which have faculty involvement at the Center. At this point, an application for formal Center designation has been submitted to the UVM Faculty Senate. The subset of Colleges that are active within the UTC is still being established. The UTC has starting growing relationships with the following Colleges: Agriculture and Life Sciences, Arts and Science, Business, Engineering and Mathematical Sciences, and Medicine. The committee of deans will formally meet with the Director twice per year. At these times an update of UTC work will be provided and the Deans will provide explicit advice on how to expand the interdisciplinary graduate research endeavors of the Center.

The Center will have a faculty advisory committee of six core faculty with direct experience in transportation. The committee will first meet in May 2007 and will have representation from all Colleges active within the UTC at that time. This advisory committee will meet with the Center Director and select staff twice per year. A program will be designed to allow brainstorming of potential future research needs within transportation that interdisciplinary teams at the UVM should pursue. An additional important goal for the faculty advisory group will be as ambassadors in their College for the Center and to assist in distribution of program information. The faculty will bring feedback on the interests and concerns of their College’s faculty. When
potential grant opportunities (both internal and external) are available these faculty will provide input on the expertise available within their College to team with the UTC.

Finally, the Center will have an external advisory committee of stakeholders and experts from within Vermont and beyond. The current committee includes the USDOT, transportation agencies, directors of other UTCs, transportation faculty from other universities, research Center directors from UVM, transportation consultants from the private sectors and non-profit advocacy groups. In the Fall of 2006, two face-to-face advisory meetings and two conference calls were held to solicit direction on the strategic plan, Center structure, Center programs and Signature Project foci. In addition, numerous one-on-one calls were undertaken to specific advisors. A subset of these individuals will form the formal external advisory committee and they will meet again in late Spring 2007. The following guidelines for the Role of the External Advisory Committee have been set:

**Composition:** Representatives from Industry, Transportation Agencies, University Transportation Centers and Universities from Vermont and Beyond.

**Objective:** Provide feedback and guidance on Center development and projects including identification of research needs within the industry. UVM Transportation Center work should complement but not duplicate the work of other UTCs.

**Meetings:** There will be two committee meetings per year. Infrequent emails will also be used to request feedback from committee members.

**Sub-committees:** Proposal review, project evaluation and other special tasks may be assigned to ad-hoc sub-groups of the advisory committee.

### 3-A Institutional Resources

The University of Vermont will support and coordinate programs at the UVM National UTC with institutional resources that include program leadership and oversight through coordination with long-term UVM strategic priorities through the Office of the Provost. This positioning for the UTC ensures the Center will be truly interdisciplinary and includes five or more Colleges. The maintenance and upkeep of office, laboratory, and educational facilities used by UVM National UTC programs, partial salary of faculty and staff involved in UVM National UTC programs, and legal and operational support of public-private partnerships for UVM National UTC programs that facilitate UVM faculty and staff working with the private sector will be provided by UVM. UVM will also provide general faculty and staff support in all programs related to the strategic
priorities of the US DOT grant, even when not directly involved in UVM National UTC program awards, including UVM programs dedicated to advancing research, coordinating education and professional development, and encouraging technology transfer.

The UVM Transportation Center has been located in Farrell Hall with three other interdisciplinary Centers. Farrell Hall will include a decision theater with visualization capability, computer lab, an visualization immersion cave, meeting space and offices. A small portion of the renovations is proposed to be charged to the UTC grant, some state funding will be used to match this contribution and other Centers’ funds are used for the majority of the costs. UVM will provide the web internet space and Internet connections for the UTC.

Center staff, although grant funded, will have the fringe benefits offered to all full-time state or centrally funded UVM employees.

3-B Center Director

The Center Director (Appendix B) is responsible for implementing the Center’s Strategic Plan and ensuring compliance with all other UTC Program requirements. The Center Director will direct and oversee the Center’s funds, personnel, and programs. The Center Director will be 80% funded by the UTC grant and holds a faculty position in the School of Engineering. A secondary appointment in Community Development and Applied Economics has been approved.

