

Kansas State University

UNIVERSITY TRANSPORTATION CENTER

STRATEGIC PLAN

The Sustainability and Safety of Rural Transportation Systems and Infrastructure

Prepared for

The University Transportation Centers Program
Research and Innovative Technology Administration (RITA)
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Exhibit I: Mission and Goals of UTC Program

MISSION

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 of excellence.

GOALS

1. **Education:** a multidisciplinary program of course works and experiential learning that reinforces the transportation theme of the Center.

2. **Human Resources:** an increased number of students, faculty and staff who are attracted to and substantively involved in the undergraduate, graduate and professional programs of the Center.

3. **Diversity:** students, faculty and staff who reflect the growing diversity of the U.S. workforce and are substantively involved in the undergraduate, graduate and professional programs of the Center.

4. **Research Selection:** an objective process for selecting and reviewing research that balances multiple objectives of the program.

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

6. **Technology Transfer:** availability of research results to potential users in a form that can be directly implemented, utilized, or otherwise applied.

Exhibit II: Strategic Plan

TABLE OF CONTENTS

I. Program Overview.....	2
A. Glossary	2
B. Center Theme.....	3
C. Director’s Summary.....	5
1. Current Status.....	5
2. Vision for the Future.....	6
II. Program Activities	8
A. Research Selection.....	8
B. Research Performance	15
C. Education	18
D. Human Resources	23
E. Diversity.....	26
F. Technology Transfer.....	27
III. Management Approach	31
A. Institutional Resources.....	33
1. Faculty Resources	34
2. Office Resources.....	35
B. Center Director.....	35
C. Center Faculty and Staff	36
1. Multiparty Arrangements.....	38
D. Matching Funds	38
IV. Budget Details.....	40
A. Format	40
B. Grant Year.....	40
C. Salaries.....	40
D. Scholarships.....	42
E. Expendable Property, Supplies, and Services.....	42
F. Permanent Equipment.....	42
G. Travel	43
H. Other Direct Costs.....	43
I. Facilities & Administrative (Indirect) Costs.....	43
V. Kansas State University’s UTC Advisory Committee.....	45
VI. APPENDIX A.....	47
A. Research Selection.....	47
B. Research Performance	47
C. Education	47
D. Human Resources	48
E. Technology Transfer.....	48
VII. Approval Letter for Use of Matching Funds.....	49
VIII. Director’s Résumé.....	50

I. PROGRAM OVERVIEW

A. Glossary

The following terms and acronyms are used throughout this plan.

FTA: Federal Transit Administration

KDOT: The Kansas Department of Transportation

KSU: Kansas State University

K-TRAN: Kansas Transportation Research and New-Developments Program (KDOT)

KU: The University of Kansas

LTAP: Local Technical Assistance Program

NCEES: National Council of Examiners for Engineering and Surveying

PI: Principle Investigator

RFP: Request for Proposal

RITA: Research and Innovative Technology Administration

TASK: Traffic Assistance Services for Kansas

TRB: Transportation Research Board

UMR: University of Missouri at Rolla

USDOT: United States Department of Transportation

UTC: University Transportation Center

B. Center Theme

The theme of this Center is *The Sustainability and Safety of Rural Transportation Systems and Infrastructure*. This theme is selected to complement the mission and direction of Kansas State University and to meet the needs of the Kansas Department of Transportation and the rural transportation community as a whole. Research at Kansas State University's UTC will also fill a national need—although the demand for addressing rural transportation is recognized, no UTC specifically focuses on the sustainability and safety of rural transportation systems and infrastructure in the context of a declining and aging rural population.

The need for addressing rural transportation safety is great. Forty-two percent more fatal crashes occur in rural parts of the United States than on busy stretches of highways through cities and suburbs. Indeed, rural roadways, which account for more than half of the 8.2 million miles of roadways in the United States, have the highest rate of fatalities per vehicle mile traveled—more than six times that of urban interstates. While only about forty percent of all vehicle miles are traveled on rural roads, about sixty percent of the traffic accident fatalities occur on rural roads. When adjusted for miles traveled, the fatality rate from traffic accidents on rural roads is nearly two and a half times greater than the fatality rate from accidents on urban roads. Clearly, with longer response times due to their inherent rural nature, with more severe crashes and with a higher likelihood of rollovers, rural transportation safety remains a significant problem.

However, these safety issues should not be viewed in a vacuum and must be viewed in the context of a decreasing and aging rural population. By 2020, there will be as many retired people as there are children. At the same time, the rural areas in the Great Plains have continued to depopulate. These factors, when combined, will compound economic stresses, further limiting financial resources available for rural transportation infrastructure and safety.

Limited transportation resources—combined with an inherent desire for a safer transportation system—require an innovative approach to rural transportation issues. Primarily, this requires a focus on the economic and community sustainability for rural transportation; transportation resources will have to go further and do more than ever before.

Increasing transportation safety saves more than just lives—in 1999, the cost of traffic crashes and the associated injuries and deaths was estimated at more than \$230.6 billion.¹ Although transportation safety issues are constantly being addressed, much of the attention and funding is directed towards higher-class roads, such as Interstate Highways and the National Highway System. According to the General Accounting Office, while rural roadways account for seventy-seven percent of all lane-miles, only forty-one percent of highway program funds were spent on rural roads.

As financial limitations will continue to play a significant role in rural transportation infrastructure and safety, it is increasingly critical that every transportation dollar be put to its best use. As a focus of its research, Kansas State University's UTC will focus on managing transportation with regards to the effects of an aging and decreasing rural population. This research will consist of high-impact areas that affect rural transportation and safety—focusing on infrastructure preservation and monitoring, improving information and decision support systems, impaired driving, as well as seatbelt usage. For example, the increased response time for emergency vehicles due to a decreasing rural population will be a focus issue.

Finally, the Center will focus on rural transportation issues related to terrorist threats and actions against hazardous materials carriers. Rural transportation systems not only support motorists and rail traffic, but also continue to carry the majority of the nation's food supply. The safety and security of the nation's food supply will also be a focus that is directly related to rural transportation infrastructure and safety.

1. Blincoe, L.J., "The Economic Impact of Motor Vehicle Crashes," National Highway Transportation Safety Administration, Washington, DC, 2002.

C. Director's Summary

In forming a strategic plan, it is critical to understand the history of research and educational efforts at Kansas State University and have those efforts placed in context. Positive changes are difficult to make and impossible to measure absent a reference to the current status of research, education, and technology transfer at Kansas State University.

1. Current Status

In the past, the majority of Kansas State University's transportation research was funded by K-TRAN, a cooperative transportation research program between the Kansas Department of Transportation, Kansas State University, and the University of Kansas. Much of this research focused on the immediate needs of KDOT, such as highway work zone safety, and material and design analysis. While Kansas State University routinely participates in the research of K-TRAN, it has not had the financial resources to address other research areas that are also critical to rural transportation. Indeed, financial limitations have prevented research of the depth and breadth required to make major improvements to rural transportation research.

Dispersed expertise has also been a historical roadblock to transportation research in Kansas. While the Kansas State Board of Regents governs six state universities, including Emporia State University, Fort Hays State University, Kansas State University, Pittsburg State University, Wichita State University, and Washburn University, no single university in the Kansas system has a strong, interdisciplinary transportation program. Working with the Mid-American Transportation Center (MATC) at the University of Nebraska-Lincoln, which has been designated the Region VII UTC, Kansas State University has begun working with the University of Kansas, the University of Missouri-Rolla and Lincoln University of Missouri to multiply our strengths in transportation research and education. Additionally, Kansas State University's UTC will draw on the resources of the other State universities in Kansas.

The sparsity of the Midwest's population also presents unique challenges to collaboration in research, education, and outreach. Just as the members of the Mid-American Transportation Research Center, which has been designated the Region VII consortium, are distributed widely, so are the faculties' expertise. Challenges exist in bringing students, researchers and instructors together. One of the initial efforts spawned through the collaboration with MATC has been the initiation of shared courses in the transportation engineering curriculum through interactive classrooms and distance learning. Perhaps the most valuable to the transportation community and students—both graduate and undergraduate—will be the offering of a depth and breadth of transportation-related courses never offered by any single university of the Consortium previously.

2. Vision for the Future

Through a collaborative effort—not only among Region VII Consortium members, but the rural transportation community as a whole—Kansas State University's UTC will develop a prominent research program capable of addressing both the long-term and short-term needs of rural transportation. Kansas State University's UTC will link together researchers, educators, students, and engineers in the field to an extent that will allow the full use of their combined transportation experiences. This gestalt effect—a creation of a unified concept greater than the sum of its parts—will help grow rural transportation research exponentially.

These goals will allow research at Kansas State University to support the national strategy for surface transportation research. By focusing also on graduate and undergraduate education, Kansas State University will help increase the number of Americans prepared to design, deploy, and operate the complex transportation systems of the future. Finally, by focusing on outreach, the practical application of research will be not merely a desire of research, but the goal.

The vision of the center is not only to address the long-term transportation needs of rural Kansas, but identify those problems shared by Kansas' and other states' rural communities. Identifying and addressing the solutions to the problems that have the greatest impact—where the greatest difference can be made—is the vision of Kansas State University's UTC.

By the end of the grant, Kansas State University's UTC anticipates having a well-established rural transportation research center capable of dynamically addressing current and future rural transportation needs. The program will be capable of offering education, outreach, and research at a level not previously achievable by combining the experiences, research abilities, and expertise of all of the Region VII Consortium members as well as those qualities from other Kansas universities. It is further anticipated that there will be strong local and nationwide involvement in the National Transportation Forum initiated as an internet bulletin board resource for transportation professionals.

Finally, at the end of the grant period, Kansas State University's UTC will have expanded its faculty and staff capabilities while enhancing undergraduate and graduate education. The purpose of an institution of higher learning is exactly that—to educate. Kansas State University's UTC will work to involve students and engineers in the field with research efforts in an endeavor to maximize the benefits of Kansas State University's UTC to the global community.

II. PROGRAM ACTIVITIES

The activities outlined below focus on establishing a research, education, and outreach program that maximizes the effectiveness of Kansas State University's UTC. The combination and interlinking of research, education, and outreach are considered essential and to be made in the context of a diverse array of students, faculty, and staff capable of addressing dynamic research and educational needs.

A. Research Selection

Research Selection Goal: An objective process for selecting and reviewing research that balances multiple objectives of the program.