The Center Director will also represent the University of Vermont and the UVM National UTC at external meetings, with a UTC requirement to participate in up to two annual meetings held by the USDOT with the directors of all of the University Transportation Centers.

3-C Center Faculty and Staff

The proposed organizational chart for the UTC is shown in Figure 2. The Center Director and staff will be responsible for:

1. Management of the Center including financial tracking;
2. Participation in Signature Research Projects with faculty and students;
3. Outreach and promotion of the Center and its work;
4. Management of student programs;
5. Partnership with internal and external groups for workshops, conferences and educational programs;
6. Proposal development for additional research and educational programs including matching funds;
7. Tracking and preparation of performance metrics;
8. Publication of the website and Center reports;
9. Dissemination of project results; and
10. Internal UVM reports on operations and programs of the UVM National UTC as requested to the UVM Office of the Provost and the UVM Board of Trustees.

Financial and Office Support – In order to ensure minimal overhead costs and effective use of resources, the financial and office support staff of the UTC will be shared with the other UVM Centers housed at Farrell Hall.

Figure 2: UTC Organizational Chart
The UTC will have 50% FTE of an **Office Manager**. The Office Manager will coordinate internal and external funding, coordinate complex book-keeping, and ensure that budget reports and budget projections are updated to ensure long-term financial sustainability of the Center. This person will ensure that budget management at the UVM National UTC is consistent with UVM budget reporting and authority. This person is also the point of contact for external coordination with the Center partners' and for grant funds awarded either directly or as subcontracts from the Center. He/she will coordinate and maintain databases of all grants and investigators with contact information and project descriptions. The **financial assistant** (60% FTE) will work with the Office Manager to undertake the more routine day-to-day financial transactions of the Center such as purchasing, travel, and tabulation of quarterly tracking reports to project PIs.

An **Office Assistant** will be shared by four Centers (40% FTE for UTC). In addition to reception functions, the office assistant will perform basic office support tasks such as copying, mail management, meeting/rooms scheduling, phone inquires and assistance with correspondence.

A **Communications Assistant** will be employed full-time 50% FTE by the UTC. This position will be dedicated to ensuring the Center has a professional web presence that includes highlighting research projects with publicly-accessible and searchable databases, published papers, and published models. This person will also ensure that the formatting and maintenance of internal research databases conform to federal standards (such as those for the Transportation Research Board) so that they can be linked to national research databases when relevant (e.g., after acceptable peer-review or publication). This person will also work to establish a system such that grants contracting and paperwork can be solicited and received on-line (as is done at UVM’s EPSCoR program and nationally at grants.gov) to modernize, streamline, and facilitate the grants process. The communications assistant will maintain the Center’s database of contacts, design and oversee printing of promotional materials, and assist with the preparation of grant proposals.

The remaining professional positions described in the next three paragraphs will start at 100% FTE but are expected to substantially decrease as the Transportation Center grows beyond only the USDOT UTC grant to being a diversely funded and sustainable Center. UVM’s current transportation faculty and graduate students are limited in number and are therefore somewhat *stretched* to accomplish the Signature Research projects proposed with the resources of a
National UTC. The 100%FTE research staff at the start of this grant will complement faculty expertise and allow fulltime attention to get research started fast. Furthermore, these staff will become an essential component of the permanent transportation research capacity this UTC grant is allowing UVM to build. One recent new transportation grant from the Department of Energy will already provide a portion of one staff member’s salary. The UVM UTC is writing external grant proposals to repeat this success such that a sustainable Center comprised of significant transportation expertise is in place in the state of Vermont by the UTC grant period. Funding targets include state agencies, private foundations, industry and other federal sources such as NSF and TRB. The staff discussed below are essential to UVM’s team conducting this future work.

The **Research Technician and Research Engineer** (100%FTE decreasing with time as additional funds are available) will work for the UTC but participate actively in two or more of the Signature Research Projects. These critical technical staff are key to the long-term viability of the Transportation Center, including its sustained existence after the National UTC grant period. By working with the faculty and graduate students on field data collection, research vehicle instrumentation, modeling software and analysis, these individuals will become an integrated piece of UVM’s transportation research capacity. The skill sets of these individuals will facilitate both the Center and UVM faculty increasing external grant support.

Two **Research Analysts** are planned for the UTC, one at the **Senior Research Analyst** level (100%FTE decreasing with time as additional funds are available). The more senior research analyst will function as an associate of the director representing the UTC within the university and externally to Vermont and nationally. Given the National Center designation, the number and extent of programs planned requires a second senior manager in addition to the Director. The senior research analyst will work to build strategic external partnerships to generate matching funds and future project funding. Furthermore, this individual will actively participate with Signature Project teams to ensure interdisciplinary barriers are minimized. This individual will prepare reports and proposals. It is likely this individual will oversee the student fellowships programs of the UVM UTC. The second research analyst will analyze quantitative and qualitative field and survey data, as well as write reports/papers. This may include survey design. Both of these individuals will start as 100% FTE on the UTC grant but will diversify as the Center grows.
The UTC Program Coordinator (100% FTE decreasing with time as additional funds are available) will be dedicated to ensuring on-site conferences and meetings, outreach events, and other programs are coordinated professionally with others on campus (other deans, directors) and external partners. The program coordinator will manage the sub-project budgets for outreach and educational activities as well as ensure matching funds are allocated when appropriate. He/she will facilitate all appropriate stakeholders to design the programs (technical programs), advertise and promote the events, and ensure facilities and supplies are provided. This person’s work will also include professional assessment of the educational and outreach programs at their completion. When appropriate the Program Coordinator will provide formal reports on the events to funding agencies and stakeholders after completion. When data or input are gathered at an event, the program coordinator will manage and tabulate this information.

As the number of funded grants that the UVM Transportation Center grows, a tracking system will be used to ensure staff time is allocated to appropriate grants in proportion to the time worked on each project.

3-D Multiparty Arrangements

The University of Vermont is the sole recipient and manager of National UTC funding under SAFETEA-LU and no multiparty arrangements are required. As partnerships in Center programs and research arise, the University of Vermont will abide by established legal and contract guidelines for those partnerships in coordination with the UVM Office of General Counsel. For research program partnerships and subcontracting of research awards, established contracting guidelines will be followed in coordination with the UVM Office of Sponsored Programs. At this time, outside parties have responded to our calls for pre-proposals as subcontractors to UVM faculty PIs. If these proposals are accepted in our peer review process this will result in sub-grants.

3-E Matching Funds

Grant funds for the UVM National UTC are subject to a 100% non-Federal match. Prospective amounts and sources of the Center’s matching funds will be diverse and correspond largely to matches to successful proposals for transportation research. These may include, but are not
limited to:

(a) Non-federal funds from the University of Vermont
(b) Non-federal funds from private partners, including for profit and not-for-profit entities such as those partners described in section 2 of the plan
(c) Non-federal funds from public entities, including local and state governmental organizations

At this time, the following match funds are being used in our budget: in-kind faculty time on research projects and educational programs; UVM’s payment of out-of-state tuition for graduate students supported by the UTC; a portion of building renovations; program fees for participants; UVM funds for faculty travel; negotiated reduced hourly rates for outside services; loaned equipment; existing faculty fellow programs; state funding to UVM; and UVM general operating funds. Where appropriate the indirect cost savings on these matches have been calculated as matching funds. We will be seeking external state funds, private foundation funding, equipment donations and corporate sponsorships to decrease the amount of UVM operating funds required for match.