1. Baseline Measures. Historically, transportation research selection at Kansas State University has focused on the immediate needs of KDOT. Although faculty members provide K-TRAN research proposals in addition to responding to K-TRAN's requests for proposals, research projects were primarily limited to addressing those immediate, practical needs of KDOT. Accordingly, research in other deserving areas was limited because of either the lack of immediacy of the need or the attenuated nature of the benefit received. Because of this, much of the research work consisted of applied research and hence limited its ability to be published. As part of Kansas State University's UTC's goals, it is desired that the number of both advanced and practical research be increased, and that the balance between advanced and practical research be improved. Baseline measurements for research selection in Appendix A, Baselines 1 and 2.

2. Research Selection Program Outcome. Kansas State University's UTC's selection process will be designed to improve rural transportation safety and infrastructure in rural areas in a holistic manner. While focusing on practical applications of research, the selection process will be dynamic, responding with flexibility and fairness to proposals. All faculty members will be encouraged to submit proposals and engage in multi-discipline and multi-institutional research.

3. Planned Activities. The selection process will include external peer review at the initial stages of the project selection as well at final selection of the projects. Efforts will be made to inform researchers and potential researchers of the goals of USDOT and KDOT, as well as other research needs identified by the Advisory Committee. Informing faculty, staff, and students of USDOT- and KDOT-identified needs is considered critical to both rural transportation research in general as well as the appropriateness of Kansas State University's transportation research as a whole.

The selection process begins through the solicitation of proposals from faculty members throughout the K-State system. Proposals will be accepted with provisions on areas of interest, format, review method, and reporting obligations, as outlined below. This will include informing the researchers of the importance of the needs of USDOT and KDOT and encouraging contact with those agencies. It is believed, due to the complex nature of the research topics, it is best to provide one-on-one interaction between those most affected by the proposed research and the researchers themselves. Accordingly, personal contact with KDOT, USDOT, and industry will be encouraged in developing the proposals. This encouragement will be enforced inherently through the research selection process by the Advisory Committee.

The areas of interest that would contribute to the sustainability and safety of rural transportation system center around five general themes:

1. Outreach
2. Rural Transportation Safety
3. Intelligence, Knowledge, and Information Systems in Transportation
4. Advanced Modeling of Pavement and Subgrade Systems
5. Infrastructure Preservation/Renovation

These topics were adopted through the Civil Engineering faculty, in consultation with KDOT, local governments, and industry, as being the most issues affecting rural transportation. While general in nature, these themes represent the strengths of the K-State faculty as well as the physical infrastructure of the department.

The Center Director will then organize the proposals, including budget estimates, and forward them to the Advisory Committee. The Committee will be given two weeks to review the material before the Committee meets. The Committee will then discuss the proposals in depth, asking for clarification or modifications on the proposals. The Committee will then vote by ballot, ranking the proposals in terms of intellectual merit and the impact of the research on the transportation community. The proposals will then be funded in order of their prioritization.

The Committee will be provided with updates of the projects as they progress. The Committee, which was chosen to represent the broad interests of the transportation community, will review the progress and final reports to ensure the goals of the UTC, RITA, and USDOT are met.

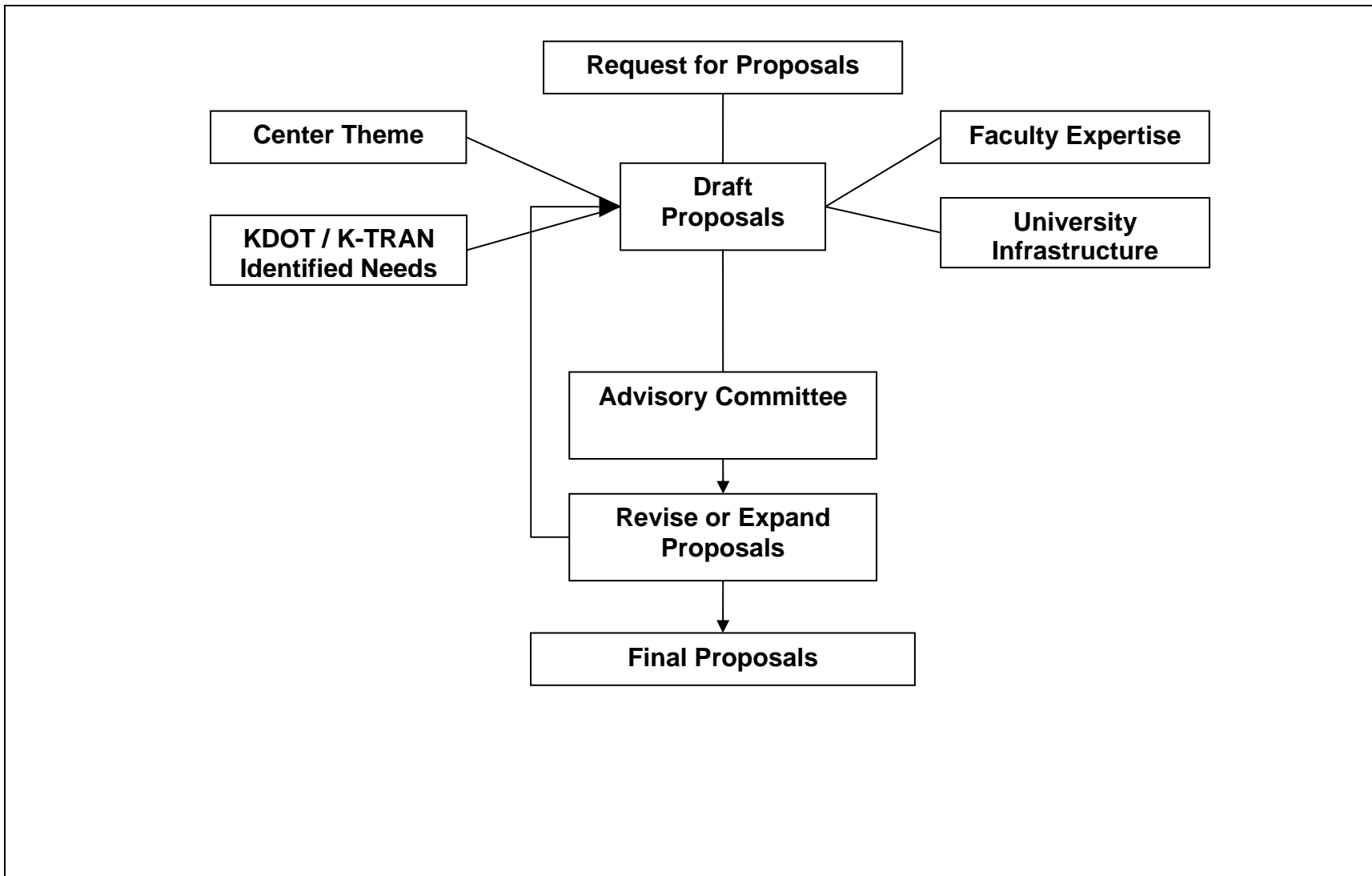


Figure 1. Research Selection Procedure.

Required Activities. The criteria for proposal evaluation will be developed by the Advisory Committee to ensure fairness and promote the goals and interests of the UTC program, KDOT, USDOT, and the transportation community as a whole. External peer review is considered critical, and will involve, whenever possible, experts in the specific areas of research being addressed. This strategy will allow research to change dynamically to address subtle needs identified by the peer review process.

The Advisory Committee is essential to the effectiveness of the UTC. The Advisory Committee consists of members of government, industry, and law enforcement. The Advisory Committee members are shown in Section V.

The Advisory Committee will not merely approve or disapprove projects, but have the authority to place conditional approval on a research project, which would be funded only as modified by the Advisory Committee. This allows the peer-review process to not be merely reactive, but proactive in beneficially revising research objectives and goals so that the maximum benefit can be achieved through each individual project. This also assures research projects address specific needs rather than merely general ones.

The Advisory Committee will also be made aware of the specific goals of USDOT and specifically the Federal Transit Authority (FTA) within USDOT. Specifically, rural transit issues will be a focus, as the increasingly-elderly population requiring transit services will increase with an overall decreasing rural population. Because of this, the specific FTA research goals will be emphasized to the Advisory Committee:

- Provide Transit Research Leadership
- Increase Transit Ridership
- Improve Capital & Operating Efficiencies
- Improve Safety & Emergency Preparedness
- Protect the Environment & Promote Energy Independence.

The theme of rural transportation was chosen specifically to affect rural transportation needs rather than transportation in general. For example, while transit issues will be considered of paramount importance, the focus of research will be limited to the rural aspects of transit. Specifically, one research topic identified by KDOT and the Riley County Area Transportation Agency to be of high priority is that of “Improving the Usage of Demand Response Transit Services in Rural Kansas.” While safety is another focus area, it will also be limited to a rural focus; a need identified by KDOT and law enforcement in Kansas is the research topic, “Promoting Center Line Rumble Strips to Increase Rural, Two-lane Highway Safety.”

Transit inherently becomes a critical need not because of the benefits of transit globally, but because of the needs of an aging population in rural areas. Seniors are particularly sensitive to losing mobility and independence—aspects of transit that, while associated with transit, are more related to a focus on rural transportation. Dr. Coon has been elected to the Riley County Area Transportation Agency Board of Directors and has developed an internship program for an undergraduate student in the development of their Long-Term Strategic Plan.

Finally, research results will be required to be submitted for publication in peer-reviewed journals whenever practicable. This will provide a retrospective analysis of the appropriateness of the research and its suitability to its stated goals.

Recommended Activities. Kansas State University’s UTC believes in affecting transportation in the most positive ways possible. Accordingly, the national transportation needs identified by USDOT and its Operating Administrations are considered to be of paramount importance. Two primary areas at this time are Advanced Research and Congestion Chokepoints.

Advanced Research. RITA defines Advanced Research as “research that involves and draws upon basic research results to provide a better understanding of phenomena and develop innovative solutions—sometimes referred to as exploratory research—in order to convey its more fundamental character, its broader objectives, and the great uncertainty in expected outcomes compared to problem-solving research.” Clearly, this is the most effective way to address rural transportation issues, whose inherently-complex nature requires research be done in collaboration with KDOT, whose depth of experience in rural transportation is significant. Furthermore, Kansas State University’s UTC has partnered with other regional entities, including its Region VII partners, to increase its ability to perform Advanced Research and develop practical applications of that research.