UVM recognizes that the rules governing the use of in-kind and cash contributions as matching funds are set forth in the most recent revision of OMB Circular A-21 and that any restriction on the use of federal funds applies equally to non-federal matching funds. Also, should there be interest from the State of Vermont, eligible federal FHA funds for state planning and research (e.g. funds under Section 503, 504(b), or 505 of title 23 of the United States Code) may be applied.
4 Budget Details

The UVM National UTC expects first year funding (FY05) to total approximately $1.56 million after rescissions for the Highway Trust Fund Obligation Ceiling and certain congressional budget actions. An initial budget for the first installment of funds is outlined in Table 2. Details to the extent they are known are shown in Table 3. As the UVM UTC only opened in July 2006 and no prior transportation center was active at UVM, the first year funds are proposed for use between August 2005 and June 2007. Detailed salary information is available at this time but not published here due to the public nature of this document. FY06 funding was announced to be $3,010,000 of the $3.5M authorized. Based on these two years of funding the UVM UTC is anticipating, and has planned for, a total grant amount of $13.5M. It is recognized that this funding level is for planning purposes only and that it is subject to changes in levels. Federal funding for FY07 and beyond are unknown.

The UVM UTC has elected to use the State of Vermont fiscal year as the grant year for its UTC. Therefore, UVM UTC year one will be considered August 10, 2005 through June 30, 2007. For Year 2 and in subsequent years, the grant year will run from July 1 through June 30. Amounts in Table 2, are based on estimated actual expenditures on strategic planning before Dr. Aultman-Hall arrived at UVM in FY06(UVM). FY07(UVM) costs include strategic planning under Dr. Aultman-Hall in academic year 2006-2007, as well as estimated costs for the start of research programs and facilities development.
Table 2: Year 1 ($1.56M) Estimated Budget with Estimated Match (Aug 2005-June 2007)

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>Budget</th>
<th>Explanatory Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Director Salary</td>
<td>105,600</td>
<td>80% FTE</td>
</tr>
<tr>
<td>Faculty Salaries</td>
<td>158,600</td>
<td>College of Engineering Planning, new courses and transportation research</td>
</tr>
<tr>
<td>Administrative Staff Salaries</td>
<td>67,000</td>
<td>50% Communications Assistant ($37,000), 50% Office Manager ($37,000), 60% Financial Assistant ($32,000), 40% Office Assistant ($27,000)¹</td>
</tr>
<tr>
<td>Other Staff Salaries</td>
<td>68,000</td>
<td>100% FTE Senior Research Analyst ($68,000)</td>
</tr>
<tr>
<td>Other Staff Salaries</td>
<td>54,000</td>
<td>Provost Office Staff Strategic Planning UVM FY06</td>
</tr>
<tr>
<td>Student Salaries</td>
<td>257,000</td>
<td>15 UTC awards and one student for emissions testing</td>
</tr>
<tr>
<td>Student Salaries</td>
<td>61,000</td>
<td>Post doctoral fellows</td>
</tr>
<tr>
<td>Staff Benefits</td>
<td>203,539</td>
<td>39% (except for students)</td>
</tr>
<tr>
<td><strong>Total Salaries and Benefits</strong></td>
<td>974,739</td>
<td></td>
</tr>
<tr>
<td>Scholarships/Tuition</td>
<td>160,000</td>
<td>Out of state tuition differential (10)²</td>
</tr>
<tr>
<td>Permanent Equipment</td>
<td>205,000</td>
<td>Equipment for tailpipe emissions sampling³</td>
</tr>
<tr>
<td>Permanent Equipment</td>
<td>300,000</td>
<td>Farrell Hall renovation ($150,000 UVM)²</td>
</tr>
<tr>
<td>Expendable Property, Supplies, Services</td>
<td>53,500</td>
<td>Provost Office 2005-2006 planning</td>
</tr>
<tr>
<td>Expendable Property, Supplies, Services</td>
<td>17,546</td>
<td>Environmental Particles Lab</td>
</tr>
<tr>
<td>Expendable Property, Supplies, Services</td>
<td>71,847</td>
<td>Farrell Hall Office Supplies, furniture, computers (2006-2007)</td>
</tr>
<tr>
<td>Expendable Property, Supplies, Services</td>
<td>124,500</td>
<td>Conferences</td>
</tr>
<tr>
<td>Domestic Travel</td>
<td>17,000</td>
<td>Includes $3000 of faculty match</td>
</tr>
<tr>
<td>Foreign Travel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Direct Costs (Specify)</td>
<td>270,000</td>
<td>Small Faculty Grants (salaries, equipment and supply breakdown unknown as they are not yet awarded)</td>
</tr>
<tr>
<td>Other Direct Costs (Specify)</td>
<td>86,000</td>
<td>Visualization Program Database and Demo</td>
</tr>
<tr>
<td><strong>Total Direct Costs</strong></td>
<td>2,280,132</td>
<td></td>
</tr>
<tr>
<td>F&amp;A (Indirect) Costs</td>
<td>839,868</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL COSTS</strong>²</td>
<td>3,120,000</td>
<td></td>
</tr>
<tr>
<td>Federal Share</td>
<td>1,560,000</td>
<td></td>
</tr>
<tr>
<td>Matching Share (if applicable)</td>
<td>1,560,000</td>
<td></td>
</tr>
</tbody>
</table>

¹ Other staff will not be hired before July 2007 and are therefore not included here
² Excluded from indirects
³ Includes Federal and Matching Shares
APPENDIX A

BASELINE MEASURES FOR UNIVERSITY TRANSPORTATION CENTERS (UTCs)

Reported for the most recently completed academic year (05-06)

Research Selection

1. Number of transportation research projects selected for funding.
   ____5__________

1a. Number of those projects that you consider to be:
   basic research    __ 1__________.
   advanced research   __ 2_________.
   and applied research   __ 2_________.

   Projects may be included in more than one category if applicable.

2. Total budgeted costs for the projects reported in 1 above.
   $___925,000 (total not single year)___

Research Performance

3. Number of transportation research reports published.
   ____1 (peer reviewed journal)__________

4. Number of transportation research papers presented at academic/professional meetings.
   ____ 11__________

Education

5. Number of courses offered that you consider to be 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 year being reported.

   Undergraduate: __2__________
   Graduate: __2__________

6. Number of students participating in transportation research projects. Count individual
   students (one student participating in two research projects counts as one student).
Undergraduate: __3__
Graduate:      __5__

**Human Resources**

7. Number of advanced degree programs offered that you consider to be transportation-related.

   Master’s Level: ____1___________
   Doctoral Level: ____1 _________

8. Number of students enrolled in those transportation-related advanced degree programs.

   Master’s Level: ____2___________
   Doctoral Level: ____1___________

9. Number of students who received degrees through those transportation-related advanced degree programs.

   Master’s Level: ____1___________
   Doctoral Level: ____0___________

**Technology Transfer**

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

   ____1___________

11. Number of transportation professionals participating in those events.

   ____10___________
APPENDIX B – Director’s Resume

Lisa Aultman-Hall, Ph.D.
Director, UVM National University Transportation Center
University of Vermont
210 Colchester Avenue
Burlington, VT 05403
802-656-1245  fax 860-656-9892

PRIOR ACADEMIC EMPLOYMENT

University of Connecticut
Associate Professor, Dept. of Civil and Environmental Engineering (2001 - 2006)

University of Kentucky
Assistant Professor, Department of Civil Engineering (August 1996 - August 2001)

EDUCATION

Ph.D. 1996
Dept. of Civil Engineering (Transportation), McMaster University, Hamilton, Ontario
Thesis: Commuter Bicycle Route Choice: Analysis of Major Determinants and Safety Implications
Advisors: Drs. Fred L. Hall and Brian W. Baetz

Master of Science 1993
Dept. of Civil Engineering, Traffic Engineering, Queen’s University, Kingston, Ontario
Thesis: An Evaluation of the Modeling of Freeways in the INTEGRATION Simulation Model
Advisor: Dr. Michel Van Aerde

Bachelor of Engineering 1991
Dept. of Civil Engineering, McMaster University, Hamilton, Ontario