Congestion Chokepoints. Due to its rural nature, Kansas does not have the traditional Congestion Chokepoints typically found in more urban states. Congestion Chokepoints, however, are present as limited paratransit and rural transit systems are unable to meet the needs of the elderly in Kansas. Accordingly, the unique Congestion Chokepoints that exist in Kansas are the result of reduced access to transportation and a lack of supply with ever-increasing demand.

Additionally, the need to address traditional Congestion Chokepoints is recognized, and faculty teaching transportation courses will be encouraged to discuss these issues. Congestion Chokepoints affect not only drive times, but also affect fuel consumption and drivers’ perceptions of the transportation system. These issues are critical to an understanding of transportation systems, and, consequently, research projects that involve traffic flow and capacity will address Congestion Chokepoints.

4. Performance Indicators. As Kansas State University's UTC develops, it is anticipated that the number of projects and researchers will increase, as will the number of disciplines involved in each project. As part of their education, undergraduate and graduate students will become more involved in research as more opportunities for projects develop. Identifying performance will be measured in several ways. First, it will be measured by the retrospective analysis of research reports by the Advisory Committee. The Advisory Committee, chosen to represent the needs of USDOT, KDOT, and the transportation community as a whole, will assess the appropriateness and performance of research performed by Kansas State University's UTC. Second, Kansas State University's UTC will track performance indicators that can be objectively measured, including the number of proposals received, the number of projects awarded, the total budgeted costs, the number of PIs, the number of graduate and undergraduate students involved with research, the number of degrees obtained, and the opinions gathered through surveys performed on Kansas State University's UTC's bulletin board website

B. Research Performance

Research Performance Goal: An ongoing program of basic and applied research, the products of which are judged by peers or other experts in the field to advance the body of knowledge in transportation.

1. Baseline Measures. The baselines for publications and presentations are shown in Appendix A, Baselines 3 and 4.

2. Research Performance Program Outcome. Kansas State University's UTC anticipates improvement in several areas during the course of the UTC grant period. First, it is anticipated that the quantity of scholarly activities will increase dramatically with targeted funding aimed at producing practice-ready research results. It is the belief of Kansas State University's UTC Director that the purpose of research is to produce practical results—even with advanced research—and disseminate those results as widely as possible. With this focus, both publications and presentations will increase in both quality and quantity.

Second, increasing the number of researchers involved in transportation research will be encouraged. This will involve interdisciplinary and inter-institutional efforts, focusing on bringing as many diverse viewpoints, abilities, and areas of expertise to the research pool as possible. Encouraging interdisciplinary research will both broaden and deepen the transportation research performed by Kansas State University.

Third, the number of graduate and undergraduate students involved in transportation research will increase. As a result of the availability of increased funding for research, both undergraduate and graduate students will become more actively involved in research projects. Furthermore, because of the enhanced course offerings to be shared between the Region VII Consortium universities, students will have a true opportunity to experience a breadth of courses in transportation. Previously, graduate students in transportation quickly exhausted all of the transportation courses available at any of the Consortium universities. With expanded offerings—and indeed improved course alternatives—Kansas State University will be able to attract and retain more and better graduate and undergraduate students to research in the area of transportation.

Finally, faculty will be encouraged to leverage funding received from the UTC with other outside funding sources. Locating and securing funding sources for future projects will be critical to the Center’s future. Accordingly, the Director will work with faculty members in securing these funding sources.

3. *Planned Activities.* All research conducted with UTC funding will be subjected to external, merit-based peer review. Indeed, Kansas State University’s UTC Advisory Committee was selected specifically to address the needs of USDOT, KDOT, industry, and law enforcement. The Advisory Committee will be involved at several levels during the process.

First, the Advisory Committee will be involved in selecting the projects for funding. The diverse nature of the Advisory Committee, as shown in Section V, page 45, ensures that research proposals will receive sufficient scrutiny. Research proposals will be accepted from all Engineering faculty members and specific needs will be solicited from the Advisory Committee. Accordingly, not only will the proposals be peer-reviewed before approval, the proposals will also inherently be reflective of the needs of the transportation community, USDOT, and KDOT.

Efficient Collaboration on Transportation Research. Second, faculty will be encouraged to partner throughout the University and with other Universities in the Region VII consortium. This includes partnering outside the Civil Engineering department, to include the broader social and psychological issues that underlie many of the rural transportation needs. It is considered critical that every proposal consider the ramifications of the rural population and how to better address those needs.

Transportation research at the Region VII Consortium universities will also be a collaborative effort, reducing redundancy and allowing for the most efficient use of faculty resources and expertise. Transportation expertise is spread throughout the Midwest, both at the Region VII Consortium universities and throughout Kansas. A primary goal of Kansas State University's UTC will be to capitalize on research performed throughout the world and bring that information to faculty, students, and engineers in the field. A coordination of research efforts and sharing of unique faculty abilities will be a primary focus of Kansas State University's UTC. Efforts to reach out to involve faculty members with expertise from other universities will be a goal and an expected outcome of Kansas State University's UTC as part of the Region VII Consortium.

Second, research papers and reports will be provided to the Advisory Committee. This ensures quality control as the research process is occurring. It is not the intent of the Advisory Committee to micromanage research, but to be actively involved so that faculty research most closely matches with current needs. The reports provided will also include quarterly progress reports, so that the Committee will be able to provide feedback on an ongoing basis.

Finally, final reports and papers will be provided to the Advisory Committee and considered when reviewing future proposals for funding. This will include not only the progress and final reports being provided to the Committee, but will also include tabular values for each researcher, indicating whether progress reports were filed on time, benefits of prior Center-funded research in terms of saved dollars, as well as the final budget totals for each of the previous projects. Although prior results do not guarantee future success, this will allow the Committee to best target resources to meet the needs of the transportation community.

4. Performance Indicators. The UTC will encourage faculty members to publish work as widely as possible. As a condition of each research project funded, quarterly reports will be obtained from each of the projects' principal investigators. These reports, combined with final research reports and papers, will be made available on the Center's website. This information will be tabulated and presented to the Advisory Committee for assistance in determining the direction and effectiveness of research efforts. Additionally, the Center will publish brochures and newsletters informing the transportation community of the availability of the Center's research.

C. Education

Education Goal: A multidisciplinary program of coursework and experimental learning that reinforces the transportation theme of the Center.

1. Baseline Measures. The Kansas State University's Transportation Education Program Baseline Measures are shown in Appendix A as Baselines 3 and 4. While Kansas currently has two schools with transportation programs, Kansas State University and KU, neither program offers the desired number of transportation engineering courses. Currently, even master's level students exhaust the transportation curriculum before completing their degrees. Accordingly, increasing the breadth and depth of Kansas State University's transportation education program is considered critical to the Center's success.

2. Education Program Outcome. Kansas State University envisions a multiple-disciplinary transportation education program consisting of courses offered by Kansas State University, KU, and UNL. By sharing courses, which was initiated by the MATC Region VII Consortium, the Center anticipates tripling the transportation courses available to both graduate and undergraduate students. Additionally, new courses will be introduced, including courses on transportation safety and accident reconstruction and analysis. Transportation safety and materials courses will increase in both number and in depth, as will the ability to offer operations-focused courses.

Additionally, the Center will offer to host visiting students, such as working with the Fulbright Program, to increase the exposure of researchers and students at Kansas State University to the broadest possible backgrounds and perspectives. Drawing on transportation concepts from other countries—and their corresponding experiences—will prove invaluable to the educational program at Kansas State University.

3. Planned Activities.

Required Activities. The Center's research activities will involve both graduate and undergraduate students in order to make the benefits of research as wide-ranging as possible. It is considered critical to the students' education that they be exposed to transportation as an active, hands-on field. Accordingly, students will be encouraged to not only participate in research, but to publish scholarly articles, as well. This benefits students and faculty, as well as the transportation community as a whole.

Planned Activities. Education activities will also include developing training materials and courses, developing the internet-based National Transportation Forum bulletin board, and presenting at professional transportation seminars.

Discussions with KDOT and local governments have noted educational gaps corresponding with the election cycles of local government officials. Specifically, after each election, new county commissioners and city officials are responsible for negotiating complex construction contracts for transportation infrastructure, which have neither the background nor the resources to appropriately deal with those issues. Working with General Counsel of KDOT, a plan is being developed to offer support for these officials while forming these contractual relationships.

Drs. Coon and Hossain have begun work creating a Rural Pavement Preservation Initiative to inform local governments on best pavement preservation methods. Specifically, these programs will focus on smaller rural counties that do not have county engineers to offer ongoing technical expertise related to pavement preservation.

Enhanced Access to Research and Experience to Engineers and Researchers.

Although a significant amount of research and experience exists on transportation, much of this information and experience is not shared with engineers in the field. While KU, through its LTAP program, performs significant outreach and training to local engineers, specific topics go unaddressed. Particularly, individual engineer's needs and questions are not addressed to the extent now possible through the use of technology. Kansas State University's UTC will initiate a National Transportation Forum bulletin board on the internet, allowing engineers throughout the United States—and indeed the world—to communicate on transportation issues. The bulletin board will be hosted at Kansas State University and dynamically respond to the transportation community's needs.

The National Transportation Forum will address one of the most critical needs of rural transportation—the lack of institutional knowledge in rural areas. For example, fewer than half of Kansas' counties have county engineers. These counties contract engineering services, which limits ongoing access to information for immediate engineering needs. Quite simply, without a county engineer, county transportation personnel must resort to either best judgment or contacting their engineering consultant, who will bill for the time incurred. The National Transportation Forum will act as a repository for knowledge, especially in these rural counties, where institutional knowledge is at a premium.

The National Transportation Forum will differ from bulletin boards hosted by other entities, such as ITE and ASCE, in several ways. First, the National Transportation Forum will focus on providing existing and developing research answers to engineers in the field. Kansas State University's UTC will offer a course where students will perform research in order to answer questions posed on the bulletin board that are either complex or too time-consuming for other engineers and researchers to answer easily. A graduate student will be responsible for monitoring the bulletin board, and questions that are not answered by other engineers promptly or appear to require a greater amount of research will be researched and answered by the graduate student.

An example of anticipated interaction would be a local maintenance worker in a small town wanting to know the best seal coat for a given application. Instead of relying solely on vendor information, a student in the course will research the subject, summarize the available information, and post it in a format so that not only the maintenance worker can immediately use the information, but so that future readers will also have access. This will create institutional knowledge that is sorely lacking in many small, rural communities as well as provide the students with a significant breadth and depth of knowledge through performing research and obtaining resources to answer difficult questions. This will also benefit rural communities who frequently do not have engineering staff on hand to answer difficult technical questions.

Secondly, the National Transportation Forum will focus on bringing all areas of engineering and the sciences together. Faculty from other disciplines will be encouraged to participate as individual subject experts on the Forum. This will provide a “policing” of the forums for appropriate content and relevance, as well as providing an opportunity for experts to participate in their areas of specialty with engineers in the field. Additionally, a Transportation Hotline may be added if sufficient interest exists.

The National Transportation Forum, which will be hosted at <http://transport.ksu.edu>. The software package gForum has been donated by Gossamer Software to host the Forum, and Kansas State University Computer Services has recently installed the program and corresponding databases.

Coordinated Transportation Education Across Campuses. First, a collaborative effort will increase the number of transportation courses available to students desiring a broad and in-depth education in transportation engineering. Communication, trust, and school pride are factors that will need to be addressed in order for this effort to succeed. While previous efforts were made to share courses between KU and Kansas State University, these efforts were not long-lived. Accordingly, Kansas State University’s UTC will act as a liaison between the Consortium schools, fostering long-term relationships that allow for the sharing of academic resources that will benefit the students and faculty at all of the institutions.

It is also considered critical that faculty be available to give presentations to K-12 educational programs. These students, some of which will be future transportation engineers, need to be enticed into the transportation research arena. One of the best ways to attract the best and brightest students is to pique their interests while they are still in high school. Outreach to high schools, in the form of presentations and classes, will also be encouraged by faculty to enhance interest of students in transportation-related careers.

Student of the Year Award. The UTC will also choose an outstanding undergraduate student of the year in transportation engineering. This will be achieved through nominations by faculty, staff, and students and then voted upon by the Kansas State University Civil Engineering faculty. This will be done in collaboration with the selection of the Eno Transportation Foundation Leadership Development Conference, where the Faculty will name an outstanding graduate student to participate. It believed that separate awards for both graduate and undergraduate students—and recognizing those efforts independently—is critical to the differentiation between student classes. Quite frankly, it is difficult to convince quality undergraduate students to continue their educations when employers offer significant amounts of money for the student’s immediate entry into the workforce. Recognizing graduate students—and singling out those students for specific recognition—will reinforce what faculty members have long known: the life-long benefits of a graduate education are significant, both to the students and to the profession as a whole.

The Center’s Student of the Year Award will include a \$1,000 cash award and the Center will also pay for the student to attend an award ceremony in Washington, DC, during the annual winter meeting of the Transportation Research Board.

4. Performance Indicators. Performance Indicators 5 and 6 are anticipated to increase as the availability of graduate-level courses increase. Through a shared effort with other universities, graduate and undergraduate students will have a more direct involvement with research activities, as well. It is desired to increase not only the number of students involved in transportation, but also the quality of that education. Finally, through outreach efforts, the Center anticipates recruiting more high school students to participate in transportation engineering and related careers.

D. Human Resources

Human Resources Goal: an increased number of students, faculty, and staff who are attracted to and substantively involved in the undergraduate, graduate, and professional programs of the Center.

1. *Baseline Measures.* A lack of funding—and the lack of a synergistic relationship to overcome that lack of funding—has historically crippled the ability of transportation faculty to increase in number, as shown in Baselines 3 and 4. Due to a limited budget, corresponding to the relatively-limited number of students enrolled in the transportation engineering curriculum, few courses transportation courses are offered. Accordingly, fewer graduate students were able to be recruited for the transportation engineering program. In order to recruit high-quality transportation graduate and undergraduate students, there must be a high-quality program capable of attracting those students. In order to accomplish this goal, a synergistic relationship between the consortium universities will allow Kansas State University’s transportation program to grow in both the number and quality of both its graduate and undergraduate students.

2. *Human Resources Program Outcome.* By the end of the grant, Kansas State University’s transportation program will have increased in the number of courses available, allowing graduate students to fill their schedule of courses with coursework more appropriate to transportation engineering.

3. *Planned Activities.* The Center plans to build upon its own successes—as graduating students enter the workforce, the prestige of Kansas State University’s transportation program will be enhanced. Coupled with increases in publications and presentations, more students will become interested in transportation-related courses. This will allow more students to take transportation-related courses in which they are interested.

Required Activities. There are no specific activities required of all Centers.

Planned Activities. The Center will engage in the active recruitment of graduate and undergraduate students, deepening the resource pool available to faculty to perform quality research and offer more diverse experiences to students by allowing a more hands-on approach to education.

Recruitment of Undergraduate Students. Obtaining quality graduate students first requires the development of a successful recruiting program to encourage undergraduates to enter the transportation field. Frequently, students in upper-level engineering courses have already begun to specialize in their engineering courses and even first-year students have decided what courses interest them. Accordingly, it is considered critical that undergraduate students be recruited through efforts in high schools.

Increasing Kansas State University's outreach in high schools will serve several purposes. First, valuable information can be relayed to students, including safe driving and transportation safety. Second, students' broad interests will be addressed and their relation to transportation research, including the other fields of civil engineering—structures (bridges), geotechnical (materials, pavement design and evaluation), water resources (water flow and abatement), and environmental (runoff and transportation efficiency). Additionally, transportation engineering's connection with human factors, as well as statistics, actuarial science, accounting, and the myriad of other disciplines will be addressed.

The diverse nature of transportation engineering will be the focus of the Kansas State University's outreach program. A mobile truck, donated by FHWA's Turner-Fairbanks Highway Research Center, will be remodeled to allow high school students to observe transportation research firsthand. This project will also highlight Kansas State University's UTC and transportation program, in general.

Additionally, undergraduate financial aid will also be offered in the form of fellowships, research assistantships, and internships. Programs of cost-sharing will be examined in low-income areas previously not able to afford offering internships to students. Additionally, underserved areas will be examined for research projects of students in order to reduce transportation costs and increase accessibility to traditionally-underserved areas.

Recruitment of Graduate Students. A transportation program must build on not only faculty experience and education, but upon the undergraduate students it educates. The institutional knowledge offered by undergraduates choosing to continue to earn an advanced degree is critical to successful research programs. Accordingly, undergraduate students will be actively involved in research with the intention of attracting those students into the graduate curriculum. However, enthusiasm in research is not sufficient to attract or retain quality graduate students; financial incentives, including covering the costs of graduate students' tuition, will also be included as a recruitment tool.

Recruitment of Non-Traditional Students. Non-traditional students, including county and state engineers and consultants, will also be pursued as students. These engineers have significant experience that can be shared with both undergraduate and graduate students. Working in teaming projects, such as senior design or with collaborative efforts with faculty research projects, these engineers will add depth and breadth to the experiences of both students and faculty.

Outreach Activities. Outreach will consist of an active faculty taking part in science fairs as advisors, through greater professional and community involvement, through availability to the media to answer transportation-related questions, and through career-day presentations and involvement at high schools. Traditionally, transportation engineering has been a “catch as catch can” field of engineering; proactive development of transportation-related educational activities will serve to highlight the true difficulty—and multidiscipline nature—of transportation engineering. Transportation engineering truly requires individuals with diverse interests in fields such as psychology, environmental planning, and law. Exposing students to transportation engineering's inherent diverse nature is critical to the outreach of the Center.

Additionally, the National Research Forum bulletin board will serve to interlink thousands of individuals interested in transportation-related issues. It is believed that the wide-ranging benefits of this outreach program will also serve to pique the interests of those previously not familiar with transportation engineering.

4. Performance Indicators. The Center will track the Performance Indicators 7, 8, and 9, as set forth in the Appendix. The diverse and broad nature of the Advisory Committee will assist the Center's effort to focus on industry's and government's needs for high-quality, well-trained engineers. The Advisory Committee will be focused on growing the transportation program at Kansas State University, not only in size, but in quality and its ability to affect to society as a whole.

E. Diversity

Diversity Goal: Students, faculty, and staff who reflect the growing diversity of the United States workforce and are substantively involved in the undergraduate, graduate, and professional programs of the Center.

1. Baseline Measures. Because of privacy concerns raised by grantees who received UTC Grants, RITA no longer requires the reporting of Baselines regarding diversity. Nevertheless, Kansas State University's UTC is particularly concerned in ensuring a diverse workforce and recognizes that growing the diversity of its educational, research, and outreach programs will affect more people in a greater way. Accordingly, diversity will be considered whenever appropriate in the decisions of Kansas State University's UTC and its Advisory Committee.

2. Diversity Program Outcome. The faculty of Kansas State University considers it critical that the program represent the diverse nature of the growing diversity in the United States. Accordingly, the faculty will make every effort to involve minorities and women, particularly Kansas' under-represented Native American population, in the Center's activities.

3. Planned Activities. The Center will work with Kansas State University's Office of Affirmative Action to identify underrepresented groups and what can best be done to serve those groups. The Center will also offer its services in the form of faculty presentations and outreach to minority communities. Specifically, the Center will advocate expanding successful pre-existing recruitment programs at Kansas State University, such as partnerships with Historically Black Colleges and Universities (HBCU) that bring in ethnically-diverse graduate students. Additional partnership programs include Hispanic Serving Institutions (HSIs) and Tribal Colleges, enhancing the availability of diverse graduate students in areas related to transportation research and education.

4. Performance Indicators. Because of privacy concerns raised by grantees who received UTC Grants, RITA no longer requires the reporting of Performance Indicators regarding diversity. Kansas State University's UTC considers enhancing diversity critical to its success and will make efforts to improve diversity in an ever-diverse workforce and population.

F. Technology Transfer

Technology Transfer Goal: Availability of research results to potential users in a form that can be directly implemented, utilized, or otherwise applied.

1. Baseline Measures. One of the most important focuses to the Center will be that of technology transfer. Professional development and exposure of faculty and students to real-world problems is critical to both faculty and students, for both their educational and professional careers. Conversely—and more important—is that the research efforts at the Center, as well as the educational activities of the University, must match the needs of the transportation community. Accordingly, technology transfer is considered critical to the success of the Center. The baseline measures for technology transfer are shown in Baselines 10 and 11.

2. Technology Transfer Program Outcome. It is the Center's belief that technology transfer depends on a broad-based, multiple-media operation. Quite frankly, performing quality research and writing accurate reports is no longer a sufficient method for informing those affected by that research of the research results. Accordingly, technology transfer at Kansas State University's Center will focus not only on research reports, but increasing the number of workshops, professional development seminars for continuing education credits, expanding the offerings of short courses and seminars directed towards practical practice, and enhancing the number of "update" courses, informing transportation professionals of advances in technology and research as well as changes in laws and codes.

That is not to say that research publications will not be a heavy focus of the Center. Publications in professional and refereed journals will be of paramount importance and increase over the term of the grant. Publication and citation in refereed journals affects every other aspect of the Center's goals—they affect education and recruitment of both graduate and undergraduate students, not only from the standpoint of program prestige, but also in the suitability of the program

The Center will also have a hands-on, practical approach to transportation education. The Center will also sponsor the American Concrete Institute's (ACI's) concrete certification courses, frequently required for testing of pavements and other concrete structures. This will help students, as it will allow them to obtain summer employment as a concrete technician, a skilled occupation. Furthermore, it will provide local teaching of the certification courses to surrounding concrete workers and engineering technicians, as well. Furthermore, licensed engineers will be encouraged to take the courses to enhance their skills as transportation professionals. Information on ACI's certification process can be found on their website at <http://www.aci-int.org>.

Asphalt pavement certification will be another opportunity for interaction, outreach, and technology transfer. Kansas State University currently collaborates with the Kansas Department of Transportation in offering Superpave courses. The Superpave courses are currently taught by Kansas State University faculty (Dr. Mustaque Hossain) and the ACI courses will be taught by Drs. Robert Peterman and Brian A. Coon. This will allow a dynamic interchange of information between transportation researchers and asphalt and concrete workers "in the field."

The Traffic Assistance Services for Kansas (TASK), which has been providing highway safety training programs since 1980, will also be used for outreach and its efforts enhanced. These forums provide not only a method of dispersing information, but in gathering information from those with a vested interest in rural transportation issues.

Increased Awareness of Rural Transportation Issues. Kansas State University's UTC will also involve the public and legislators by informing them of rural transportation research and needs. It is critical to involve these individuals because of the effects of the transportation on their lives. Outreach from Kansas State University's UTC will also involve offering resources to schools in the form of speakers and to media outlets to make rural transportation a topic of discussion publicly.

Shared Benefits of Experience and Research through a National Transportation Forum. The National Transportation Forum bulletin board's benefits are manifold. First, engineers will save significant time and resources by sharing information rather than duplicating research efforts. Instead of an engineer "surfing the web" to find the answer to a question, information can be located in one source. Second, links will be made to all of the UTC member schools in order to share information and increase visibility for research performed by all UTC members. Finally, the research and educational benefits of truly sharing information on a global scale are significant. Reducing redundancy minimizes costs, enhances other research, and puts ever-scarce transportation research resources to their most-efficient use.

Finally, as discussed above, the National Transportation Forum on the Center's website will allow for interaction between and among transportation researchers and engineers in the field. This will allow for the sharing of vast quantities of information and allow for the enhancement of graduate and undergraduate educations through their interactions with the project.

3. Planned Activities.

Required Activities. The Center will provide an up-to-date webpage located at <http://transport.ksu.edu>. This webpage will exceed the reporting requirements laid out in RITA's "Reporting Requirements for University Transportation Centers (UTCs)." The Center will also participate in meetings of UTC and/or DOT experts on high-priority topics and provide expert advice to DOT on technical and/or educational topics. As discussed above in Technology Transfer Program Outcome, the Center will continue to be more reactive to industry needs through its technology transfer program, opening a two-way stream of communication, identifying needs and resources in the transportation community.

The Center will also provide Center Newsletters to the transportation community, available in electronic and paper form for those who request a hardcopy. It is believed that information should be in the form most appealing to the individual users and that no single technology transfer methodology is appropriate in every situation. Accordingly, the use of Portable Document Format (PDF) documents will maximize the information interchange while responding to requests for printed material, as well. Finally, the Center will begin making PDF documents of previous research reports performed by Kansas State University and making those documents also available on the Center's website; it is believed that previous research should be made as available as current research, and that the additional effort to PDF such documents is small compared to the relative benefit created through their enhanced availability.

4. Performance Indicators. Performance Indicators 10 and 11 will be used, as set forth in Appendix A. The number of presentations, research papers, continuing education courses taught, as well as the interaction on the National Transportation Forum bulletin board will provide feedback as to the success of the Center. Furthermore, all project proposals will be required to contain a technology transfer plan and the report results will be posted and linked to on the Center's website. It is the belief of the Center that outreach and technology transfer must be planned from the very beginning of each project.

III. MANAGEMENT APPROACH

From an organizational perspective, the Center will reside in the College of Engineering as part of the Department of Civil Engineering. The Director and Associate Director will formulate the operating policies and administrative procedures not currently addressed by Kansas State University's administrative policies. These policies and procedures will then be approved by the Advisory Committee. The Center Director will serve as head of the Center, acting as a liaison between the consumers of transportation research. This includes identifying relationships with County Engineers, rural transit associations, and other organizations with vested interests in rural transportation issues. Additionally, the Director will guide the outreach and technology transfer of the Center in order to coordinate those efforts with LTAP and other organizations in order to achieve the best dissemination of research and information possible.

The Associate Director will assist in the augmentation of research funding to further the goals of the UTC. Primarily, this will focus on the identification of rural transportation needs where funding is insufficient and develop methods to meet those needs. Additionally, the Associate Director will serve as the liaison between the University's research partners, including MATC and the other MATC Region VII Consortium member institutions, and K-TRAN. This ensures a coordination of research efforts and a consistency in Center policy. The Center's management structure is shown in Figure 2.

The Advisory Committee's membership was selected to match the diverse nature of the transportation community. Members include USDOT and KDOT representatives, leaders from the asphalt and concrete paving industries, principals and partners in transportation engineering consulting firms, a representative of the county engineers and public works, as well as law enforcement. The Advisory Committee was chosen specifically for their diverse nature and their ability to perform peer review of research proposals as well as reviewing the final research project results and reports.

While the Advisory Board will not have direct control over expenditures, it will recommend such expenditures compatible with the goals of the Center. As with any subdivision of Kansas State University, the Center will be subject to audit according to the Board of Regent's policies.

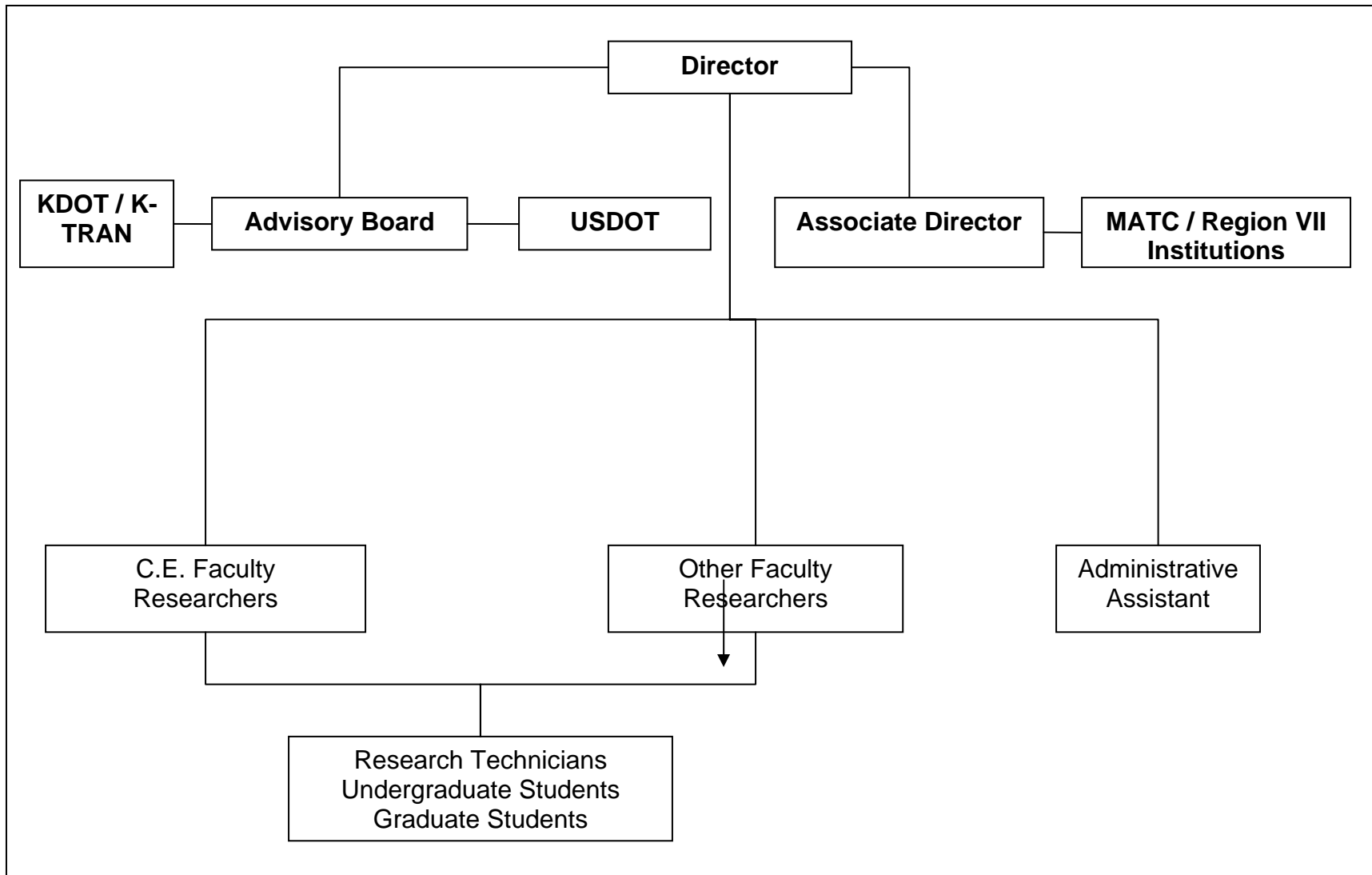
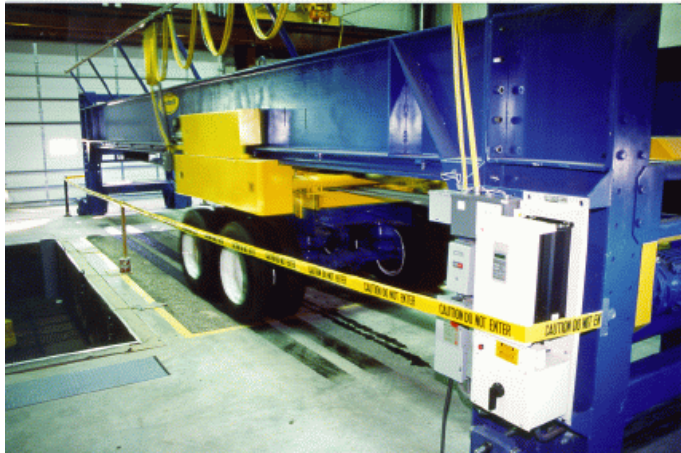


Figure 2. Organizational Structure of Kansas State University's UTC.

A. Institutional Resources

Kansas State University has extensive educational and outreach resources, including laboratory facilities and classrooms, as well as a significant research infrastructure. This includes the Environmental, Environmental Remediation, Geotechnical, Geoenvironmental, Structures, Pavement & Materials, and Surveying Laboratories.



Additionally, Kansas State University's Civil Engineering Department is the home of the Civil Infrastructure System Laboratory (CISL), which performs pooled fund testing for Iowa, Kansas, Missouri, and Nebraska. Fourteen different experiments have been run, including exposing pavements to fatigue loading of 2,000,000 cycles.

Superpave courses are also taught at Kansas State University, including laboratory facilities for a Hamburg Wheel Tester to identify pavement designs susceptible to rutting or stripping. Fatigue testing of asphalt beams is shown below.



1. Faculty Resources

Currently, the majority of Civil Engineering faculty is involved in transportation research at various levels. This includes transportation planning, operations and safety faculty (Drs. Brian A. Coon, Sunanda Dissanayake, Robert Stokes) and transportation materials faculty (Drs. Mustaque Hossain, Hani G. Melhem, Jacob M. Najjar, Robert J. Peterman, and Hayder A. Rasheed), as well as other Civil Engineering faculty in areas related to transportation issues (Drs. Alok Bandari, Asad Esmaeily, Alexander P. Mathews, Dunja Perić, Steve Starrett, and David Steward) and Industrial Engineering faculty (Dr. Malgorzata J. Rys). It is believed that a broad-based approach to transportation issues is required, as transportation issues frequently encompass multiple areas of civil engineering. The Civil Engineering faculty at Kansas State University is diverse in both skills and experience and will be able to partner with other departments with experience in human factors, psychology, and economics.

Dr. Sunanda Dissanayake. Dr Dissanayake has been an Assistant Professor in Civil Engineering at Kansas State University since August 2002. She obtained her Bachelors Degree in Civil Engineering from University of Moratuwa, Sri Lanka in 1990, Masters in Engineering from Asian Institute of Technology, Bangkok, Thailand in 1993, and PhD in Civil Engineering from University of South Florida in 1999. She specializes in Transportation Engineering with emphasis on Traffic Engineering and Highway Safety. She has completed a number of research projects in the areas of safety of special population groups, traffic operational and safety evaluation of highway facilities, and access management. She is an expert in crash data analysis and statistical modeling of crash data. Some of her current externally funded research projects include Effects of not Wearing Safety Belts on Injury Severity, Highway Safety Issues of Older Drivers, Speed Limit Related Issues on Gravel Roads, and Economic Impacts of not Wearing Seat Belts. She also is the Co-principal Investigator of several other on-going projects such as Developing a Statewide Truck Trip Management System, Rural Transportation Initiative Supporting Agricultural Transition and Sustainability, Development of a Comprehensive Rural Transportation Safety Research Program for the 21st Century, and Evaluation of the Effects of Longitudinal Construction Joints on Traffic Operations.

Dr. Robert W. Stokes. Dr. Stokes has over 25 years of experience in general transportation planning and applied transportation research. Currently a Professor of Civil Engineering at Kansas State University, he teaches undergraduate and graduate level courses in highway design, transportation planning, land development, traffic engineering and engineering economics. Prior to joining the faculty of Kansas State in 1991, he was the senior transportation planner for the city of Rapid City, South Dakota, and the Program Manager of the Urban Mobility Program at the Texas Transportation Institute, Texas A&M University. During his ten years at the Texas Transportation Institute, he was responsible for designing, implementing and monitoring a number of applied transportation research projects under the sponsorship of local, regional, state and federal highway and public transportation agencies. Dr. Stokes has extensive experience in the design and implementation of urban, rural and intercity transportation planning studies; highway design, planning and operations; traffic engineering; design and operation of turning lanes; traffic safety; and transit planning, design and operations.

2. Office Resources

The Department of Civil Engineering has provided office space for the director and made available office resources sufficient to operate the center. Extensive library facilities, computer facilities, and other technology-based resources have also been made available for use by the center.

B. Center Director

Kansas State University's Center Director is Dr. Brian A. Coon. Dr. Coon is an experienced transportation researcher, earning the Transportation Research Board's 2007 Practical Paper Award for research on guardrail runout lengths. A licensed attorney and professional engineer, Dr. Coon offers a breadth and depth of knowledge beneficial for not only transportation research, but outreach and education, as well.

Dr. Coon serves on the NCEES Mechanical Engineering Exam Committee, which writes the national licensing exam for Mechanical Engineers. Dr. Coon has also served as Representative in the Iowa House of Representatives, where he served on the State Government, Technology, and Judiciary & Law Enforcement Committees. He also served as the Vice-Chair of the Administration and Regulation Appropriation Committee, overseeing a budget of over \$96 million. Additionally, Dr. Coon was a Fulbright Scholar in Linköping, Sweden, where he worked with the Swedish Road and Transport Institute.

C. Center Faculty and Staff

Currently, a majority of the Civil Engineering department is actively involved in transportation research at some level. Individuals known at this time to be devoting more than fifty percent of their time include Drs. Brian A. Coon, Renee Slick, and an administrative assistant.

As a result of funding made available by the UTC grant, Dr. Renee Slick will be joining the Center as Associate Director and the Department of Civil Engineering as Research Associate Professor. Dr. Slick is an industrial / organizational psychologist specializing in driver training and education. Dr. Slick has worked with the Department of Defense in developing programs to examine driver safety and has extensive experience with novice and teen drivers. Dr. Slick holds a doctorate in psychology as well as an MBA. This skill set makes her uniquely qualified to examine the human factors associated with elderly drivers as well as continuing research on driver education of younger motorists in communities that, due to their rural nature, do not have the facilities or resources to train drivers in to drive in an urban environment.

Additionally, Dr. Slick has performed work with driving simulators that may offer rural communities better opportunities to train young drivers to better handle urban driving situations in a cost-effective manner. Finally, Dr. Slick will increase the outreach potential of the Center through her experience in education and psychology and their effects on effective learning.

An administrative assistant will also be hired as a direct result of the UTC grant. This position will be responsible for general administrative tasks, including the updating web pages with up-to-date progress reports, the organization of final reports and ensuring their availability and distribution, as well as the coordination of other administrative aspects of the Center. This position will also be responsible for the direct mailing and assembly of newsletters, fliers, and other media created by faculty for distribution. Finally, this position will coordinate the mobile laboratory vehicle which is to be renovated under the UTC grant so that transportation students will be able to give presentations and demonstrations at science fairs and other appropriate events.

1. Multiparty Arrangements

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

Kansas State University is a member of the Region VII Consortium of Universities, including the University of Nebraska-Lincoln, the University of Kansas, the University of Missouri-Rolla and Lincoln University of Missouri. The primary resources for the UTC grant will be concentrated at the University of Nebraska-Lincoln, and Kansas State University's UTC will augment its research funding sources from internal University funding, K-TRAN, and funding from SAFETEA-LU.

D. Matching Funds

The grant funds in the UTC Grant Agreement as authorized by 49 U.S.C. 5505 or 5506 are subject to a one-hundred percent non-Federal match. Matching funds will come from a variety of sources, including KDOT, Kansas State University, and the Kansas Legislature. Specifically, K-State will provide matching funds through time-release of faculty specifically for research and outreach.

1. Eligibility as Matching Funds.

Matching funds, which may be cash or in-kind, will serve to accomplish the program objectives and the purpose of the grant. Furthermore, these matching funds will be fully documented and carefully accounted for in the Center's records. The rules governing the use of in-kind and cash contributions as matching funds and are set forth specifically in the most recent revision of OMB Circular A-110.

2. Special Rule for the UTC Program.

All matching fund use will conform to 2 CFR 215, including funding allowed under section 503, 504(b), or 505 of 23 USCA. These sections refer to the technology deployment, local technical assistance, and state planning and research programs managed by the Federal Highway Administration.

IV. BUDGET DETAILS

Although the Center will receive a multi-year grant, for which this multi-year Strategic Plan was developed, RITA will make such funding available in annual increments in the amounts authorized under 49 U.S.C.A. 5338, 5505, or 5506 (subject to availability of funding). The itemized budget for the first year of the Center's operation is found in Exhibit II.

It is noted that the amount of Federal funding stated in the Grant Agreement is matched by non-Federal funding. None of the Federal funding is pass-through funding from the Federal government and is compliant with the Grant Agreement.

Finally, it is noted that, as of the date of this proposal, no UTC funds have been expended. The Director and Interim Director's transportation and stay at CUTC events, the housing and startup costs of the Director, and the costs of developing the Strategic Plan were borne by Kansas State University.

A. Format

The Center Budget Plan presents line items using the cost categories indicated in Exhibit B, *Instructions for Preparing a UTC Strategic Plan*. The Center Budget Plan includes attachments showing the calculations by which the line items were derived. Because the research projects have not yet been selected, many of the costs have been estimated.

B. Grant Year

The beginning and ending dates of Kansas State University's Grant Year are August 1, 2007, through May 31, 2008. This period will be reflected in the Center's Budget Plan and Financial Status Reports, and the Center understands that future funding awards under multiyear grants will be made at approximately the beginning of the Grant Year, or as soon thereafter as funding is available.

C. Salaries

Center Director. Funding for a total of 2080 hours (1.0 FTE) is requested for the Center Director, who will coordinate all Center activities.

Center Associate Director. Funding for a total of 520 hours (0.25 FTE) is requested for the Center's Associate Director for Research, who will coordinate research activities. This position will be dedicated not only to coordinating research at Kansas State University, but also assisting researchers in coordinating research nationwide.

Other Faculty and Staff Salaries. It is anticipated that thirty percent of the overall budget will be dedicated to faculty and staff salaries on future research projects selected by the Advisory Committee.

Student Salaries. It is anticipated that forty-five percent of the overall budget will be dedicated to student salaries, both undergraduate and graduates, on future research projects selected by the Advisory Committee.

Other Personnel. Funding for an administrative assistant/technician for 2080 hours (1.0 FTE). This position will fill two roles. First, the individual will assist the Center Director and Associate Director with their duties, including coordinating research proposals, performing web page updates, and assisting in outreach, such as the Newsletter and coordinating speaking events. One of the web page update duties will involve making certain all faculty publications not restricted by copyright, as well as all research reports, are posted on the Center's website. Further, the individual will begin converting previous research into electronic format so that it is more readily available.

Fringe Benefits. The following fringe benefit rates were used when developing the budget and are effective for the period August 1, 2006 through July 31, 2007. The current Kansas State University policy on Fringe Benefits can be found at <http://www.k-state.edu/research/preaward/fringe.htm> and is shown in Table 1.

Table 1. Fringe Benefit Rates.

	Full Time Employees		Students		
	Unclassified	Classified	Enrolled \geq 6 hrs. and employed < 0.5 time	Not Enrolled or enrolled < 6 hrs.	GRA/GTA Enrolled \geq 6 hrs and employed = 0.5 time
FICA	7.65%	7.65%	N/A	7.65%	N/A
Retirement	8.50%	5.77%	N/A	N/A	N/A
Members Life & Disability	1.00%	1.00%	N/A	N/A	N/A
Unemployment	0.15%	0.15%	N/A	0.15%	N/A
Workman's Comp	1.059%	1.059%	1.059%	1.059%	1.059%
Health Insurance	13.091%	21.821%	N/A	N/A	3.891%
Sick/Annual Leave	0.55%	0.55%	0.55%	0.55%	0.55%
Total	32.0%	38.0%	1.61%	9.41%	5.50%

D. Scholarships

A portion of the Center funding may be used to provide student scholarships that are not compensation for labor. These scholarships are subject to the limitations set forth in Section III.5 of the *General Provisions of Grant Agreements for UTCs*. This also applies to honorary award programs such as the UTC Student of the Year Award.

E. Expendable Property, Supplies, and Services

Materials & Supplies. A total of \$20,000 is requested for expendable supplies, primarily for education and outreach about the Center and the maintenance of the Center’s website and the National Transportation Forum bulletin board website.

F. Permanent Equipment

A written (hard copy or e-mail) request will be submitted to RITA for approval prior to the purchase of "permanent equipment" that has a unit acquisition cost of \$5,000 or more. Unless otherwise requested by the Grantee, all legal rights to equipment purchased with UTC funds shall vest in the Grantee upon acquisition. The Center recognizes that permission is not required for the purchase of "Expendable Property, Supplies, and Services" which is a category that includes such tangible items as expendable office and laboratory supplies and services such as telecommunications.

G. Travel

Travel expenses will be provided to increase the number of technical committees, outreach activities, and other activities designed to enhance the transportation research field. No travel is planned to any destination outside of the United States and its territories. If such travel is sought, written permission will be obtained from RITA, per Section III.4 of the General Provisions, prior to the initiation of such travel.

H. Other Direct Costs

Publication & Dissemination. A total of \$10,000 is requested to fund technology transfer, publication costs, support distribution of the Center's materials, and for the expenses of publishing in professional journals.

I. Facilities & Administrative (Indirect) Costs

Facilities and Administrative (F&A or "indirect") Costs are those incurred for common or joint objectives and, therefore, cannot be identified readily and specifically with a particular project or program. Facilities and Administrative Costs are negotiated through Kansas State University and can be found at <http://www.k-state.edu/research/preaward/indirect.htm>.

Table 2. Kansas State University's Facilities and Administrative Costs.

	Research	Instruction (Educational Services)	Public Serv. (Ext. Div. & Cont. Educ. & Other)	Branch Experiment Stations
On Campus				
Facilities Costs	20.0%	20.0%	10.5%	11.5%
Administrative Costs	26.0%	26.0%	26.0%	26.0%
Total	46.0%	46.0%	36.5%	37.5%
Off Campus				
Facilities Costs	0.0%	0.0%	0.0%	0.0%
Administrative Costs	26.0%	26.0%	26.0%	26.0%
Total	26.0%	26.0%	26.0%	26.0%

V. KANSAS STATE UNIVERSITY'S UTC ADVISORY COMMITTEE

<p>Richard McReynolds Director of Research Kansas Department of Transportation 2300 SW Van Buren St. Topeka, KS 66611-1195 (785) 291-3841 dick@ksdot.org</p>	<p>Paul Malir President TranSystems 2400 Pershing Road, Suite 400 Kansas City, MO 64108 (816) 329-8700 pjmalir@transystems.com</p>
<p>J. Michael Bowen, <i>ex officio</i> Kansas Division Administrator Federal Highway Administration U.S. Department of Transportation 6111 SW 29th Street, Suite 100 Topeka, KS 66614 (785) 228-2544 j.michael.bowen@fhwa.dot.gov</p>	<p>W. Michael Lackey Assistant Secretary of Transportation State Transportation Engineer Kansas Department of Transportation, Retired 3713 West 30th Terrace Topeka, KS 66614 (785) 273-1189 mlackey@cox.net</p>
<p>James Jones Executive Director Kansas Asphalt Pavers Association 2813 SW Westport Plaza Dr Topeka, KS 66614 (785) 271-0132 jjkapa@aol.com</p>	<p>E. Dean Carlson President Carlson Associates 2309 SW Mayfair Place Topeka, KS 66611 peon1@swbell.net</p>
<p>Edward J. Mulcahy National Officer Transystems Corporation 2400 Pershing Road, Suite 400 Kansas City, MO 64108 (816) 329-8600 emulcahy@transystems.com</p>	<p>Robert Thorn Partner Finney & Turnipseed, L.L.P. 2001 SW Pembroke Lane Topeka, KS 66604 785-235-0474 bthorns@cox.net</p>
<p>Leon Hobson Director of Public Works Riley County, Kansas 110 Courthouse Plaza Manhattan, KS 66502 785-537-6330 lhobson@rileycountyks.gov</p>	<p>Herman Jones Director of Administration Kansas Highway Patrol 122 S.W. 7th Topeka, KS 66603 (785) 296-6800</p>
<p>Matt Ross Executive Director, Missouri / Kansas Chapter American Concrete Pavement Association 10707 Barkley Road Suite A Overland Park, Kansas 66211 (913) 381-2251 mross@moksacpa.com</p>	<p>Keith Browning Director Douglas County Public Works 1242 Massachusetts Lawrence, KS 66044</p>
<p>Joanie Roeseler, <i>ex officio</i> <u>Region 7 Director</u> Federal Transit Administration 901 Locust Street, Suite 404 Kansas City, MO 64106 (816) 329-3920 joan.roeseler@dot.gov</p>	

Exhibit II: University Transportation Center (UTC) Budget Plan

Name of Grantee: Kansas State University Grant Year 8/1/07 thru 7/31/08
 (Date) (Date)

CATEGORIES	Budgeted Amount	Explanatory Notes
Center Director Salary	\$90,000	
Faculty Salaries	\$176,000	
Administrative Staff Salaries	\$35,000	
Other Staff Salaries	\$10,000	
Student Salaries	\$201,885	
Staff Benefits	\$109,649	
Total Salaries and Benefits	\$622,534	
Scholarships / Tuition	\$54,000	No F&A Costs
Permanent Equipment	---	No F&A Costs, \$5,000 or more
Expendable Property, Supplies, and Services	\$20,000	Less than \$5,000 is considered expendable
Domestic Travel	\$35,000	See Section IV.G
Foreign Travel	---	---
Other Direct Costs (specify)	\$10,000	See Section IV.H
Total Direct Costs	\$119,000	
F&A (indirect) Costs	\$118,465	
Total Costs*	\$859,999	
Federal Share	\$429,999	
Matching Share (if applicable)	\$430,000	KDOT/K-TRAN (\$430,000)

* Includes Federal and Matching Shares

VI. APPENDIX A

Baseline Measures for KSU's UTC

Below is data for the most recently completed academic year for Kansas State University.

A. Research Selection

1. Number of transportation research projects selected for funding: 7

1a. Number of those projects that you consider to be: basic research 2, advanced research 1, and applied research 3. Projects may be included in more than one category if applicable.

2. Total budgeted costs for the projects reported in 1 above.

\$631,160 from all sources

B. Research Performance

3. Number of transportation research reports published: 9

4. Number of transportation research papers presented at academic/professional meetings:

28

C. 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: 10

Graduate: 11

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

Undergraduate: 11

Graduate: 19

D. 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: 10

Doctoral Level: 4

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

Master's Level: 10

Doctoral Level: 3

E. Technology Transfer

10. Number of transportation seminars, symposia, distance learning classes, etc. conducted for transportation professionals. 17

11. Number of transportation professionals participating in those events. 764

VII. APPROVAL LETTER FOR USE OF MATCHING FUNDS

STATE OF KANSAS



**KANSAS DEPARTMENT OF TRANSPORTATION
OFFICE OF ASSISTANT SECRETARY AND STATE TRANSPORTATION ENGINEER**

Docking State Office Building
915 SW Harrison, Rm. 730
Topeka, Kansas 66612-1568
Ph. (785) 296-3285 FAX (785) 296-1095
TTY (785) 296-3585

Deb Miller
Secretary of Transportation

Kathleen Sebelius
Governor

February 18, 2003

Dr. Terry S. King
Dean of Engineering
Kansas State University
1046 Rathbone Hall
Manhattan, KS 66506

Dear Dr. King:

The Kansas Department of Transportation (KDOT) is very supportive of your initiative to obtain University Transportation Center (UTC) funding for a National Research Center for Rural Transportation Infrastructure at Kansas State University in the Federal transportation reauthorization bill currently being considered in Congress. KDOT, through our current university research program, will support the center with up to \$450,000 of matching funds per year.

I wish you success at obtaining Federal funding for the center.

Sincerely,

A handwritten signature in black ink, appearing to read "Deb Miller".

Deb Miller
Secretary of Transportation

Bcc. Dr. Lakshmi Reddi, Professor and Head of Civil Engineering, Kansas State University
Dr. Mustaque Hossain, Professor of Civil Engineering, Kansas State University
Warren Sick, Assistant Secretary and State Transportation Engineer
Steve Woolington, Director of Operations
Lon Ingram, Chief of Materials and Research
Richard L. McReynolds, Engineer of Research

VIII. DIRECTOR'S RÉSUMÉ

Brian A. Coon – Page 1 of 5

BRIAN A. COON

11390 Kirtner Lane
St. George, Kansas 66535

Phone: 402/770-3569
Email: brian@payne-coon.com

PROFESSIONAL EXPERIENCE

ENGINEERING EXPERIENCE

Associate Professor, Department of Civil Engineering **December 2006 – Present**
Kansas State University, Manhattan, Kansas

- Director, University Transportation Center
- Teach graduate and undergraduate courses in transportation safety and planning
- Perform research for the Kansas Department of Transportation

Accident Reconstructionist / Research Engineer **January 1997 – December 2006**

Midwest Roadside Safety Facility, Lincoln, Nebraska

- Perform crash reconstruction of actual real-world impacts
- Responsible for electronic instrumentation of guard rails and test vehicles
- Process data, including extensive digital signal processing and perform engineering analysis of failures

LEGAL EXPERIENCE

Assistant County Attorney **Fall 2005**

Lancaster County, Nebraska, Prosecutor's Office

- Acted as Deputy County Prosecutor prosecuting misdemeanor cases under Nebraska's Senior Practice Rule
- Screened cases, made charging decisions, and performed plea bargaining
- Responsible for trying both bench and jury trials

Summer Associate **Summer 2005**

Woods & Aitken, L.L.P., Lincoln, Nebraska

- Performed legal research and writing in a large number of legal areas, including Construction Law, Corporate and Business Real Estate, and all aspects of litigation
- Assisted at hearings, trials, and in various discovery tasks

State Representative **January 1995 – January 1997**

Iowa House of Representatives, State of Iowa

- Youngest elected State Representative in Iowa in 1994, representing more than 32,000 residents
- Vice Chair, Administration and Regulation Appropriation Subcommittee
- Member, House Judiciary and Law Enforcement Committee

EDUCATION

- Doctor of Philosophy (Ph.D.) in Engineering* University of Nebraska – Lincoln
Major: Mechanical / Transportation Engineering
Dissertation Title: “Development of Crash Reconstruction Procedures for Roadside Safety Appurtenances”
- Juris Doctor (J.D.), with distinction* University of Nebraska College of Law
Nebraska Law Review (top ten percent) Community Legal Education Program (CLEP)
Criminal Litigation Certificate Phi Delta Theta Law Fraternity–Master of the Rolls
- Fulbright Scholar* Swedish Road and Transport Research Institute
Research Topic: “Harmonization of International Testing Standards for Roadside Safety Devices”
- Master of Science (M.S.E) in Engineering* University of Nebraska – Lincoln
Major: Geotechnical Engineering
Thesis Title: “Dynamic Impact Testing of Guardrail Posts Embedded in Soil”
- Bachelor of Science (B.S.E.) in Engineering* University of Iowa
Major: Mechanical Engineering

PROFESSIONAL LICENSURES AND CERTIFICATIONS

- Licensed Professional Engineer
State of Nebraska, #E-10480
• Mechanical Engineering
• Civil Engineering
State of Kansas, #19190
- Bar Membership—licensed to practice law in the following jurisdictions:
• Colorado, #38211
• Kansas, #22988
• Nebraska, #23512
• Federal District Court for the District of Kansas
- Certified Part-Time Law Enforcement Officer, Kansas
American Concrete Institute (ACI) Certified Examiner, Number 079044
Nuclear Radiation Worker (Nuclear Density Gauge)
Westlaw Certifications: Advanced Case Law Research, Advanced Statutory Research, International Law Research, Patent Research, Tax Research, and Trademark Research Certifications

PROFESSIONAL AFFILIATIONS

- American Bar Association (ABA)
American Concrete Institute (ACI)
Manuscript Review Committee, ACI Structural Journal and ACI Materials Journal
American Society of Civil Engineers (ASCE)
American Society for Engineering Education (ASEE)
American Society of Mechanical Engineers (ASME)
National Council of Examiners for Engineering & Surveying (NCEES)
Member, Mechanical Engineering Exam Committee
Subject Matter Expert, Calculator Committee
Chi Epsilon, Civil Engineering Honor Society
Colorado Bar Association
Phi Beta Delta, International Honor Society

COMPUTER PROFICIENCIES

LS-DYNA – Non-linear finite element simulation program
Familiar with network installation, including DSL and ISDN, wireless networking, and router configuration
Microsoft Office – Expert proficiency with Word, Excel, and PowerPoint
Familiar with all aspects of Microsoft Windows and PCs, including hardware and software troubleshooting

LANGUAGE PROFICIENCIES

Fluent in English (Native)
Fluent in Swedish (Completed Svenska för Invandrare (Swedish for Immigrants) with highest honors)

AWARDS

Practice-Ready Paper Award, Transportation Research Board, Washington, DC, 2007.
American Patriot Award, Concerned Women of America of Iowa, 1995.

SELECT PUBLICATIONS

Peer-Reviewed Journal Articles:

- Coon, B.A., D.L. Sicking, and K.K. Mak, Guardrail Runout Lengths, Transportation Research Record, National Research Council (June 2006).
- Coon, B.A. and J.D. Reid, Reconstruction Techniques for Energy-Absorbing Guardrail End Terminals, Accident Analysis & Prevention, vol. 37, no. 6, (November 2005).
- Coon, B.A. and J.D. Reid, Crash Reconstruction Technique for Longitudinal Barriers, ASCE Journal of Transportation Engineering, vol. 131, iss. 1 (January 2005).
- Reid, J.D., B.W. Bielenberg, and B.A. Coon, Indenting, Buckling, and Piercing of Aluminum Beverage Cans, Finite Elements in Analysis and Design, vol. 37, no. 2 (February 2001).

Conference Papers:

- Polivka, K.A., B.A. Coon, D.L. Sicking, R.K. Faller, B.W. Bielenberg, J.R. Rohde, and J.D. Reid, Development of the Midwest Guardrail System (MGS) W-Beam to Thrie-Beam Transition, Paper No. 07-2628, Annual Meeting of the Transportation Research Board (TRB) AFB20 Committee on Roadside Safety Design, Transportation Research Board, Washington, D.C. (January 2007).
- Coon, B.A., Analysis of Real-World Impact Conditions: Implications on Geometric Design, Winter Transportation Research Board Meeting, Washington, D.C. (January 2007).
- Coon, B.A., Guardrail Runout Lengths Revisited, Summer Transportation Research Board, St. George, Utah (July 2005).
- Coon, B.A. and J.D. Reid, Energy-Absorbing Wheel Tethers for Racecars, Seventh International LS-DYNA User's Conference, Dearborn, MI (May 2002).
- Coon, B.A. and J.D. Reid, Finite Element Modeling of Cable Hook Bolts, Seventh International LS-DYNA User's Conference, Dearborn, MI (May 2002).
- Coon, B.A., J.D. Reid, J.R. Rohde, and J. Herr, A New Shear Strength Testing Device for NCHRP Report 350 Strong Soil, Paper 01-0412, Annual Meeting of the Transportation Research Board (January 2001).
- Coon, B.A., P. Anugonda, and J.D. Reid, Piercing Resistance of Aluminum Beverage Cans, Sixth International LS-DYNA User's Conference, Dearborn, MI (April 2000).

Research Reports:

- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the Permanent New Jersey Safety Shape Barrier—Update to NCHRP 350 Test No. 4-12 (2214NJ-2). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-178-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 13, 2006).
- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the Permanent New Jersey Safety Shape Barrier—Update to NCHRP 350 Test No. 2-10 (2214NJ-1). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-177-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 13, 2006).
- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the SKT-MGS Tangent End Terminals—Update to NCHRP 350 Test No. 3-34 (2214TT-1). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-176-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 12, 2006).
- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the Guardrail to Concrete Barrier Transition—Update to NCHRP 350 Test No. 3-21 with 28" C.G. Height (2214T-1). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-175-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 12 2006).
- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the Permanent New Jersey Safety Shape Barrier—Update to NCHRP 350 Test No. 3-11 (2214TB-2). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-174-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 12, 2006).
- Polivka, K.A., R.K. Faller, D.L. Sicking, J.R. Rohde, B.W. Bielenberg, J.D. Reid, and B.A. Coon, Performance Evaluation of the Permanent New Jersey Safety Shape Barrier—Update to NCHRP 350 Test No. 3-11 (2214TB-1). Final Report to the National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Transportation Research Report No. TRP-03-173-06, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (October 11, 2006).
- Reid, J.D., B.A. Coon, B.A. Lewis, S.H. Sutherland, and Y.D. Murray, Evaluation of LS-DYNA Soil Material No. 147. Federal Highway Administration Report No. FHWA-HRT-04-094, Washington, DC (2004).
- Bielenberg, B.W., R.K. Faller, J.D. Reid, J.C. Holloway, J.R. Rohde, D.L. Sicking, and B.A. Coon, Impact Analysis of Three Concrete Beam Specimens. Final Report to APTEK, Inc., Transportation Research Report No. TRP-03-130-02, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (2003).
- Herr, J.E., J.R. Rohde, D.L. Sicking, J.D. Reid, R.K. Faller, J.C. Holloway, B.A. Coon, and K.A. Polivka, Development of Standards for Placement of Steel Guardrail Posts in Rock. Final Report to the Midwest State's Regional Pooled Fund Program, Transportation Research Report No. TRP-03-119-03, Project No. SPR-3(017)-Year 9, Project Code: RPPF-99-01(a), Midwest Roadside Safety Facility, University of Nebraska-Lincoln (2003).

- Coon, B.A., R.K. Faller, and J.D. Reid, Cable Barrier Literature Review, Final Report to the Midwest State's Regional Pooled Fund Program, Transportation Research Report No. TRP-03-118-02, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (2002).
- Coon, B.A., J.D. Reid, and J.R. Rohde, Dynamic Impact Testing of Guardrail Posts Embedded in Soil, Final Report to the Federal Highway Administration, Transportation Research Report No. TRP-03-77-98, Midwest Roadside Safety Facility, University of Nebraska-Lincoln (1999).