TEACHING EXPERTISE

• Transportation Planning
• Traffic Engineering and Transportation Safety
• Geographic Information Systems (GIS) & Global Positioning Systems (GPS), Surveying
• Professional Short Courses: Bicycle Facility Design, Highway Capacity Analysis and Traffic
  Signal Optimization

AREAS OF RESEARCH SPECIALIZATION

• Travel Behavior, especially route choice
• Vehicle Tailpipe Emissions Modeling
• Freight Transportation Planning
• Transportation Safety
• Bicycle Transportation
• Spatial Analysis using Geographic Information Systems (GIS) and Global Positioning Systems
  (GPS) for Transportation
Aultman-Hall Resume (continued)

SUMMARY OF PROFESSIONAL ACCOMPLISHMENTS

Teaching Evaluations: University of Connecticut (10 point scale)
Spring 2006 – 9.2  Fall 2005 – no teaching
Spring 2005 – 9.4  Fall 2004 – 8.7
Spring 2004 – no teaching  Fall 2003 – 8.8
Spring 2003 – 9.0  Fall 2002 – 8.7
Spring 2002 – no teaching  Fall 2001 – 8.7 and 8.2

Total Number of Research Grants - 28 - $2,114,354
PI for 19 Grants - $1,446,805
Total Directly Managed by Aultman-Hall (a portion of all multiple PI grants) - $1,382,125

Dissemination of Research:
Refereed Journal Papers: 29 total, 25 in print, 4 in-press (5 additional papers in review)
Book Chapters: 1
Conference Participation: total 55 (those not cited as papers in other categories)
  Full Papers in Conference Proceedings (full paper-reviewed) - 5
  Full Papers in Conference Proceedings (abstract reviewed) - 12
  Presentations by Dr. Aultman-Hall or graduate students under her supervision – 22
  Presentations by Other Co-authors (and not cited as papers in other categories) - 4
  Invited Conference Presentations - 12
Invited Academic Seminars: 11
Technical Reports: 65

Graduate Students Supervised:
Current: 2 Ph.D. Candidates, one Master’s student
Completed: 10 Master’s students, 1 Ph.D.

Highlights of Recent Service:
• Member, TRB Committee on Safety Data, Analysis, and Evaluation (2005-)
• Member, TRB Committee on Travel Survey Methods (2005-)
• Co-host, Women in Engineering Leadership Summit (NSF funded), May 3-5 2004
• Chair, Transportation Research Board, Committee on Bicycle Transportation (2002-2004)
• Managed Review - 13-19 TRB papers/yr - Bicycle Transportation Committee (2002-2006)
• NSF Panel, November 2002, CAREER, Civil and Mechanical Systems
• NSF Panel, May 2002, Division of Operations Research, Service Enterprise Engineering
• NSF IGERT(Integrative Graduate Education and Research Training) Program Review - Content
  Specialist for Geographic Information Science at SUNY Buffalo, May 2002
APPENDIX C: Proposal Review Form
# UVM Transportation Center 2007-2008 Signature Research Project Proposal Evaluation Form

## 1. STATEMENT OF CONFLICT OF INTEREST AND CONFIDENTIALITY

1. Your Potential Conflicts. To the best of my knowledge, I have no affiliation or relationship with the principal investigator(s) that would prevent me from providing an objective review of this proposal.

2. Your Identity as a Reviewer will be Kept Confidential. I understand my identity as the reviewer of specific proposals will be kept confidential to the maximum extent possible, but that the scores and comments I provide will be provided to the principal investigator(s).

3. Proposal Content. I understand that I will keep the contents of the proposal confidential.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

## 2. PROPOSAL INFORMATION

- Proposed Project Title
- Principal Investigator (PI):
- Total UTC Fund Request (not including match):

## 3. REFEREE INFORMATION (will NOT be revealed to investigators)

- Referee’s Name
- Referee’s Institution
- Date

## 4. EVALUATION CRITERIA

Please score each criteria below on the following scale:

- 5 = Well exceeds expectations
- 4 = Exceeds expectations
- 3 = Meets expectations
- 2 = Below expectations
- 1 = Well below expectations

### 4.1 Intellectual Merit

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Intellectual merit of the proposed activity</td>
</tr>
</tbody>
</table>

#### 4.1.1 Intellectual Merit

- Importance of the proposed activity to advancing knowledge and understanding within its own field or across different fields
- Qualifications of the proposer (individual or team) to conduct the project
- Extent the proposed activity suggests and explores creative and original concepts
- Extent the proposed activity is well-conceived and organized
- Sufficient access to resources

Your comments on intellectual Merit of the proposal are much appreciated:

### 4.2 Broad Impacts

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposed activity has broad impacts for society, policy, or diversity</td>
</tr>
</tbody>
</table>

4.2.1 The proposed activity has broad impacts for society, policy, or diversity
| 4.2.2 | The proposed activity advances discovery and understanding while promoting teaching, training, and learning. |
| 4.2.3 | The proposed activity broadens participation of underrepresented areas (e.g., geographic, modal, urban/rural, gender, ethnicity, disability, etc.). |
| 4.2.4 | The project enhances the capacity for research, education and technology transfer (such as partnerships or activities beyond the funded project that will live on past the life of the specific project) and furthers the UTC’s objectives. |
| 4.2.5 | Activity results will be disseminated broadly to enhance scientific and technological understanding. |

Your comments on the Broad Impacts of the proposal are much appreciated:

<table>
<thead>
<tr>
<th>4.3 UTC Theme</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent this project is consistent with the UVM UTC theme (Sustainable Systems and Advanced Technologies for Northern Communities)</td>
<td></td>
</tr>
</tbody>
</table>

Your comments on the fit with the UVM UTC Theme are much appreciated:

<table>
<thead>
<tr>
<th>4.4 Optional except for USDOT/federal reviewers, USDOT multimodal research priorities.</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfies USDOT multimodal research priorities as defined in SAFETEA-LU. PI sufficiently identified one or more specific citation from these resources:</td>
<td></td>
</tr>
<tr>
<td>a. National Highway Research and Technology Partnership’s Highway Research and Technology: The Need for Greater Investment</td>
<td></td>
</tr>
<tr>
<td>b. Federal Transit Administration’s National Research and Technology Program</td>
<td></td>
</tr>
<tr>
<td>c. U.S. Department of Transportation’s Strategic Plan</td>
<td></td>
</tr>
<tr>
<td>d. U.S. Department of Transportation’s Research, Development, and Technology Plan, including its 2006 update</td>
<td></td>
</tr>
<tr>
<td>e. Maritime Administration’s Research, Technology, Demonstration, and Deployment (RTDD) Program</td>
<td></td>
</tr>
<tr>
<td>f. Advanced Research</td>
<td></td>
</tr>
<tr>
<td>g. Congestion Chokepoints</td>
<td></td>
</tr>
</tbody>
</table>

Your comments on the USDOT priorities are much appreciated:

<table>
<thead>
<tr>
<th>5. USING THE CRITERIA BELOW, WHAT IS THE OVERALL RATING OF THE PROPOSAL?</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 = Excellent: Outstanding proposal in all respects; deserves highest priority for support.</td>
<td></td>
</tr>
<tr>
<td>4 = Very Good: High quality in nearly all respects; should be supported if at all possible.</td>
<td></td>
</tr>
<tr>
<td>3 = Good: A quality proposal worthy of support.</td>
<td></td>
</tr>
<tr>
<td>2 = Fair: Proposal lacking in one or more critical aspects; key issues need to be addressed.</td>
<td></td>
</tr>
<tr>
<td>1 = Poor: Proposal has serious deficiencies.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. REFEREE’S FUNDING RECOMMENDATION (choose one and please explain in overall comments section):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fund as a top priority proposal</td>
</tr>
<tr>
<td>Fund as submitted if there are sufficient funds</td>
</tr>
<tr>
<td>Fund with modifications</td>
</tr>
<tr>
<td>Do not fund</td>
</tr>
</tbody>
</table>

Your overall comments are much appreciated: