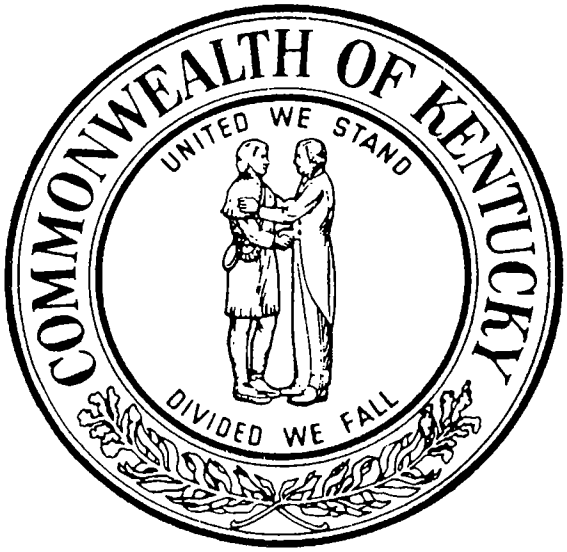
PLANNING AND RESEARCH PROGRAM

SPR-PL-1-(38)
JUNE 16, 2002 – JUNE 15, 2003



IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
DIVISION OF PLANNING
DIVISION OF MULTIMODAL PROGRAMS

AND

UNIVERSITY OF KENTUCKY
KENTUCKY TRANSPORTATION CENTER

WORK PROGRAM AND COST ESTIMATE
FOR
PROJECT SPR-PL-1(38)
June 16, 2002 through June 15, 2003

PART I
PLANNING
MULTIMODAL PROGRAMS

PART II
RESEARCH AND DEVELOPMENT

PART III B
RESEARCH AND DEVELOPMENT

PART IV
RESEARCH AND DEVELOPMENT

PREPARED IN COOPERATION
WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FOREWARD

This Planning and Research Program SPR-PL-1(38) for the period June 16, 2002 to June 15, 2003 is submitted in compliance with the provisions of Section 307 of Title 23, United States Code, and describes programs and operations for planning activities in the Kentucky Transportation Cabinet (KYTC) and the Kentucky Cooperative Transportation Research Program (KCTRP). This program modifies and updates previous such programs and is specifically intended to reflect the needs of the Kentucky Transportation Cabinet. It is fully expected that products from this program will also have national applications.

The Divisions of Planning and Multimodal Programs are charged with the responsibility for recommending, advising, and assisting the chief administrators of the KYTC in the development of the overall goals, policies, project priorities, and procedures relating to the total transportation program of the Department. Proposed activities for Fiscal Year 2003 are reported in detail by Volume and Chapter in this Work Program.

The KCTRP is concerned with the development and conduct of a comprehensive research program in cooperation with the U.S. Department of Transportation, Federal Highway Administration (FHWA).

In addition to research developed in cooperation with FHWA, the KCTRP may perform other services for the KYTC on a nonparticipating basis. The scope of these services could include activities such as research studies and special investigations of various engineering and operation activities. The Research Program and Implementation Advisory Committee (RPIAC), headed by the State Highway Engineer and coordinated through the Research Coordinator, will give direction to the research program.

KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
FISCAL YEAR 2003
PLANNING AND RESEARCH WORK PROGRAMS

PROGRAM IDENTITY	FEDERAL	STATE MATCH	LOCAL	TOTAL
PLANNING				
SPR-PR Part I Planning	$6,070,000	$1,517,500		$7,587,500
PL Funded Metropolitan Area Planning	$1,506,399	$94,150	$283,012	$1,883,561
Other Planning Activities	*$300,000	*$900,000		$1,200,000
Subtotal – Planning	$7,876,399	$2,511,650	$283,012	$10,671,061
RESEARCH				
SPR-PR Part II Research	$2,030,000	$507,500		$2,537,500
FY 02 Carryover Funds	$484,800	$121,200		$606,000
Part III B Research		$177,800		$177,800
TRB Dues	$98,265			$98,265
NCHPR Dues	$507,854			$507,854
Subtotal – Research	$3,120,919	$806,500		$3,927,419
TOTALS – PLANNING & RESEARCH	$10,997,318	$3,318,150	$283,012	$14,598,480

*Six Year Highway Plan charged to projects, not FH02.

CHAPTER	TITLE	AMOUNT
1	Administrative	$258,500
2	Personnel Training	$145,300
3	Equipment Management	$829,500
4	Traffic Data Collection and Processing	$1,240,600
5	Strategic Corridor Planning	$1,018,300
6	Intermodal Statewide Planning	$471,100
7	Highway Systems	$335,600
8	Geographic Information Systems	$442,600
9	Cartography	$438,800
10	GPS Processing	$138,400
11	GPS Collection	$178,600
12	Highway Information System	$990,400
13	Special Analyses	$159,700
14	Air Quality Conformity Analysis Program	$246,700
15	Metropolitan Planning Organizations	$192,700
16	Small Urban Areas Studies	$81,900
17	Bicycle and Pedestrian Transportation Program	$15,300
18	Traffic Congestion Management System	$31,900
19	ITS Coordination	$103,700
20	Traffic Data – Forecasting	$182,500
21	Statewide Traffic Model	$85,400
	TOTAL	$7,587,500

CHAPTER 1: Administrative

RESPONSIBLE UNIT: Division of Planning
Administrative Section (Internal Customer Service Team and External Customer Service Team)
Division of Multimodal Programs

PURPOSE AND SCOPE: The Administrative Section is comprised of the Internal Customer Service Team and External Customer Service Team. The Internal Customer Service Team recommends, advises, and assists the chief administrators of the Kentucky Transportation Cabinet in the development of the overall goals, policies, project priorities, and procedures relating to the transportation program of the Cabinet. Additionally, it is the function of Internal Customer Service Team to plan, organize, direct, motivate, and control activities to accomplish its goals in accordance with Cabinet and federal transportation policies and procedures. The External Customer Service Team focuses on customers external to the Division for cartographic products, statistical reports, and responses to various kinds of data requests including responding to the Cabinet's web page. The administration of the Work Program also includes full consideration of Title VI and the Civil Rights Act of 1964 and other social, environmental, and economic implications and is in compliance with the Cabinet's approved Affirmative Action Program.

PROPOSED ACTIVITIES FOR 2002-2003: Service and respond to all internal and external customer requests in a precise, timely, and customer friendly manner regarding all inquiries for assistance.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	$133,200	$22,900	$156,100
OTHER	$72,400	30,000	$102,400
TOTAL	$205,600	$52,900	$258,500

CHAPTER 2: Personnel Training

RESPONSIBLE UNIT: Division of Multimodal Programs
Division of Planning

PURPOSE AND SCOPE: The training of personnel is essential to the transportation program in order to keep pace with changing techniques and evaluate new procedures and development. This is particularly essential to the Cabinet's multimodal/intermodal programs as more and better technical analyses and assistance are required.

PROPOSED ACTIVITIES FOR 2002-2003: An effort will be made to continue a level of staff training which will maintain the integrity of professional career development and improvement of technological skills.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICE	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	$80,000	$21,000	$32,100	$133,100
OTHER	$7,700	$3,000	$1,500	$12,200
TOTAL	$87,700	$24,000	$33,600	$145,300

CHAPTER 3: Equipment Management

RESPONSIBLE UNIT: Division of Planning
Equipment and Traffic Management Activity Center
Equipment Management Team

PURPOSE AND SCOPE: This team focuses on the identification, purchase, repair, placement and operation of the various pieces of traffic data collection equipment statewide with the Districts and within the Division.

PROPOSED ACTIVITIES FOR 2002-2003: A recently completed study of the Division's Weigh-In-Motion program and the traffic counting program revealed a critical need in both of these programs for new electronic traffic data recorders. In a recently completed five-year plan, these two programs will be upgraded and modernized to enhance this Division's electronic traffic data gathering capabilities over the next two bienniums.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$423,500**	**$8,000**	**$431,500**
OTHER	***$397,000**	**$1,000**	**$398,000**
TOTAL	**$820,500**	**$9,000**	**$829,500**

*Includes $36,000 for the purchase of two new vehicles.

CHAPTER 4: Traffic Data Collection and Processing

RESPONSIBLE UNIT: Division of Planning
Equipment and Traffic Management Activity Center
Traffic Data Collection and Processing Team

PURPOSE AND SCOPE: To collect and make available traffic volume and vehicle classification data for highway planning, design and various other purposes. This involves making a significant number of short duration (usually 48 hours) portable machine counts on the State Highway System. Machine counts and estimates will be performed on local roads to obtain county level VMT for local roads. An adequate program of continuous traffic counting stations (ATRs) provides the basis for factoring the short-term counts. Vehicle classification data will be collected, processed, and made available to Cabinet staff for analytical and forecasting purposes. This year's activities will include the design and implementation of new procedures and technology to collect, process, and maintain this data, while improving access to users.

PROPOSED ACTIVITIES FOR 2002-2003: Perform approximately 6,500 regularly scheduled short duration portable machine counts, and medium duration (7-day or control station) portable machine counts at 63 locations. Collect vehicle classification data at approximately 300 stations, operate and maintain 76 permanent ATR traffic, update factors used in adjusting short counts, such as weekly, monthly, and axle correction factors, review ATR in cooperation with the Equipment Management Team, for proper locations and coverage, update TVS to include any new stations or roadway alignment changes, correct incorrect milepoints, missing stations and poor estimates as detected, use GIS application software to automate the generation of station and count maps, explore alternative methods for collecting short duration (48 hour) machine counts on local roads as needed to acquire county level VMT estimates, update data summaries developed under research study entitled "Estimation of Equivalent Axleloads," implement recommendations from the Kentucky Transportation Center's "Analysis of Vehicle Classification Data" research study, and convert existing vehicle classification file from a mainframe to a PC environment.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	$203,600	$856,700	$1,060,300
OTHER	*$145,000	$35,300	$190,300
TOTAL	$348,600	$892,000	$1,240,600

*Includes $120,000 for data collection.

CHAPTER 5: Strategic Corridor Planning

RESPONSIBLE UNIT: Division of Planning
Strategic Planning Activity Center
Strategic Corridor Planning Team

PURPOSE AND SCOPE: To perform the necessary level of planning to develop a conceptual purpose and need statement, identify major environmental issues including environmental justice, initiate consultation with local officials, initiate agency coordination, involve the public early and often for projects listed in the Six Year Highway Plan and Statewide Transportation Plan (Long Range Plan), identify and evaluate alternatives, generate project cost estimates, and oversee outsourced activities. Also included are brief technical project studies, interchange justification studies, and/or other special studies. Also evaluate and research techniques to better inform and involve the public about the project development process.

PROPOSED ACTIVITIES FOR 2002-2003: Based on scheduled design starts, projects will be selected from the Six Year Highway Plan (first priority) and additional projects will be selected from the Long Range Highway Element of the Statewide Transportation Plan (second priority) for analysis to include: develop a conceptual purpose and need statement; establish environmental footprint and identify major environmental issues for each project; coordinate with various agencies and organizations to solicit input and to identify support for and/or opposition to the project; initiate consultation with local officials and other stakeholders, including potential affected minority and low-income populations, as appropriate; participate in a public involvement process to solicit input and identify support and opposition; define project concepts and alternatives and select preferred concepts and/or alternatives, as appropriate; and develop cost estimates for project concepts and alternatives, as appropriate.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$346,500**	**$323,300**	**$669,800**
OTHER	**$342,000**	**$6,500**	**$348,500**
TOTAL	**$688,500**	**$329,800**	**$1,018,300**

*Includes $330,000 for intermediate planning activities. An additional $2,400,000 (non SPR funds) is estimated for resources outside the Kentucky Transportation Cabinet.

CHAPTER 6: Intermodal Statewide Planning

RESPONSIBLE UNIT: Division of Planning
Strategic Planning Activity Center
Intermodal Statewide Planning Team

PURPOSE AND SCOPE: To conduct a comprehensive statewide transportation planning process with the Area Development Districts (ADDs) and the Highway District Offices (HDOs). To periodically update a fiscally-balanced, multimodal Statewide Transportation Plan (STP) and provide input to the Six Year Highway Plan.

This process includes intermodal transportation planning projects/programs and support of the Intermodal Advisory Panel (IAP). Tasks include identifying and analyzing intermodal facilities, access and systems; recommending strategies to enhance intermodal transportation; oversight of waterway transportation; recommending intermodal access projects for the Six Year Highway Plan and STP; and assisting with other planning activities as needed.

PROPOSED ACTIVITIES FOR 2002-2003: Work closely with the ADDs/HDOs to enhance the statewide transportation planning process, including public involvement/coordination with the MPOs; provide the ADDs with transportation systems information; provide direction for special projects; analyze, identify, and prioritize modal/intermodal transportation; and provide support for the IAP, to obtain input for the intermodal transportation planning process.

Conduct special studies as needed to analyze riverport issues, freight transportation, and highway access to intermodal facilities; respond to inquiries about proposed transportation projects; review surplus property/right-of-way proposals and school site locations as related to long-range transportation needs; and make information on intermodal transportation available for public use.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$146,900**	**$260,700**	**$407,600**
OTHER	***$55,500**	**$8,000**	**$63,500**
TOTAL	**$202,400**	**$268,700**	**$471,100**

* This amount includes $50,000 for the University of Kentucky Transportation Center for support of intermodal transportation planning activities, directory, and web page. This chapter also includes $684,900 (not financed with SPR funds) for the annual program with the Area Development Districts.

CHAPTER 7: Highway Systems

RESPONSIBLE UNIT: Division of Planning
Transportation Systems Activity Center
Highway Systems Team

PURPOSE AND SCOPE: To maintain the official Department of Highways records for the State Primary Road System, National Highway System, Functional Classification System, Designated National Truck Network (NN), Coal Haul Highway System, Forest Highway System, and the Kentucky Scenic Highways and Byways System. To conduct the necessary research and evaluations relative to proposed system changes, prepare official documentation for approval and signature, and notify all necessary personnel of the approved changes. For the Coal Haul System gather and compile source data on the transportation of coal by truck in the Commonwealth of Kentucky.

PROPOSED ACTIVITIES FOR 2002-2003: Continue to examine systems change process to respond in a more timely fashion. Update, maintain, and publish for distribution to interested parties and the trucking industry an official listing of truck route descriptions, and a statewide map depicting the NN, send out forms semi-annually to coal companies and truck transporters for reporting the truck transportation of coal, update database and maps from information on returned semi-annual reports, provide ton-mile statistics to Department of Local Government, publish Kentucky's Official Coal Haul System Report, study possible legislative proposals to streamline and stabilize the Coal Haul Road System, provide the Secretary's Office with information for updating the "Extended Weight Coal Haul Road System" by Official Order, review applications requesting designation as a scenic highway or byway for meeting Transportation Cabinet guidelines and make recommendation for designation.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	$144,600	$102,000	$246,600
OTHER	*$83,000	$6,000	$89,000
TOTAL	$227,600	$108,000	$335,600

* Includes $75,000 for Coal Haul report contract with two Area Development Districts.

CHAPTER 8: Geographic Information Systems (GIS)

RESPONSIBLE UNIT: Division of Planning
Transportation Systems Activity Center
GIS Team

PURPOSE AND SCOPE: To meet the needs of the Division, Cabinet, other state agencies, and entities outside state government for accurate GIS based electronic maps. To maintain the transportation layer base map to the highest map standard level and most up-to-date status possible. See that data links to the base map are always complete and accurate.

PROPOSED ACTIVITIES FOR 2002-2003: Create a seamless statewide transportation GIS base map using GPS to collect data on all public streets and roads; work with Data Management Activity Center to conflate data to new GIS transportation layer for all public roads, and link new data as required; develop new county maps using ArcInfo® and ArcView® showing all the transportation layers and other pertinent features; and maintain and update the GIS base maps to continually reflect the latest street and road alignments, road attribute data, and other map features.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	TOTAL
PERSONNEL	**$232,600**	**$232,600**
OTHER	***$210,000**	**$10,000**
TOTAL	**$442,600**	**$442,600**

*Includes $200,000 for University of Kentucky technical assistance.

CHAPTER 9: Cartography

RESPONSIBLE UNIT: Division of Planning
Transportation Systems Activity Center
Cartography Team

PURPOSE AND SCOPE: To meet the needs of the Division, Cabinet, other state agencies, and entities outside state government for general and special purpose maps. This continuing program involves creating, updating, printing, and distributing a wide variety of cartographic projects.

PROPOSED ACTIVITIES FOR 2001-2002: Continue development of electronic mapping for all city, county, state, and special-purpose cartographic products; maintain and publish electronic formats of cartographic products on the internet; use the large-format plotter to print city, county, and state maps as needed for distribution through the Division of Planning inter-account service and the Kentucky Geological Survey Map Sales function; update the Official State Highway Map and have necessary printing accomplished; create reports and exhibits for various Division projects and studies; and provide mapping and graphic assistance to other Divisions and Departments on request.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$263,500**	**$6,300**	**$269,800**
OTHER	***$168,000**	**$1,000**	**$169,000**
TOTAL	**$431,500**	**$7,300**	**$438,800**

* Includes $64,000 for the Official State Highway Map printing and $100,000 for UKTC Research Studies.

CHAPTER 10: Global Positioning System (GPS)

RESPONSIBLE UNIT: Division of Planning
Data Management Activity Center
GPS Processing Team

PURPOSE AND SCOPE: Match GPS centerline data collected and processed with existing Linear Referencing System (county, route, milepoint). Maintain the Cabinet's GIS transportation layer.

PROPOSED ACTIVITIES FOR 2002-2003: Match newly acquired centerline data to the existing highway network – includes updating and verifying roadway mileage, highway systems data, and use in maintaining and generating data driven maps. These include County Road Aid Series, functional, truck, state system, and traffic station maps. Make GIS base map changes as necessitated by changes to the highway network.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	TOTAL
PERSONNEL	**$120,400**	**$120,400**
OTHER	**$18,000**	**$18,000**
TOTAL	**$138,400**	**$138,400**

CHAPTER 11: Global Positioning System (GPS)

RESPONSIBLE UNIT: Division of Planning
Data Management Activity Center
GPS Collection Team

PURPOSE AND SCOPE: Coordinate data collection activities for the statewide GIS transportation layer with Area Development Districts (ADDs). Maintain quality control by coordinating with the ADDs through review of data and training.

PROPOSED ACTIVITIES FOR 2002-2003: Collect roadway centerline data using GPS technology for all public roads, statewide. Collect intersection and control point data for verifying all centerline data submitted by ADDs and Central Office. Perform office reviews to verify data meets the required standards and confidence levels established by this Division and in accordance with the National Standard for Spatial Data Accuracy.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$121,100**	**$31,500**	**$152,600**
OTHER	**$18,000**	**$8,000**	**$26,000**
TOTAL	**$139,100**	**$39,500**	**$178,600**

CHAPTER 12: Highway Information System

RESPONSIBLE UNIT: Division of Planning
Data Management Activity Center
Highway Information System Team

PURPOSE AND SCOPE: Maintain and operate the HIS database. Use the Highway Performance Monitoring System (HPMS) to establish a baseline for measuring highway system performance and produce the highway data submittal required annually by FHWA. Provide information to the Transportation Cabinet, other governmental agencies, consultants, and private organizations. Continue development and maintenance of the HIS database interface with the (GIS); including maintenance of base map graphics, and link to associated network and data.

PROPOSED ACTIVITIES FOR 2002-2003: Work with the Office of Technology and other divisions within the Transportation Cabinet to: upgrade the HIS database to "Highways by EXOR"; consolidate the Cabinet's data maintenance efforts, and enhance the current reference system to identify routes in the Six Year Highway Plan. Make modest enhancement to improve HIS access through the Oracle Web Server until the new version is implemented; assist in the development and maintenance of a Cabinet GIS; maintain base map and database network for state maintained roads; assist the Office of Technology and the Division of Traffic with development of a procedure to provide up-to-date route network, DMI, functional class, NHS, and urban area information to the CRASH database. Utilize HPMS to update Rating Indices, Capacity, and Volume/Service Flow ratio in the HIS database. Use HIS to measure highway system performance and assist with analyses of the Unscheduled Needs List. Convert to new HPMS software, perform changes required by Federal legislation, regulations, policies, and/or guidelines, as needed to the HPMS. Perform field inventories and make updates to the HIS database.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICES	TOTAL
PERSONNEL	**$303,400**	**$42,000**	**$345,400**
OTHER	***$640,000**	**$5,000**	**$645,000**
TOTAL	**$943,400**	**$47,000**	**$990,400**

* Includes $600,000 for GPS maintenance.

CHAPTER 13: Special Analysis

RESPONSIBLE UNIT: Division of Planning (Special Analysis Team)
Division of Multimodal Programs

PURPOSE AND SCOPE: Numerous requests are made throughout the year for activities and information that may not directly relate to an applicable chapter of the work program. These requests vary from information assimilation requests that may require only hours to complete to technical analyses and reviews and policy review/recommendations that may require extensive efforts.

PROPOSED ACTIVITIES FOR 2002-2003: It is anticipated that a large volume of special requests will continue to be received and processed by these Divisions.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	CENTRAL OFFICE	DISTRICT OFFICE	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	**$118,800**	**$10,500**	**$22,400**	**$151,700**
OTHER	**$5,000**	**$2,000**	**$1,000**	**$8,000**
TOTAL	**$123,800**	**$12,500**	**$23,400**	**$159,700**

CHAPTER 14: Air Quality Conformity Analysis Program

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: Coordinate and perform analyses necessary for Air Quality Conformity Determinations for both rural and some MPO areas to allow for the timely advancement of projects. Coordinate with Division for Air Quality, EPA-Atlanta, FHWA, FTA, MPOs, and KYTC for conformity approvals. Review and comment on the air quality rules, proposed rules, regulations, and guidance that impact transportation. Maintain a working knowledge of EPA's air quality modeling software, as well as, review and comment on model updates. Develop new modeling methods for rural conformity. Establish and maintain conformity consultation processes, which specifies each agency's roles and responsibilities.

PROPOSED ACTIVITIES FOR 2002-2003:

- Establish conformity consultation agreements statewide.
- Develop sub-area models from the Statewide Traffic Model for proposed rural non-attainment areas.
- Review and comment on the guidelines for the 8-Hour Ozone Standard, MOBILE Model 6, Air Quality Regulations, and non-attainment designations.
- Run the MOBILE Model for all necessary regional air quality conformity analyses. The Division will be responsible for performing conformity analyses on several rural counties and five MPO areas.
- Review and comment during the preparation of mobile budgets for the State Implementation Plan (SIP) for the updates to the One-Hour Air Quality Standards, 8-Hour Standard Designations and for SIP amendments and budget adjustments.
- Promote and educate the Cabinet, public officials, and general public about air quality, conformity analysis, and federal guidelines.
- Review CMAQ proposals.

CHAPTER 14: Air Quality Conformity Analysis Program

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	**$120,200**	**$120,200**
OTHER	***$126,500**	**$126,500**
TOTAL	**$246,700**	**$246,700**

*Includes $100,000 for Air Quality Models for new non-attainment areas and $25,000 for consultants. Other expenses $1,500.

CHAPTER 15: Metropolitan Planning Organizations
(Areas over 50,000 Population)

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: Provide technical assistance and coordination to the metropolitan planning organizations (MPOs) for developing and maintaining a continuing, cooperative, and comprehensive (3C) transportation planning process that results in plans or programs consistent with the comprehensively planned development of the urbanized areas (areas over 50,000 population) in accordance with the 1991 Intermodal Surface Transportation and Efficiency Act, and the 1997 Transportation Equity Act For the 21st Century, as amended (Title 23, United States Code, Section 134). This process ensures that KYTC and local transportation projects remain eligible to receive federal funding. The scope of work for the 3C planning process is in accordance with the annual unified work programs, which describe all anticipated urban transportation and transportation related planning activities to be performed with planning assistance provided under Section 5303 of the Federal Transit Administration Act, and under Title 23, U.S.C. 104 (f) and 307 (c).

PROPOSED ACTIVITIES FOR 2002-2003:

- The continuing technical assistance and review of MPO activities and documents, plus attendance at technical, policy, and other committee meetings to represent the Cabinet. The Division of Multimodal Programs (DMP) staff will continue to ensure consistency between local and state plans and programs, including MPO and State transportation improvement programs, congestion management plans, the Cabinet's Six-Year Plan, MPO Long Range Transportation Plans, and the Cabinet's Statewide Long Range Plan. The DMP will continue to provide technical assistance for MPO traffic model updates through participation in the Traffic Model Users Group. DMP staff will also monitor Census 2000 activities.

- Special traffic assignments and analyses for the design and implementation of various highway and street projects. The DMP maintains traffic models for the Ashland and analyses for projects in these areas. The Owensboro MPO has traffic modeling software and is assuming some responsibility for performing traffic assignments and analysis of projects. Traffic assignments for the other urbanized areas are done by the local MPOs (with assistance from this Division) but coordinated through our Division for distribution throughout the Cabinet.

- Census 2000 and FHWA have designated two additional areas as MPOs in Kentucky: Bowling Green and the Radcliff-Elizabethtown-Vine Grove-Fort Knox Area. DMP will assist in organizing, coordinating, and educating the new MPO staffs, technical, and policy members.

CHAPTER 15: Metropolitan Comprehensive Transportation Studies (Areas over 50,000 Population)

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PROPOSED ACTIVITIES FOR 2002-2003 (Continued):

- DMP staff will continue to coordinate with the Transportation Cabinet's Office of Transportation Delivery on transit and transit planning issues.

- Air quality conformity analysis for the 5 non-attainment (or maintenance) areas for the one hour standard will be coordinated by the DMP with the MPOs, Division of Environmental Analysis, Division for Air Quality, FHWA, FTA , and EPA. DMP will provide traffic model output in the form of vehicle-miles of travel (VMT) for the three maintenance areas (Ashland, Lexington, and Owensboro) that will be used to determine conformity of the MPOs' Transportation Plans and TIPs. Henderson and Hopkinsville, are proposed non-attainment areas for the 8-hour Standard. The division will coordinate air quality conformity analyses for these new areas, as well.

- MPOs will continue to provide traffic data for Cabinet projects. The Cabinet will do traffic projections for some projects in MPO areas.

- The MPOs will continue transportation planning activities as outlined in their UWPs. Several special planning efforts are expected to be continued or are new this year including: Louisville's Bridges and Transportation Tomorrow, and Cincinnati's Brent Spence Bridge and the N/S Initiative.

- DMP staff will continue to monitor and coordinate various CMAQ projects in the non-attainment and maintenance areas. Projects will include ozone awareness programs, traffic management and operation centers, inspection and maintenance programs, and other programmed projects.

- DMP staff will continue to monitor and coordinate MPO rideshare programs.

- The MPOs will continue transportation planning activities as outlined in their UWPs. Several special planning efforts, such as Major Corridor Studies in Louisville, Lexington, and Northern Kentucky, traffic management programs and Congestion Management Programs in Louisville, Lexington, and Northern Kentucky, and sub-area analyses are expected for the new year. Continuing effort will be directed toward the updating or amending long range transportation plans in all MPO areas.

- The Cabinet and the MPOs continue to expand the use TransCADD, the new GIS based transportation modeling software program. DMP will continue to support the use of both MINUTP and TransCADD for MPO area transportation modeling.

CHAPTER 15: Metropolitan Comprehensive Transportation Studies (Areas over 50,000 Population)

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	$186,600	$186,600
OTHER	*$6,100	$6,100
TOTAL	$192,700	$192,700

*PL funds passed thru to MPOs ($1,506,399 Federal and $94,150 Road Fund as well as $283,012 local funds for the PL Program do not flow through the Cabinet). Other Central Office expense $6,000 (SPR).

CHAPTER 16: Small Urban Areas Studies

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: Identify and analyze traffic operational and transportation system deficiencies in small urban areas (5,000 to 50,000 population). The purpose of this analysis is to provide highway administrators with quantified urban transportation needs information sufficient to determine an urban improvement project priority program. These prioritized projects are used as input to KYTC's Six Year Plan and Long Range Needs Plan. Coordination with the Cabinet's Divisions of Planning, Traffic, Environmental Analysis, and Design, District Offices, and ADDs is required. The emphasis of this effort will be to provide a timely response to transportation system issues.

PROPOSED ACTIVITIES FOR 2002-2003:

- Small Urban Area Transportation Study Updates will be completed by consultant engineering firms for the areas of Madisonville, Maysville, and Mason County. Cabinet staff from the Division of Multimodal Programs provides general oversight and guidance, along with some data input, and serves on advisory committees set up with local representatives for providing input to the studies. State road funds are used to fund the contracts with the consultants.

- New Urban Area Transportation Studies will be initiated for Georgetown and Somerset. The procedure and funding will be the same as above.

- With the availability of updated socioeconomic data and microcomputer modeling techniques, efforts will be directed toward the translation of existing models to TransCAD The models in conjunction with other analytical tools will be utilized to study, at a level of detail dependent on the complexity of the issues, the transportation system impacts of various proposals. Proposals are generated within KYTC and requests which are received routinely from local governments. Project and priority recommendations will be made as appropriate.

- Existing MINUTP models will be converted to TransCAD on an as-needed basis. Procedures will be developed to incorporate GIS data and tools in the model development process. DMP will continue to support both MINUTP and TransCAD models as approved.

CHAPTER 16: Small Urban Areas Studies

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	$79,400	$79,400
OTHER	$2,500	$2,500
TOTAL	$81,900	$81,900

* An additional $400,000 of State Road Funds are identified in the Cabinet's Six Year Highway Plan for Urban Transportation Studies for areas with 5,000-50,000 population.

CHAPTER 17: Bicycle & Pedestrian Transportation Program

RESPONSIBLE UNIT: Division of Multimodal Programs

PURPOSE AND SCOPE: Coordinate with the state bicycle and pedestrian program, develop a statewide bikeway system, work and coordinate with the Kentucky Bicycle & Bikeway Commission to provide assistance to the general public, municipal governments and other state agencies in the planning and development of bicycle and pedestrian facilities and programs. This assistance will be in the form of technical advice, assisting in the development of plans, and coordinating studies.

PROPOSED ACTIVITIES FOR 2002-2003:

- To complete development of an overall plan for bicycle and pedestrian facilities to be incorporated into the Long Range Plans of the State and MPOs.
- To coordinate with the revision and update statewide bike route system and associated maps.
- Answer requests for bicycle and pedestrian needs studies that arise from time to time.
- Promote and facilitate the increased use of non-motorized modes of transportation, including developing facilities for the use of pedestrians and bicyclists and public education, promotional, and safety programs for using such facilities.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTILMODAL PROGRAMS	TOTAL
PERSONNEL	$15,100	$15,100
OTHER	$200	$200
TOTAL	$15,300	$15,300

CHAPTER 18: Traffic Congestion Management System

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: Coordinate the development and implementation of traffic congestion management systems in the Louisville, Northern Kentucky, and Lexington urbanized areas of the state. The traffic management systems in these urbanized areas shall be developed by the MPOs.

PROPOSED ACTIVITIES FOR 2002-2003:

- Coordinate with the MPOs in Louisville, Northern Kentucky, and Lexington in the development and implementation of required Traffic Management Programs for their areas.
- Coordinate with the ARTIMIS Regional Traffic Management System for the Cincinnati-Northern Kentucky area. This involves work with ODOT, ITS Branch of Operations, and the MPO.
- Coordinate with the TRIMARC Freeway Incident Management System for Louisville. This involves work with ITS Branch of Operations, INDOT, and the MPO.
- During the normal statewide transportation planning process, traffic congestion is and will be routinely considered in selecting and prioritizing projects that are considered for the Six-Year Plan, the State Long Range Transportation Plan, and Small Urban Area Transportation Studies.
- Test using the Texas Transportation System performance measures in an urban area study.
- Coordinate urban mobility team and serve as Kentucky liaison for the *Annual Urban Mobility Study.*

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	**$31,600**	**$31,600**
OTHER	**$ 300**	**$300**
TOTAL	**$31,900**	**$31,900**

CHAPTER 19: Intelligent Transportation System (ITS) Coordination

RESPONSIBLE UNIT: Division of Multimodal Programs

PURPOSE AND SCOPE: To coordinate with the Intelligent Transportation System (ITS) Branch of the Division of Operations. The Cabinet is active in several aspects of the national ITS program both at the state level and at the national level.

PROPOSED ACTIVITIES FOR 2002-2003:

- Coordinate any new ITS project(s) approved for funding by the U.S. Department of Transportation in MPO or SUA areas.
- Assist in developing a comprehensive and integrated statewide ITS plan including a statewide ITS architecture in order to promote coordinated and integrated ITS projects to obtain maximum benefits. This project will be a continuation of work previously assigned to the UKTC and is included in the KYTC Research Program as KYSPR-98-188.
- Coordinate Archive Data User Services using data from various ITS operations.
- Coordinate and communicate ITS as a component of the MPO and SUA transportation planning process.
- Coordinate with Lexington Traffic Information Center and the Bluegrass ITS (BITS) group. This involves work with the ITS Branch of Operations, District 7 Traffic and Planning, Bluegrass ADD, and the Lexington Traffic Information Center.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	**$23,500**	**$23,500**
OTHER	**$80,200**	**$80,200**
TOTAL	**$103,700**	**$103,700**

*Includes $80,000 for consultants.

CHAPTER 20: Traffic Data - Forecasting

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: To maintain traffic trends, provide current and projected traffic volume estimates, and associated elements such as design hour volumes, directional distribution, composition of traffic, and truck loadings for project development and design purposes.

PROPOSED ACTIVITIES FOR 2002-2003:

- Approximately 140 traffic estimates will be prepared for planning studies, design projects, environmental analysis, and other purposes as needed. Various procedures, including trendline analysis and the use of computerized traffic models (including statewide traffic model and small urban models) will be utilized to determine traffic assignments. Traffic trends will be monitored to assure usage of accurate K-factors, directional factors, and growth rates. Socioeconomic and site data will be reviewed for usage in traffic model analysis and forecasting.

- Monitor and provide quality review for traffic projections provided by the MPOs and planning consultants.

- Administer statewide traffic forecasting contract and provide quality review for traffic projections made by the consultant.

- Provide assistance and training to users of the ESAL Forecasting for Superpave computer program.

- Maintain databases that track traffic forecasts and traffic forecast parameters. Make databases available to other user offices.

- Update the 2001 Traffic Forecasting Report.

- Future year forecasting factors will be provided for the Highway Performance Monitoring System.

- $25,000 of this budget estimate will be utilized by the Kentucky Transportation Center for producing ESAL tables and vehicle classification summary files.

- Coordinate with the Division of Planning to insure that traffic forecasting data needs are met.

- Work on Commercial Vehicle Monitoring (CVM) Team to provide traffic forecasts of heavy truck usage of existing and proposed new CVM stations. Also provide assistance with reviewing consultant work on ongoing CVM scoping study.

- Chair the Traffic Model Users Group which is a peer group for traffic forecasters and traffic modelers composed of members from government, academia, and the private sector.

CHAPTER 20: Traffic Data - Forecasting

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	*$110,600	$110,600
OTHER	**$71,900	$71,900
TOTAL	$182,500	$182,500

* Charges will be made to SYP projects for some forecasts.

**Includes up to $71,900 for use of resources outside the Kentucky Transportation Cabinet:

1. Statewide Forecasting Contract - $200,000 ($31,200 FH02, $168,800 will be charged to projects).
2. Kentucky Transportation Center Intern - $15,000.
3. Kentucky Transportation Center Equivalent Axleload Processing - $25,000.
4. Other office expenses $700.

CHAPTER 21: Statewide Traffic Model

RESPONSIBLE UNIT: Division of Multimodal Programs
Urban Planning Branch

PURPOSE AND SCOPE: To update and maintain the Statewide Traffic Model (KySTM). To collect data on vehicular movement on the highway system through origin-destination surveys. Process and assemble data to aid in determining travel desires for the location of new routes, relocation of existing routes, decisions between alternate route improvements, or as input into KySTM.

PROPOSED ACTIVITIES FOR 2002-2003:

- Develop a plan and specifications for updating the statewide traffic model.
- Use upgraded model for corridor studies, air quality conformity, and special requests.
- This chapter provides for the coding and processing of data for a few O-D surveys to be made upon request or as needed on a project by project basis. Integrate new origin-destination information into the trip table for KySTM. Specific origin-destination (O-D) station locations needed for the FY 2001 work program year are not known at this time. Specific locations to be surveyed for use in the model update will be identified during routine maintenance of KySTM and as specific project needs arise. At that time a consultant will be hired to obtain the O-D data.
- Incorporate and coordinate NPTS (National Personal Transportation Survey) data use in the appropriate models.
- Incorporate and coordinate Census 2000 data and TAZ-UP data use in appropriate models.
- Use KySTM to develop Sub-area studies on a county wide basis for air quality analysis.

DISTRIBUTION OF ESTIMATED COST FOR 2002-2003

	MULTIMODAL PROGRAMS	TOTAL
PERSONNEL	$30,200	$30,200
OTHER	*$55,200	$55,200
TOTAL	$85,400	$85,400

*Includes $15,000 for STM maintenance by consultant and $40,000 for KTC Research Study. Other expenses $200.

PART II

RESEARCH & DEVELOPMENT

KENTUCKY PLANNING AND RESEARCH PROJECT
WORK PROGRAM--PART II
FISCAL YEAR 2003

LINE ITEM NO.	STATE STUDY NO.	STUDY TITLE	PRINCIPAL INVESTIGATOR	ESTIMATED COST FY 2003
1	03-50	General Administration	Toussaint	$268,350
2	03-56	Unforeseen Investigations	Toussaint	205,650
3.	85-107	Long-Term Monitoring of Experimental Features	Toussaint	40,500
4	00-206	Seismic Evaluation of the I-24 Corridor for Moderate Seismic Events	Harik	48,000[1]
5	00-210	Variations Between Design and Construction that Impact Environmental Commitments	Hopwood	54,000[1]
6	01-223	Development of Load-Spectra for Use in Pavement Designs for Implementation of the 2002 AASHTO Pavement Design Guide	Allen	158,000[1]
7	01-224	Environmental Impacts of Bridge Cleaning Operations	Hopwood	39,000[1]
8	01-225	Case Study of 4f Litigation and Rulings	Hopwood	55,000[1]
9	01-227	Geotechnical Data Bank of Kentucky	Hopkins	216,000
10	01-228	Reduction of Stresses on Buried Rigid Highway Structures Using the Imperfect Ditch Method and Expanded Polystyrene (Geofoam)	Hopkins	72,000
11	01-229	Resilient Modulus of Compacted, Crushed Stone Aggregate Bases	Hopkins	45,000
12	01-234	Earthquake Response Training and Assessment of Future Earthquake Study Needs in Western Kentucky	Harik	89,500[1]
13	02-236	Constructibility Issues on KyTC Projects	Hancher	63,000
14	02-237	Evaluation of Methods to Protect Water Quality in Karst Areas	Hopwood	67,500
15	02-238	Bearing Capacity Analysis and Design of Highway Base Materials Reinforced with Geofabrics	Hopkins	58,500
16	02-239	Corrosion Evaluation of Mechanical Stabilized Earth Walls	Hopkins	45,000
17	02-240	Deployment of a Virtual Weigh Station	Crabtree	160,500[1]
18	02-241	Development of an Intelligent Transportation Systems (ITS) Maintenance and Management Plan for Kentucky	Crabtree	90,500[1]
19	02-242	Analysis of Procurement Processes and Development of Recommendations for ITS Procurements	Crabtree	45,500[1]
20	02-243	Evaluation of Current Incentive/Disincentive Procedures in Construction	Allen	67,500
21	02-244	Evaluation of NDT and Geo-Physical Techniques	Allen	112,500
22	02-245	Evaluation of Aggregate Segregation on Pavement Performance	Allen	108,000
23	02-246	Seismic Evaluation of the Parkways in Western Ky	Harik	47,000[1]
24	02-247	Correlation Between Highway Lighting and Driver Safety	Pigman	106,500[1]
25	02-250	Identification of High Accident/Crash Locations and Evaluation of Benefit/Cost	Pigman	106,500[1]
26	02-251	Access Management Guidelines	Pigman	90,000

LINE ITEM NO.	STATE STUDY NO.	STUDY TITLE	PRINCIPAL INVESTIGATOR	ESTIMATED COST FY 2003
PROPOSED NEW STUDIES				
27	03-257	Effect of Pavement Resurfacing on Traffic Safety	Pigman	67,500
28	03-258	Traffic Crashes at Intersections	Pigman	67,500
29	03-259	Effect of Warning Signs on Operating Speeds	Stamatiadis	67,500
30	03-260	Implementation of Remote Sensing Technology	Harik	27,000
31	03-261	Multi-Barge Flotillas Impact Forces on Bridges	Harik	27,000
32	03-262	Lessons Learned on KyTC Construction Projects	Hancher	54,000
33	03-263	Kentucky Highway User Survey	Grossardt	67,500
34	03-264	State TVS Count Estimation Process	Grossardt	22,500
35	03-265	Evaluation of Kentucky's Pavement Management System and Maintenance Rating System	Allen	81,000
36	03-266	Utilization of Pavement Profiling Equipment to Determine As-built Transverse and Longitudinal Profiles of Existing Highways	Allen	90,000
37	03-267	Development of Pavement Distress Manual	Allen	45,000
38	03-268	Safety and Health Concerns for KyTC and Contractor Personnel: Phase I	Hopwood	31,500
39	03-269	Survey of Welding Processes	Hopwood	13,500
40	03-270	Characteristics and Engineering Properties of the Soft Soil Layer at the Top of Highway Soil Subgrades	Hopkins	22,500

REVISED PROGRAM TOTAL $3,143,500

[1] Includes FY02 Carryover Funds

Carryovers:		Underruns:	
P206 - $30,000	P240 - $48,000	P180 - $43,000	P249 - $13,000
P210 - $54,000	P241 - $32,000	P202 - $25,000	
P223 - $50,000	P242 - $14,000	P230 - $19,500	
P224 - $39,000	P246 - $20,000	P231 - $13,000	
P225 - $55,000	P247 - $39,000	P232 - $13,000	
P234 - $40,000	P250 - $39,000	P248 - $19,500	

Total Approved Carryover $606,000

Note: Items 2 through 40 do not include 10% set aside for general administrative purposes in item 1; however, they do include 30% university overhead.

GENERAL ADMINISTRATION
KYSPR 03-50

The general administrative costs associated with payroll distribution, personnel actions, accounts, receptionist, office equipment, and preparation of line items, proposals, and detailed work plans are combined in this section inasmuch as a pro rata apportionment of time and other accountable costs among the several studies would be impractical from the standpoint of accounting.

PROGRAMMED COST FY 2003: $268,350

UNFORESEEN INVESTIGATIONS
KYSPR 03-56

OBJECTIVE: To conduct, upon request, impromptu investigations and analyses, and provide quick response to requests for short-term investigations or evaluations.

BACKGROUND: Frequently, Kentucky Transportation Center investigators are called upon to conduct impromptu investigations for the evaluation of materials' performances, construction procedures, analyses of failures, and other related features of highway design, construction, and maintenance. These investigations vary in complexity and nature, depending upon the situation and information desired. Most frequently, the investigations serve as a means of providing a tentative solution or analysis for immediate problems. In some cases, a full-scale study may result from what initially began as a minor investigation. These impromptu investigations serve a vital function through provision of an immediate report relative to a particular problem.

As technology advances and industry expands, there is an ever increasing number of new products that become available for potential use in highway construction or maintenance. Some of those products may be used under current specifications or special provisions. Other may not be covered, and it is essential that such products be evaluated prior to widespread use.

Pavement blowups, deck slab failures, landslides, culvert collapses, etc. are all causes for immediate concern. In such cases, quick remedial actions are necessary to protect motorists from potentially dangeous situations and for restoration of services. Hurried stop-gap repairs may be effected. Later, investigations of distresses are used in determining the causes of failures and provide information ofr development of more permanent solutions. Information gained during these investigations also may provide useful evidence leading to recommendations for design, construction, or maintenance guideline changes. Occurrences of problems may prove beneficial in the event adequate investigations or evaluations are undertaken and solutions evolve. Cost-effective preventative countermeasures may later be adopted for routine use. The benefit-cost ratios for those investigations may often be unusually high.

PROGRAMMED COST FY 2003: $205,650

LONG-TERM MONITORING OF EXPERIMENTAL FEATURES
KYSPR 85-107

Continuation of an Approved Study
Work Plan Submitted July 18, 1984; Approved December 3, 1984
Anticipated Completion Date: Continuing

OBJECTIVE: To provide a procedure for long-term monitoring and reporting of experimental design, construction, or maintenance features utilized in transportation facilities.

BACKGROUND: As technology advances, there is a continually increasing number of somewhat unique or innovative approaches used as experimental features in transportation design, construction, or maintenance phases. Provisions are generally made for short-term evaluations of experimental features; however, most formal studies or projects are frequently finalized in rather nominal time periods and no provisions are made for long-term evaluations. Long-term evaluations provide significant information at relatively nominal costs.

FY 2003 PROPOSED WORK: Field inspections and data analyses will continue. Additional projects containing experimental features will be scheduled for monitoring as they evolve. Monitoring of projects presently included under this study will continue.

PROGRAMMED COST FY 2003: $40,500

TOTAL ESTIMATED COST: Continuing

SEISMIC EVALUATION OF THE I-24 CORRIDOR FOR MODERATE SEISMIC EVENTS KYSPR 00-206

Continuation of an Approved Study
Work Plan Submitted July 1999; Approved August 1999
Anticipated Completion Date: FY 2004

OBJECTIVES: The objective of this study is to conduct a seismic evaluation of bridges, and their corresponding approaches and embankments, on and/or over I-24 in Kentucky. With the exception of the I-24 bridge at Cumberland River crossing, and the I-24 bridge at Tennessee River crossing, which will be evaluated for 250-years and 500-years events, all other bridges on/and over the I-24 corridor are to be evaluated for 50-years and 250-years events. During a 50-year event, the bridges are to remain in the elastic range without any disruption to traffic. During a 250-year event, partial damage will be permitted on the bridges; however, they are to remain accessible to emergency and official vehicles. The expected benefit of this study is to mitigate partial or total collapse of bridges along the I-24 corridor as a result of a moderate seismic event, and to identify roadway embankments anticipated to require rapid rehabilitation to restore the functional utility of the corridor after a seismic event.

BACKGROUND: Bridges, and their corresponding approaches and embankments, along the I-24 corridor have not been evaluated for a seismic event along the New Madrid seismic zone. Due to the potential economic impact on the western part of the Commonwealth, a seismic evaluation for a 250-years seismic event is essential for determining the seismic vulnerability of the corridor. A 250-years seismic event is defined as an event with a 10% probability of being exceeded in 250 years, or a seismic event with a 90% probability of occurrence in the next 2,500 years.

FY 2002 ACCOMPLISHMENTS: (1) Field inspection on all bridges, their approaches and embankments along the I-24 corridor was carried out; (2) Prioritization of the seismic evaluation; (3) Seismic evaluation of the bridges in McCracken County, and (4) Modeling and evaluation of the Cumberland River and Tennessee River bridges is 80% complete.

FY 2003 PROPOSED WORK: (1) Complete 40% of the seismic evaluation of bridges on and over I-24; and (2) Complete the evaluation of the Cumberland River and Tennessee River bridges.

PROJECTED COST THROUGH FY 2002:	$226,000
PROGRAMMED COST FY 2003:	$ 48,000
TOTAL ESTIMATED COST: [1]	$320,000

[1] Original estimate $180,000 (revised by SAC)

VARIATIONS BETWEEN DESIGN AND CONSTRUCTION THAT IMPACT ENVIRONMENTAL COMMITMENTS
KYSPR 00-210

Continuation of an Approved Study
Work Plan Submitted August 25, 1999; Approval of Work Plan Pending
Anticipated Completion Date FY 2003

OBJECTIVES: KTC will review and map the KyTC planning, design, and construction processes. Cases involving variances between design and construction having environmental impacts will be identified and documented. The root causes of those variances and the magnitude of their environmental impacts (relative to permits, and further mitigation requirements) will be determined. The analyses will also include an evaluation of successful construction changes and the process by which they were accomplished. The review and analysis will provide recommendations of best design procedures for future projects and remedial strategies for existing projects. The recommended best design procedures will enable designers to anticipate problems and choose design options less likely to be changed in construction. Process re-engineering will be recommended where deficiencies in current planning/design/construction/ environmental interaction were identified. Process changes will be aimed at facilitating teamwork entailed in the new KyTC project development process.

BACKGROUND: Environmental impact assessment and permitting activities are a normal part of the project development process. Environmental permits usually contain specific conditions that are addressed in the design phase. In many cases, changing conditions or constructability issues result in modifications to project design during construction. Construction changes can result in violations to the approved permits and cause unintended changes to the functionality of the design. Also, KyTC officials have commented that periodically there is *design in isolation* where environmental issues are addressed separately, then added to the project. It would be beneficial to study/document such events, determine their root causes and effects, and provide actions to prevent future occurrences. Currently, KyTC is redefining the working interrelationships between its divisions related to project development through teamwork and improved interdepartmental coordination. One focus of that new effort is better implementation of environmental/project commitments. Review of recent KyTC implementation of those commitments will assist in enhancing the performance on the new and KyTC evolving project development process.

FY 2002 ACCOMPLISHMENTS: Little progress was made as KyTC did not provide a study advisory committee

FY 2003 PROPOSED WORK: The integration of the environmental impact assessment and permitting activities related to KyTC planning and construction processes will be reviewed. Those causes/events will be analyzed to identify how best to deal with them both from policy and process bases. Related processes ranging from planning through design and construction will be mapped to identify how such variances could be addressed. If necessary, proposed procedural revisions may be recommended to prevent/accommodate for construction-related variances with existing KyTC environmental documents and regulatory agency permits.

PROJECTED COST THROUGH FY 2002:	$ 60,600
PROGRAMMED COST FY 2003:	$ 54,000
TOTAL ESTIMATED COST: [1]	$112,000

[1] **Original estimate was $108,000**

DEVELOPMENT OF LOAD SPECTRA FOR USE IN PAVEMENT DESIGNS FOR IMPLEMENTATION OF THE 2002 AASHTO PAVEMENT DESIGN GUIDE KYSPR 01-223

Continuation of an Approved Study
Work Plan Submitted July 2000; Approved August 2000
Anticipated Completion Date: FY 2003

OBJECTIVES: To develop load spectra for calculating traffic loadings on pavements and to develop a method for comparing ESAL parameters with load spectra.

BACKGROUND: A procedure for estimating equivalent single axleloads (ESALs) was developed in 1985. This procedure used weight, classification, and traffic volume data collected by the KyTC as basic input for development of these parameters. Since the procedure was adopted in 1985, there have been several changes to the procedures, including aggregation of the functional classes and streamlining of the data processing procedures with conversion from mainframe to personal computer. Recent revisions by AASHTO in their Pavement Design Guide have resulted in load spectra replacing ESALs as the basis for calculating loadings on pavements. Conversion of the input data to load spectra will allow Kentucky to design pavements in accordance with the AASHTO guidelines, which will also be consistent with most other states. Timely analysis of weight and traffic data will allow conversion from ESALs prior to Kentucky's adoption of the AASHTO Pavement Design Guide in 2002.

FY 2002 ACCOMPLISHMENTS: A review has begun of the draft software which will be included with the 2002 Design Guide. The NCHRP Project developing the Design Guide is currently behind schedule and therefore the final format of the traffic input requirements has not been available. In addition, the review of existing data collection procedures has continued.

FY 2003 PROPOSED WORK: It is anticipated the draft report of the guide will be reviewed during the upcoming year. Guidelines will be developed to identify key items which must be accomplished to achieve a transition of our current ESAL processing procedure to the necessary load spectra.

PROJECTED COST THROUGH FY 2002:	$ 70,877
PROGRAMMED COST FY 2003:	$158,000
TOTAL ESTIMATED COST:[1]	$241,500

[1] Original estimate was $135,000

ENVIRONMENTAL IMPACTS OF BRIDGE CLEANING OPERATIONS
KYSPR 01-224

Continuation of an Approved Study
Work Plan Submitted July 2000; Approved July 2000
Anticipated Completion Date FY 2003

OBJECTIVES: KTC will review pertinent federal and state regulations related to the discharge of wastewater containing lead and other heavy metals into the environment. KTC will also evaluate lead/heavy metal concentrations generated by current pressure washing practices on KyTC maintenance painting projects and will characterize the existing paint on subject bridges to determine the potential for release of lead/heavy metals into the wastewater. KTC will cooperate with the KyTC Paint Team to evaluate the lead/heavy metal content in the wastewater treated by current KyTC practice and by other mechanical and chemical methods. Based upon those results, KTC will propose alternative practices for wastewater treatment and disposal.

BACKGROUND: KyTC bridge maintenance painting operations (using overcoating) entail cleaning of the existing steel to provide substrates suitable for paint application. Typically, existing paint being cleaned contains lead or other heavy metals that are regulated as hazardous (toxic). Air quality regulations for lead and other hazardous materials are well defined and KyTC has effective specifications for addressing them. Pressure washing is a key cleaning procedure used to remove surface debris (e.g. chalk) and poorly bonded existing paint. The wastewater generated by pressure washing those substrates contains lead and possibly other trace quantities of other hazardous materials. The concentration of heavy metals in the wastewater depends upon: 1) its concentration in the existing paint, 2) the condition of that paint and 3) the method of pressure washing employed (i.e., nozzle size and type, washing pressure and standoff distance between the nozzle and substrate). The wastewater is typically filtered using 430 micron or finer pore size non-woven geotextile fabric to mechanically filter out most of the hazardous material then directly discharged into receiving waters or onto the ground. While the Natural Resources Cabinet has approved this method, it is primarily procedure-based. Further research is needed to determine its efficiency and to identify alternative actions that KyTC can employ where/if additional treatment is necessary.

FY 2002 ACCOMPLISHMENTS: Work was initiated to collect wastewater from typical bridge maintenance painting operations and to analyze it for lead. Wastewater generated during eight KyTC bridge overcoating projects were sampled periodically and analyzed for total suspended solids, pH, total lead and dissolved lead. Work was initiated on developing a mechanical/chemical filtration unit to be fabricated by the Georgia Tech Research Institute. It is anticipated that the unit will be able to reduce the lead content in wastewater near or below drinking water standards.

FY 2003 PROPOSED WORK: Wastewater from KyTC overcoating projects will continue to be sampled. The Georgia Tech Research Institute filtration unit will be evaluated on several of those projects. A final report will be prepared documenting the findings of the field tests and providing recommendations for future handling/treatment/disposal of wastewater generated during KyTC overcoating operations.

PROJECTED COST THROUGH FY 2002:	$63,300
PROGRAMMED COST FY 2003:	$39,000
TOTAL ESTIMATED COST: [1]	$99,000

[1] Original estimate was $81,000

CASE STUDY OF 4f LITIGATION AND RULINGS
KYSPR 01-225

Continuation of an Approved Study
Work Plan Submitted September 27, 2000; Approval of Work Plan Pending
Anticipated Completion Date FY 2003

OBJECTIVES: KTC will review recent/significant literature on 4f litigation and court rulings impacting KyTC and other transportation agencies. This will include review of specific claims against the FHWA, case circumstances, resulting court rulings and significant project impacts. Based upon that review and related material (e.g. FHWA guidance documents), KTC will identify steps KyTC can undertake to identify: 1) alternatives that would support the contention that there is no "prudent and feasible alternative to using the land" and 2) mitigation actions that effectively "minimize harm" to adversely impacted environmental sites. KTC will provide guidance to KyTC on: 1) determining when projects impacting 4f lands should be pursued, 2) necessary conditions for considering alternatives unfeasible, and 3) MOAs and other mitigation-related agreements necessary to establish that appropriate minimization actions will be acceptable and will be implemented. KTC will prepare a 4f Guidance CD-ROM for distribution to KyTC personnel and consultants addressing 4f. The CD-ROM will be periodically upgraded under another research effort to incorporate the latest court rulings and FHWA policies related to 4f.

BACKGROUND: Section 4(f) of the 1966 DOT Act places severe restrictions on the use of federal funds to impact public/wildlife/historic properties for transportation projects. The intent of that law is clearly to limit/prevent proposed projects from impacting those properties. Proposed projects that do not directly impact 4f properties, but whose proximity constitutes "constructive use" are also subject to 4f restrictions by reason of substantial impairment. Federal, state or local officials may designate impacted properties and a determination of major purpose is key to determining whether Section 4(f) applies. Project impacts on 4f properties are allowed where "no prudent and feasible" alternative exists and where minimization mitigation actions are employed. Since the promulgation of the 1966 DOT Act, the law has been rewritten and courts have provided increasingly lenient rulings allowing highway agencies to impact some 4f properties.

FY 2002 ACCOMPLISHMENTS: A draft document has been prepared outlining most past litigation related to 4f including case issues and specific court rulings. The document has been revised to incorporate the most recent cases and related FHWA policies/guidance. The document has been provided to KyTC officials for initial review and comment.

FY 2003 PROPOSED WORK: Guidelines will be developed for design and construction of roadways in 4f properties based on the information obtained from specific litigation/court rulings. KTC will interface with KyTC and FHWA division officials to derive a process whereby 4f issues can be addressed early in project development and a determination can be made on whether to impact a 4f property. Typical approaches used to evaluate 4f situations and opportunities for MOAs and mitigation actions/agreements will be identified. Conditions for considering alternatives unfeasible will also be identified along with past actions employed by state highway agencies in those circumstances. A CD-ROM will be prepared outlining the 4f approval process and providing guidance/previous court rulings for use in project development by KyTC officials.

PROJECTED THROUGH COST FY 2002:	$50,700
PROGRAMMED COST FY 2003:	$55,000
TOTAL ESTIMATED COST: [1]	$100,800

[1] Original estimate was $67,500

GEOTECHNICAL DATA BANK OF KENTUCKY
KYSPR 01-227

Continuation of an Approved Study
Work Plan Submitted July 2000; Approved July 2000
Anticipated Completion Date: FY 2004

OBJECTIVES: Major objectives are to continue development of the geotechnical (soil and rock) computer database of Kentucky in a "Windows" client/server environment, input historical highway geotechnical records, develop and improve procedures for capturing, in a "real-time mode," geotechnical data as it is generated, further develop plotting capabilities and data retrieval mechanisms, develop an array of on-line analyzers for statistical analyses of data and related graphs, develop an interface with the Kentucky Geological Survey (KGS) digital mapping, and be closely involved with personnel of the 12 Highway Districts of the Kentucky Transportation Cabinet in the use, training, and regional development of the database. Another objective is to continue to work with potential rockfall hazards and landslides and continue management of the rockfall and landslide data. Also, to improve detection methods, movements of a selected number of landslides will be tracked with Global Positioning System (GPS) equipment. Programs will be developed and included in the interactive database software for storing, plotting, and analyzing landslide movements. Another major objective includes development of "on-line,' interactive application software, which currently is in the initial development stage and which will be in the database. One software program, which has been initiated, involves development of an interactive rail-wall design.

BACKGROUND: The future performance of a highway (pavement and structures) is directly related to the types of geology and soils. The performances of highway cut slopes and embankments are directly related to the engineering properties of the soils and rocks used to form the embankments and cut (or excavated) slopes. If roadway embankment materials perform poorly, then excessive settlements and slope instability occur. Premature failures of pavements due to the poor performances of embankments and geological formations in cut sections can have a large affect on future maintenance costs.

FY 2002 ACCOMPLISHMENTS: Additional District Operations personnel were connected to the data base. Rockfall and landslide data were updated as requested by KyTC District and Central Office personnel. Graphical user interface screens were developed or modified for site and engineering test data entry. Historical geotechnical engineering data from roadway and structure plans were entered into the system. Scalable mapping features were developed. Rail piles installed at landslide sites to stop movement were monitored with sub-centimeter accuracy GPS equipment. The movement of railroad steel piles is being monitored to determine the effectiveness of installing rail piles.

FY 2003 PROPOSED WORK: Routines will be developed to capture geotechnical test data in a "real time" mode as it is generated. Personnel of KTC will continue to manage the rockfall and landslide databases and will continue to examine potential rockfall and landslide sites. KTC personnel will continue to rate rock slopes and landslides identified by District personnel. Graphical user interfaces for data entry for landslide and rock slope sites will be revised and improved to conform to the needs and requirements of the KyTC. The monitoring of landslides movement with high-accuracy GPS equipment will continue.

PROJECTED COST THROUGH FY 2002:	$397,895
PROGRAMMED COST FY 2003:	$216,000
TOTAL ESTIMATED COST:	$607,500

REDUCTION OF STRESSES ON BURIED RIGID HIGHWAY STRUCTURES USING THE IMPERFECT DITCH METHOD AND EXPANDED POLYSTYRENE (GEOFOAM)
KYSPR 01-228

Continuation of an Approved Study
Work Plan Submitted September 2000; Approved September 2000
Anticipated Completion Date: FY 2004[2]

OBJECTIVES: The objective of this study is to examine the use of expanded polystyrene (geofoam) and the imperfect ditch method for reducing the vertical stresses on rigid buried highway structures, such as pipes and culverts.

BACKGROUND: Construction of highway embankments above highway pipes and culverts has great practical significance because of the stresses imposed by the fill on the buried structure. Relative stiffnesses of the culvert and soil control the magnitude and distribution of earth pressure on the buried structure. The vertical earth pressure on a flexible culvert is less than the weight of the soil about the culvert due to positive arching. However, the vertical earth pressure on a rigid culvert, or pipe, is greater than the weight of the soil above the structure because of negative arching. Experiments have shown that the loads on rigid embankment culverts were some 90 to 95 percent greater than the weight of the soil directly above the structure. In model tests performed by Hoeg (1968), the crown pressure was about 1.5 times the applied surcharge. Penman et al. (1975) measured the earth pressure on a rigid reinforced concrete earth pressure below 174 feet of rockfill and found that the vertical earth pressure on the culvert crown was about 2 times the overburden stress due to the fill above the top of the culvert. To avoid high stresses on rigid buried structures, the imperfect trench, or induced, ditch method of construction was invented. The imperfect trench method involves installing a compressible layer above the culvert within the backfill. Traditionally, such compressible materials as baled straw, leaves, old tires (used in France), or compressible soil, have been used. As the embankment is constructed, the soft zone compresses more than the surrounding fill. This process induces positive arching which reduces the stresses on the buried structure.

FY 2002 ACCOMPLISHMENTS: Two software packages were used to simulate model culvert stresses with and without lightweight material. Sites selected by KyTC construction engineers were analyzed as possible candidates for using geofoam fill over culverts.

FY 2003 PROPOSED WORK: In collaboration with the Kentucky Transportation Cabinet, potential sites will be identified for possible installation of the geofoam, or other lightweight materials, over culverts where the imperfect ditch method is specified. If a site or sites are selected it will be instrumented and stresses monitored during and after construction. Finite element analyses will be performed to determine the optimum shape of the geofoam filled trench.

PROJECTED COST THROUGH FY 2002:	$108,000
PROGRAMMED COST FY 2003:	$ 72,000
TOTAL ESTIMATED COST:	$267,000

[2] KTC Director extended one year

RESILIENT MODULUS OF COMPACTED, CRUSHED STONE AGGREGATE BASES
KYSPR 01-229

Continuation of an Approved Study
Work Plan Submitted September 2000; Approved September 2000
Anticipated Completion Date: FY 2005[2]

OBJECTIVES: The objective of this study is to determine the resilient modulus of compacted, crushed stone aggregate bases used in highway pavements in Kentucky.

BACKGROUND: In July 1993, FHWA performed a process review of the Kentucky Transportation Cabinet's procedure for pavement design. FHWA found the Cabinet's procedures to be in accordance with past experience and knowledge. However, the most significant concern that FHWA had "was the possible lack of a geotechnical study on a project due to inadequate design time for sampling and testing." FHWA recommended "that an in-depth assessment be made of the most appropriate strength test to accommodate Kentucky's future needs and that resilient modulus testing be given consideration for informational design values, evaluation of other research efforts, and keeping up with state-of-the-art practices."

The trend in designing highway pavements in recent years consists of using mechanistic models based on the theory of elasticity or linear or nonlinear finite elements. In these approaches, the coefficients of pavement layers, as proposed by the AASHTO (1960) Road Test design guide, are replaced by elastic moduli. The 1986 and 1993 AASHTO Pavement Design Manuals suggest using resilient modulus in place of the soil support value. The Guides also suggest using correlations to determine resilient modulus because testing is complex and time consuming. Resilient modulus testing is difficult on a production basis. Also, the Kentucky Transportation Cabinet and consultants, who perform design work for the Cabinet, are not currently equipped to perform resilient modulus tests. Hence, relationships between resilient modulus of different aggregate bases are needed to design pavements in Kentucky using mechanistic models.

Over the past four years, the Geotechnical section of the Kentucky Transportation Center has been performing numerous resilient modulus tests on Kentucky soils. The necessary equipment was purchased some four years ago. With slight modification and an additional chamber, resilient modulus of aggregates could be performed using this existing equipment.

FY 2002 ACCOMPLISHMENTS: Software and hardware for the resilient modulus system was upgraded. All testing equipment was made operational and several resilient modulus tests were performed in a triaxial testing chamber that accommodates specimens measuring 6 inches in diameter and 12 inches in height. Samples tested were submitted by the KyTC Division of Materials. Several pavement resilient modulus models were evaluated. A new model is being developed to overcome deficiencies in current models.

FY 2003 PROPOSED WORK: Testing of various base aggregates will continue. Work will continue on developing a model to use resilient modulus values in pavement design.

PROJECTED COST THROUGH FY 2002:	$54,200
PROGRAMMED COST FY 2003:	$45,000
TOTAL ESTIMATED COST:	$162,000

[2] **KTC Director extended one year**

EARTHQUAKE RESPONSE TRAINING AND ASSESSMENT OF FUTURE EARTHQUAKE STUDY NEEDS IN WESTERN KENTUCKY
KYSPR 01-234

Continuation of Approved Study
Work Plan Submitted May 2000; Approved June 2000
Anticipated Completion Date: FY 2004

OBJECTIVES: The primary objectives of this study are: (1) to develop a training and information manual for post earthquake investigation and evaluation of Kentucky's highway infrastructure (bridges, embankments, dams, retaining walls, etc.); (2) to conduct workshops and offer training sessions and hands on experience for post earthquake response to engineers in the Kentucky Transportation Cabinet and to district engineers in each of the twelve districts in Kentucky; (3) to coordinate efforts with the Division of Disaster and Emergency Services of the Department of Military affairs, and with the Departments of Transportation in Tennessee, Missouri, Illinois, and Indiana; and (4) to assess and prioritize future earthquake study needs for Western Kentucky.

BACKGROUND: From the early 1980s to the early 1990s, and under the guidance and leadership of the Division of Disaster and Emergency Services of the Department of Military affairs, various state and public agencies joined efforts to prepare for responding to various natural disasters in Kentucky (e.g., flooding, earthquakes, etc.). For earthquake preparedness, the Kentucky Society of Professional Engineers took the lead in recruiting engineers and offering training sessions for inspection of buildings and bridges following an earthquake. The majority of the engineers were volunteers from the private practice. Participation in the earthquake response effort was large and active at first. At present, there is no activity in the area of post earthquake response, and in case of a major seismic event, the Transportation Cabinet and the state will not be able to provide adequate response. In addition, a detailed assessment of future earthquake study needs in Western Kentucky will effectively allocate the limited financial resources.

FY 2002 ACCOMPLISHMENTS: Work continued on the development of instruction manuals for post earthquake response training and evaluation.

FY 2003 PROPOSED WORK: Work will continue on the development of the instruction manuals for post earthquake response.

PROJECTED COST THROUGH FY 2002:	$127,500
PROGRAMMED COST FY 2003:	$ 89,500
TOTAL ESTIMATED COST:	$270,000

CONSTRUCTIBILITY ISSUES ON KYTC PROJECTS
KYSPR 02-236

Continuation of an Approved Study
Work Plan Submitted July 1, 2001; Approved August 5, 2001
Anticipated Completion Date: FY 2003

OBJECTIVES: The goal of this study is to provide the Kentucky Transportation Cabinet with an evaluation of the feasibility and implementation needs to utilize constructibility processes on its highway construction projects. The following objectives have been identified for this study:

1. Identify the constructibility practices currently used by other DOTs.
2. Identify the primary constructibility issues on KyTC construction projects, characterized for small, rural and urban projects
3. Identify practices to alleviate or minimize the impact of major constructibility issues.
4. Evaluate the development of a "lessons learned system" which can be effectively implemented for use in constructibility reviews on KyTC construction projects.
5. Recommend guidelines for implementation of the constructibility review process for KyTC construction projects.

BACKGROUND: Several KyTC construction projects are now reconstruction and rehabilitation projects. There are many constructibility issues encountered on these projects that are repetitive in nature, and often cause disruptions and disputes. These repetitive problems of constructibility need to be identified and alleviated. Research is needed to develop guidelines for implementation of constructibility reviews on KyTC projects.

FY 2002 ACCOMPLISHMENTS: A literature review and surveys of other DOTs was conducted on existing constructibility practices. Three meetings were held with the advisory committee with much discussion of the process. Current KyTC practices with value engineering, constructibility and post-construction reviews were identified. Efforts were begun to identify the key constructibility issues on KyTC construction projects.

FY 2003 PROPOSED WORK: Efforts to identify the major constructibility issues will be continued. Processes for implementing constructibility input on projects will be evaluated for effectiveness and efficiency. The essential elements required of a feasible "Lessons Learned" system for the Cabinet will be identified working with the advisory committee. Guidelines for implementation of the constructibility review process for KyTC projects will be developed and a final report will be prepared for the project.

PROJECTED COST TRHOUGH FY 2002:	$ 54,000
PROGRAMMED COST FY 2003:	$ 63,000
TOTAL ESTIMATED COST:	$108,000

EVALUATION OF METHODS TO PROTECT WATER QUALITY IN KARST AREAS: PHASE I
KYSPR 02-237

Continuation of an Approved Study
Work Plan Submitted September 27, 2000; Approval of Work PlanPending
Anticipated Completion Date FY 2003

OBJECTIVES: The objectives for Phase I of the study include:

A. Obtain background information on highway water runoff, karst, ground water regulations, existing traffic/pollution/permeation models and BMPs for treatment

B. Locate a highway/karst site for initial field water runoff monitoring and other analyses

C. Identify and employ procedures to completely characterize the site for generation of pollutants and their transport into underground aquifers

D. Create/employ models that relate traffic, roadway, geologic formations and other variables to pollution of underground aquifers

E. Report findings

BACKGROUND: The Federal Highway Administration and a number of other state and local governments have conducted studies on the water quality of highway runoff. Those studies indicate that highway runoff may carry varying amounts of heavy metals (cadmium, copper, lead, zinc) and various other pollutants (e.g. TSS, oil, gasoline). At high concentrations, metals are toxic to aquatic life and may accumulate in high concentrations from roadway runoff due to the fact that they do not readily degrade in the environment. Nonmetallic pollutants also threaten aquatic life and pose potential health hazards to the public.

In the past, this runoff was allowed to flow unhindered into receiving waters. State highway agencies, especially those in several western states have been/are being subjected to local regulation related to ground water runoff (e.g. California and Washington). Currently, they have begun addressing those regulations including the conduct of research studies to identify BMPs that can be employed to limit pollutant impacts from highway runoff. The problem is that precipitation that causes most of the water runoff must be drained from impervious roadways, bridges, and parking surfaces as rapidly as possible to maintain safety and traffic flow. That poses a problem due to the general lack of space along right-of-ways or shoulders for treatment alternatives. In Kentucky, this problem is compounded by the presence of permeable geological formations (i.e. karst). Those formations provide direct routes for stormwater runoff to enter groundwater water supplies placing the public and wildlife that depend on groundwater for personal consumption at risk.

FY 2002 ACCOMPLISHMENTS: A literature search was conducted on Karst Geology, Water Quality of Highway Runoff and Best Management Practices for preventing pollutants from highway runoff from violating water quality standards. The review of that literature was used to identify viable treatment options to be investigated. Karst site was identified and procedures were employed to completely characterize the site for generation of pollutants and their transport into underground aquifers. Work was initiated to collect samples from stormwater runoff and to analyze the samples for pollutants and heavy metals.

FY 2003 PROPOSED WORK: The stormwater samples will be analyzed for heavy metal content and methods will be employed to limit pollutants from entering the sensitive Mammoth Cave National Park ecosystem. Also, a review will be conducted of current US EPA and state regulations related to the discharge of heavy metals into receiving waters and upon the ground. An interim report with the literature search results will be furnished to the Study Advisory Committee.

PROJECTED COST THROUGH FY 2002:	$67,500
PROGRAMMED COST FY 2003:	$67,500
TOTAL ESTIMATED COST:	$135,000

BEARING CAPACITY ANALYSIS AND DESIGN OF HIGHWAY BASE MATERIALS REINFORCED WITH GEOFABRICS
KYSPR 02-238

Continuation of an Approved Study
Work Plan Submitted July 2001; Approved July 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: The primary objective of this study is to develop and implement a mathematical bearing capacity model for analyzing and designing highway bases and flexible pavements reinforced with polymer geogrids or geotextiles.

BACKGROUND: Chemical stabilization is often used to improve the bearing capacity of soft soil subgrades. Improvement of the subgrade ultimately improves performance. There are circumstances when chemical stabilization cannot be used because of temperature constraints (chemical stabilization is not recommended when the temperature is below 45° F). Also, a curing time is required for chemical stabilization that is not practical in areas where traffic must be rerouted immediately onto the partially completed pavement. Geofabrics are often used when chemical stabilization is not an option. Geofabrics are used in conjunction with aggregate bases. However, the thickness of aggregate required to support traffic (including construction traffic) is unknown. A reliable design approach is needed to determine when to use aggregates and geofabrics and how much aggregate thickness is required. The thickness required is not constant; it varies with traffic loadings, type of geofabric, and soil strength. Bearing capacity models, which are based on limit equilibrium concepts, can be used to evaluate the stability of aggregate bases reinforced with geosynthetics.

FY 2002 ACCOMPLISHMENTS: Several graphical user interfaces (GUI) for entering data into the windows computer program (under development) were written. Several analyses were performed using an older DOS program and an interim report was prepared.

FY 2003 PROPOSED WORK: The various approaches will be summarized and evaluated. Advantages and disadvantages will be noted. The theoretical methods used to the develop the model were originally developed for embankments reinforced with geotextiles. The equations will be modified for modeling aggregate bases under traffic loads. Work will continue on development of a "Windows" computer program. All algorithms will be developed in a "Windows" computer program in a client server environment. Development of graphical user interfaces screens will continue for data entry.

PROJECTED COST THROUGH FY 2002:	$ 58,500
PROGRAMMED COST FY 2003:	$ 58,500
TOTAL ESTIMATED COST:	$175,500

CORROSION EVALUATION OF MECHANICALLY STABILIZED EARTH WALLS
KYSPR 02-239

Continuation of an Approved Study
Work Plan Submitted September 2001; Approved October 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: The primary objectives of this study are to monitor mechanically stabilized earth (MSE) walls to determine the long-term deterioration of the reinforcing elements, monitor wall stability, and to build a computer-based system for managing initial and long-term wall data.

BACKGROUND: Retaining walls are frequently used to stabilize earth slopes. Walls are typically used when right of way constraints prevent construction of soil or rock slopes. Retaining walls require less space than slopes, but are more expensive. Mechanically stabilized earth walls and slopes are widely used in highway design and construction. These walls are constructed with interlocking panels supported by horizontal reinforcing strips attached to the panels, or by attaching reinforcing strips to timbers or concrete facing materials. The strips are placed in select backfill (usually granular) behind the wall. The most commonly used type of reinforcing strip is galvanized metal in a strip or grid configuration. Walls with galvanized metal strips have been widely used since the late 1970's. The long-term durability of the reinforcing materials is a major concern for MSE walls and slopes because of suspected corrosion or degradation due to chemical and other actions in a soil-water environment. More recent applications have used polymer type reinforcing strips. Some walls are constructed with polymer type reinforcing elements by wrapping geofabrics around the backfill to form the face of the wall. The long-term effects on polymer type reinforcing elements are also unknown.

FY 2002 ACCOMPLISHMENTS: Attributes of MSE walls located on Kentucky highway routes were obtained. Attributes obtained included height, length, function (retaining wall, bridge abutment, etc.), overall condition, and location was noted using mapping grade Global Positioning System equipment. Work began on developing a data base in a client-server environment to store all wall attributes.

FY 2003 PROPOSED WORK: An inventory of MSE walls located on Kentucky highway routes will continue. Development of a data base system will be continued. A risk analysis will be accessed on inventoried walls.

PROJECTED COST THROUGH FY 2002:	$ 27,000
PROGRAMMED COST FY 2003:	$ 45,000
TOTAL ESTIMATED COST:	$175,500

DEPLOYMENT OF A VIRTUAL WEIGH STATION
KYSPR 02-240

Continuation of an Approved Study
Work Plan Submitted 08/02/01; Approved 08/15/01
Anticipated Completion Date: FY 2003

OBJECTIVES: To implement, at a selected site in Kentucky, a prototype "virtual weigh station." To evaluate the performance and value of the system and develop recommendations regarding expansion to additional sites.

BACKGROUND: A large portion of the commercial vehicle traffic in Kentucky travels on roadways that are not monitored by weigh/inspection facilities. Trucks traveling on these roadways are not subject to the same level of regulation and enforcement that they would encounter on the monitored routes. Also, trucks are able to bypass weigh/inspection facilities by taking short detours on alternate routes. As a result, the effectiveness of Kentucky's commercial vehicle regulation and enforcement efforts is severely compromised.

As part of its CVISN Model Deployment, Kentucky has developed and prototyped a Remote Monitoring System (RMS) for commercial vehicle enforcement. This system, when combined with weigh-in-motion equipment, can function as a virtual weigh station, providing the same functionality as a weigh station at a fraction of the cost. Additionally, the virtual weigh station will not require continuous staffing, nor will it need to be continuously monitored. It will provide covert enforcement, thus making it more difficult for violators to avoid detection.

FY 2002 ACCOMPLISHMENTS: The system requirements were established, a vendor was selected, and the process was initiated to establish a subcontract for the system design and installation. Site selection criteria were established, and ten candidate locations were identified. Each site was visited and videotaped, and enforcement officers were interviewed regarding the suitability of each site.

FY 2003 PROPOSED WORK: The Study Advisory Committee will select the site for the Virtual Weigh Station. The subcontractor will design, procure, install, and integrate the system. An evaluation plan will be developed and the system will be evaluated.

PROJECTED COST THROUGH FY 2002:	$ 33,000
PROGRAMMED COST FY 2003:	$160,500
TOTAL ESTIMATED COST:	$202,500

DEVELOPMENT OF AN INTELLIGENT TRANSPORTATION SYSTEMS (ITS) MAINTENANCE AND MANAGEMENT PLAN FOR KENTUCKY
KYSPR 02-241

Continuation of an Approved Study
Work Plan Submitted 07/02/01; Approved 08/23/01
Anticipated Completion Date: FY 2003

OBJECTIVES: To involve ITS stakeholders throughout Kentucky in the development of recommendations and strategies for how ITS activities, including maintenance, should be supported and coordinated throughout the Transportation Cabinet. To identify best practices in ITS management and maintenance and incorporate these best practices into an "ITS Design Manual" for Kentucky.

BACKGROUND: For ITS projects, the emphasis has traditionally been on getting systems deployed, with minimal attention given to how the systems would be managed and/or maintained. The structure, processes, and expertise of traditional state transportation agencies were focused on highway construction projects, not on deployment and operation of high-technology systems. ITS projects tend to be interdisciplinary, requiring cooperation and communication among multiple agencies. They also involve rapidly changing technologies, creating a need for state agencies to be flexible and agile.

Within the Kentucky Transportation Cabinet, responsibilities for ITS activities are divided among multiple agencies, creating the potential for redundancy, inefficiency, or items "falling through the cracks." Deploying new technologies places additional burdens on District Offices, and Cabinet employees often lack the specialized training required to maintain ITS technologies. This can result in diminished system performance, equipment failures, and increased life-cycle costs.

Developing a Maintenance/Management Plan can help to ensure that system maintenance and system operations are key considerations when implementing any ITS technology. The plan will provide a set of guidelines and procedures to make sure maintenance is performed effectively and without excessive cost. In addition, an ITS Maintenance/Management Plan will provide a clearer understanding of the best way to allocate responsibilities and coordination activities within the Kentucky Transportation Cabinet, thus resulting in more efficient and more effective utilization of resources.

FY 2002 ACCOMPLISHMENTS: A literature review and a survey of other states were conducted to identify other states or urban areas that have prepared ITS maintenance and/or management plans. The findings and recommendations of these efforts were compiled and studied, resulting in a set of "best practices."

FY 2003 PROPOSED WORK: Site visits will be made (as necessary) to 1-3 states or urban areas to gather more detailed information on their "best practices." Key stakeholders within Kentucky will be identified and a stakeholder team will be formed to identify key issues, challenges, and opportunities related to management and maintenance of Kentucky's ITS resources. This team will meet as necessary (3-4 meetings expected) to address key issues, develop strategies, and establish priorities. An ITS Maintenance and Management Manual will be developed for Kentucky.

PROJECTED COST THROUGH FY 2002:	$35,500
PROGRAMMED COST FY 2003:	$90,500
TOTAL ESTIMATED COST:	$126,000

ANALYSIS OF PROCUREMENT PROCESSES AND DEVELOPMENT OF RECOMMENDATIONS FOR INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PROCUREMENTS
KYSPR 02-242

Continuation of an Approved Study
Work Plan Submitted 06/28/01; Approved 08/06/02
Anticipated Completion Date: FY 2003

OBJECTIVES: To analyze Kentucky's existing procurement processes, identify strengths and weaknesses of each, and develop recommendations for a revised process that will incorporate the best features of each existing process and meet the unique requirements of ITS procurements.

BACKGROUND: ITS deployments present many challenges, not least of which is the difficulty in procuring ITS equipment and services. Traditional procurement processes were designed for highway construction projects, and they are usually intended to purchase a specified, standard item at the lowest possible cost. Traditional processes are often cumbersome and slow, requiring substantial lead times and providing little flexibility. This can be a major impediment to ITS procurements, where technologies are new and rapidly changing, and where specifications and standards may not exist. ITS procurements require speed, flexibility, and much cooperation between the public agency and the contractor. ITS procurements may involve multiple agencies and cross jurisdictional boundaries. As a result, traditional procurement processes can create frustration and inefficiency when they are used for ITS procurements.

The Kentucky Transportation Cabinet currently has four different procurement processes available for different types of procurements. Each process has advantages and disadvantages, but no single process is well-suited to ITS procurements.

FY 2002 ACCOMPLISHMENTS: A literature review was conducted to identify "best practices" from other states. The Study Advisory Committee was briefed by an ITS procurement expert from FHWA. Project staff attended FHWA-sponsored training on ITS procurement. Key players in Kentucky's ITS procurement were identified and interviewed. Existing procurement processes in Kentucky were analyzed and described, focusing on identifying the strengths and weaknesses of each process with regard to ITS procurement.

FY 2003 PROPOSED WORK: The key attributes of the "ideal" procurement process will be identified and described. This process will be assessed in terms of what legislative or regulatory changes would be necessary before it could be implemented. Based on this analysis, specific recommendations will be developed for implementing the best possible procurement process (or processes) for ITS. These recommendations will be included in a final report.

PROJECTED COST THROUGH FY 2002:	$31,000
PROGRAMMED COST FY 2003:	$45,500
TOTAL ESTIMATED COST:	$76,500

EVALUATION OF CURRENT INCENTIVE/DISINCENTIVE PROCEDURES IN CONSTRUCTION
KYSPR 02-243

Continuation of Approved Study
Work Plan Submitted and Approved July 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: 1.) To review current incentive/disincentive programs in Kentucky for highway construction projects. 2.) To review other state DOT's incentive/disincentive programs for highway construction projects. 3.) To identify project completion incentives/disincentives based on either lane rental, and/or road user costs generated from life-cycle cost analysis in Pavement Design. 4.) To determine project quality incentives/disincentives based on material characteristics/performance data, i.e.: densities, percent air voids, pavement thickness, rideability, etc. 5.) To develop a computer model to optimize incentives/disincentives of highway construction projects based on both project completion and quality of construction.

BACKGROUND: In almost every highway construction project undertaken in Kentucky, the users of the facility will incur some type of economic burden during and possibly after the construction phase. Predominately the main associated cost will be linked to construction delays. However, users can experience long term economic burdens if quality standards were neglected during construction. This occurs mostly when transportation facilities deteriorate at an accelerated rate due to inferior products or constructions means, thus increasing future maintenance efforts. Therefore, in almost any highway construction project there should be a system in place to identify incentives/disincentives for project completion and quality of construction for those performing the work. The most common forms of incentives/disincentives for highway construction projects are evaluated in terms of dollars. In efforts to enhance overall quality of highway construction projects and minimize user delay costs, this report will try to develop a model that will be used to balance project completion incentives/disincentives and project quality incentives/disincentives.

FY 2002 PROPOSED WORK: An evaluation of both Cabinet and other State DOT's incentive/disincentive programs was initiated. In addition, a literature search was performed to determine the policy of other agencies.

FY 2003 PROPOSED WORK: Project completion incentives/disincentives and lane rental, and/or road user costs will be analyzed to determine optimum combinations to ensure quality and timeliness. This work will begin on project quality incentives/disincentives that are based on material characteristics and/or performance data, i.e.: densities, percent air voids, pavement thickness, rideability, etc.

PROJECTED COST THROUGH FY 2002:	$67,500
PROGRAMMED COST FY 2003:	$67,500
TOTAL ESTIMATED COSTS:	$202,500

EVALUATION OF NDT AND GEO-PHYSICAL TECHNIQUES
KYSPR 02-244

Continuation of an Approved Study
Work Plan Submitted and Approved July 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: 1) To review NDT and geophysical techniques (resistivity, conductivity, micro gravity, ground penetrating radar, seismic reflection/refraction, cross hole tomography, electro magnetic, etc.) currently being used by other DOTs and other agencies, 2) Determine the NDT and geophysical methods and equipment to be utilized in test projects for the Kentucky Transportation Cabinet, 3) Evaluate test projects and consultants utilizing various NDT and geophysical techniques and compile results, 4) Determine the benefit/cost of each method utilized, and 5) Develop draft specifications for the potential use of NDT and geophysical methods by the Transportation Cabinet.

BACKGROUND: Many states throughout the country have been using NDT and geophysical techniques to assist in the design, construction, and maintenance of their transportation systems for decades. Various techniques have been successfully utilized to identify potential collapse zones in karst terrain, locate voids under pavements and bridge approaches, identify in-filled scour pockets around bridge foundations, and for a number of other transportation related applications.

FY 2002 ACCOMPLISHMENTS: A survey of various practices related to NDT and geophysical methods was conducted. The results of these surveys were summarized, and presented to the Cabinet. Based upon the results of the literature search, a number of field projects were identified to test the effectiveness of the proposed methods. Guidelines for evaluating the field projects and the geophysical methods were developed and approved by the committee. RFPs were issued to selected contractors to test and develop two field projects.

FY 2003 PROPOSED WORK: Responses to the two RFPs will be evaluated and a contractor will be chosen for the two construction projects under consideration. The field investigations will be completed. The collected data and the reports by the contractors will be evaluated. This includes the contractor's methods, data analysis and proposed recommendations.

PROJECTED COST THROUGH FY 2002:	$63,000
PROGRAMMED COST FY 2003:	$112,500
TOTAL ESTIMATED COST:	$247,500

EVALUATION OF AGGREGATE SEGREGATION ON PAVEMENT PERFORMANCE
KYSPR 02-245

Continuation of an Approved Study
Work Plan Submitted and Approved July 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: 1) Review segregation specifications used by other transportation agencies and review current research being conducted on segregation, 2) Evaluate state-of-the-art technology (infrared camera, photo-imaging, ground penetrating radar, ROSAN) for identifying and measuring segregation, 3) Determine the major causes of thermal segregation, and 4) Evaluate the effects of both thermal and aggregate segregation on pavement performance.

BACKGROUND: For decades transportation agencies have been aware of aggregate segregation. Recently, thermal segregation has been added to the list of problems in hot mix pavements. Equipment such as remixing pavers and load transfer devices have reduced the amount of segregation. Although equipment changes have helped reduce this problem, it is still a cause for concern, and little is known about the long-term effects that it has on pavement performance.

FY 2002 ACCOMPLISHMENTS: A survey of various practices related to segregation was conducted. The results of these surveys were synthesized and summarized. Based upon the results of the literature search, a number of techniques are being evaluated in Kentucky on selected projects. Field data was collected and is in the process of being analyzed. Preliminary testing of infrared cameras was tried to identify areas of thermal segregation.

FY 2003 PROPOSED WORK: Development and evaluation will continue on methods to measure aggregate segregation. Field testing will continue to collect data from numerous field paving projects. Data analysis will be initiated on all field data to determine the feasibility of the various methods attempted.

PROJECTED COST THROUGH FY 2002:	$63,000
PROGRAMMED COST FY 2003:	$108,000
TOTAL ESTIMATED COST:	$216,000

SEISMIC EVALUATION OF THE PARKWAYS IN WESTERN KENTUCKY
KYSPR 02-246

Continuation of an Approved Study
Work Plan Submitted July 2001: Approved August 2001
Anticipated Completion Date: FY 2005

OBJECTIVES: The objective of this study is to conduct a seismic evaluation of the bridges on and/or over the Parkways in Western Kentucky.

TASKS: The following tasks will be carried out on bridges on and over the Parkways in Western Kentucky:

A- Field Inspection: Conduct field inspection of bridges, their approaches and embankments along the Parkways, and compare bridge plans with "as built" bridges.

B- Prioritization: Prioritize the seismic evaluation of bridges/approaches/embankments, and conduct an evaluation based on a projected moderate seismic event (or 50-year event) along the New Madrid seismic zone.

C- Retrofit Measures: Propose retrofit measures as needed.

BACKGROUND: Bridges, their corresponding approaches, and embankments on and over theParkways in Western Kentucky have not been evaluated for a seismic event along the New Madrid seismic zone. Due to the potential economic impact on the western part of the Commonwealth, a seismic evaluation is essential for determining the seismic vulnerability of the corridor.

EXPECTED BENEFITS: To mitigate partial or total collapse of bridges along the Parkways in Western Kentucky as a result of a moderate seismic event. To identify roadway embankments anticipated to require rapid rehabilitation to restore the functional utility of the Parkways after a seismic event.

FY 2002 ACCOMPLISHMENTS: Completed 25% of Task A and 25% of Task B.

FY 2003 PROPOSED WORK: Complete 100%of Task A and 50% of Task B.

PROJECTED COST THROUGH FY 2002:	$43,000
PROGRAMMED COST FY 2003:	$47,000
TOTAL ESTIMATED COST:	$405,000

CORRELATION BETWEEN HIGHWAY LIGHTING AND DRIVER SAFETY
KYSPR 02-247

Continuation of an Approved Study
Work Plan Submitted and Approved July 2001
Anticipated Completion Date: FY 2003

OBJECTIVES: The objectives of this study are as follows: 1) to determine the benefits associated with lighting at highway interchanges, highway mainlines, and intersections: 2) to determine the optimum type, placement and amount of lighting to provide; and 3) to determine an economic correlation between effective lighting and cost savings.

BACKGROUND: Nighttime visibility is a critical issue to users of the highway system. Research has indicated that between 40 and 60 percent of nighttime highway crashes could be eliminated by the addition of highway lighting. Highway lighting can be justified under many circumstances based on the cost savings resulting from crash reductions. Presently, most urban streets and highways have lighting installed; however, rural applications are rare except at intersections and interchanges. Problems associated with highway lighting include glare, placement, structural design, and light trespass/pollution. Analysis and evaluation of the advantages and disadvantages associated with highway lighting could be used to improve the overall driving safety for highway users in Kentucky.

FY 2002 ACCOMPLISHMENTS: A literature search was conducted, followed by a questionnaire survey, to determine lighting practices and policies in other states. Data collection was initiated at selected sites using a light meter to determine the general data collection approach for measuring before and after luminance levels at case study sites.

FY 2003 PROPOSED WORK: Information from the literature search and survey of states will be documented for inclusion in the final report. Additional work will be undertaken to determine case study sites and crash data will be reviewed and analyzed to determine the benefits of highway lighting. Case study sites will be selected to determine if the characteristics of sites where the installation of lighting has had an effect on the crash history. Inspections will be performed for the case study sites to measure the lighting output in terms of luminance values and this data will be compared with crash histories.

PROJECTED COST THROUGH FY 2002:	$24,000
PROGRAMMED COST FY 2003:	$106,500
TOTAL ESTIMATED COST:	$135,000

IDENTIFICATION OF HIGH ACCIDENT/CRASH LOCATIONS AND EVALUATION OF BENEFIT/COST
KYSPR 02-250

Continuation of an Approved Study
Work Plan Submitted and Approved: July 2001
Anticipated Completion Date: FY 2003

OBJECTIVES: To develop improved methods for evaluating benefits and costs and prioritizing improvements at high accident/crash locations.

BACKGROUND: The process of determining which projects to implement under a given budget, and which to defer until later, is central to the planning and management of highway systems. The Transportation Cabinet's Division of Traffic must routinely evaluate and prioritize safety improvements for high accident/crash locations. In order to effectively assign priorities to potential improvements, the benefits and costs must be determined. An improved method for identifying and prioritizing improvements for eliminating hazards would increase the probability of selecting the most logical projects for implementation. Projects are identified annually as part of the hazard elimination program and an improved method could be implemented. The process currently in place effectively identifies high accident/crash locations; however, the prioritizing process is not always applicable to the types of projects which frequently need to be prioritized.

FY 2002 ACCOMPLISHMENTS: Preliminary work was accomplished toward review of literature and review of programming procedures/algorithms for safety prioritizations procedures. Documentation of the overall high-crash location identification procedure was completed. Accident reduction factors developed as part of another research activity were related to the benefits factors required in benefit-cost analyses for safety improvements. The work plan was revised to include revisions to the crash buildup procedure used for the hazard elimination program, in addition to development of an interactive process for first-level evaluation of benefits and costs for safety improvements.

FY 2003 PROPOSED WORK: Prioritization procedures used by other states will be evaluated for use as input into the overall safety improvement prioritization procedure. Revisions will be made to the crash buildup program to enable accessing and processing the revised crash report form in use since January 2000. Work will be undertaken to convert the "dynamic programming" software from mainframe to PC. Updated crash reduction factors will be incorporated into the hazard elimination program as a component of the benefit-cost analyses. The interactive procedure for first-level evaluation of benefits and costs will be finalized and assistance will be provided for implementation.

PROJECTED COST THROUGH FY 2002:	$24,000
PROGRAMMED COST FY 2003:	$106,500
TOTAL ESTIMATED COST:	$135,000

ACCESS MANAGEMENT GUIDELINES
KYSPR 02-251

Continuation of an Approved Study
Work Plan Submitted and Approved: July 2001
Anticipated Completion Date: FY 2004

OBJECTIVES: To evaluate the effectiveness of the currently used ad-hoc access control procedures; design and evaluate access control measures for different transport system conditions; and recommend the most effective procedures for access control.

BACKGROUND: Balancing transportation needs and land development is a fundamental concept in access management in order to sustain economic growth and maintain a safe and smooth operation of the surrounding road system. To achieve this goal, access management utilizes a series of policies that aim in identifying guidelines and standards for allowable access levels, access spacing criteria, access permit procedures, and means for enforcing these standards. It is not difficult to envision a "major" arterial that has far more intersections and driveways than local roads which would severely restrict flow and alter the functional purpose of the arterial. Improperly located driveways and intersections, excessive traffic signals, insufficient storage areas, and lack of turning lanes or tapers contribute not only to crashes and congestion but they also reduce the capacity of the roadway system and degrade the character area. The lack of a universal approach through access management often leads communities to a continuous investment in roadway improvements that typically follow development and attempt to address the traffic problems after the fact. Effective access management translates into fewer conflict points, lower traffic delays, higher travel speeds, and improved roadway capacity.

FY 2002 ACCOMPLISHMENTS: Literature related to access management practices was reviewed and documented. Existing access management practices in Kentucky were reviewed and discussed with the Study Advisory Committee. KRS and KAR laws and regulations were also reviewed to determine their influence on access management practices in Kentucky.

FY 2003 PROPOSED WORK: Additional work will focus on in-depth evaluation and documentation of current access management/control procedures in use by the Kentucky Transportation Cabinet. A panel of practitioners will be conveyed to determine the efficiency of the existing Kentucky methods. The panel will be asked to identify their experiences and concerns with access management practices. The comments of the panel will be analyzed to identify alternatives or practices that require further investigation during the experimental phase of the research. Preliminary simulation models will be developed using the TSIS traffic simulation package to evaluate alternative designs.

PROJECTED COST THROUGH FY 2002	$ 22,500
PROGRAMMED COST FY 2003:	$ 90,000
TOTAL ESTIMATED COST:	$180,000

EFFECT OF PAVEMENT RESURFACING ON TRAFFIC SAFETY
KYSPR 03-257

New Study; Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: To analyze the before and after crash history, speed, and volumes on routes which have been resurfaced to determine whether improvements should be made in conjunction with the resurfacing project.

BACKGROUND: Hundreds of miles of various types of road are resurfaced each year in Kentucky. These projects typically consist of applying an overlay on the existing surface. A review of fatal crashes on two-lane rural roads resulted in the conclusion that several of the countermeasures identified in the analysis could be addressed as part of the resurfacing program. Issues to be addressed are what has been the effect of past resurfacing projects and whether the identified countermeasures would have a positive effect on traffic safety at these locations.

FY 2002 ACCOMPLISHMENTS: None

FY 2003 PROPOSED WORK: The focus of work for the upcoming year will be to select case study sites where resurfacing projects have been completed and initiate a data collection effort to determine the potential effect of including safety improvements as part of resurfacing projects. Site selection will be influenced by availability of data and inclusion of a range of resurfacing projects in terms of contract amount, highway type, and geographic location. Specific data collection will include crash histories, speeds, volumes, and overall geometric conditions at the case study sites.

PROGRAMMED COST FY 2003: $67, 500

TOTAL ESTIMATED COST: $135,000

TRAFFIC CRASHES AND CONTROL AT INTERSECTIONS
KYSPR 03-258

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: The overall objectives of this project are to: a) determine average crash rates for various categories of at-grade intersections, b) determine the typical characteristics of crashes at intersections, c) develop a methodology to use to determine intersection traffic control, d) evaluate the effectiveness of U-turns at signalized intersections, e) evaluate traffic control at stop sign approaches.

BACKGROUND: The only available statewide crash data which has been specifically developed for intersections is from a report from 1989 through 1991. There is a need to develop more up-to-date information to use to identify high crash intersections and typical characteristics for crashes at intersections. There are many alternative types of traffic control which can be used at intersections. Comparisons of the results of using various traffic control measures can provide useful information when determining the optimum traffic control to use at a specific intersection.

FY 2003 PROPOSED WORK: A file containing all crashes occurring at intersections will be developed. Characteristics of crashes occurring at intersections will be summarized. Data will be collected at locations using U-turns at signalized intersections and intersections with several crashes in which a driver disregarded a stop sign. Data will be collected before and after changes in traffic control at intersections. Work will begin on relating crashes to specific intersections.

PROGRAMMED COST FY 2003: $67,500

TOTAL ESTIMATED COST: $180,000

EFFECT OF WARNING SIGNS ON OPERATING SPEEDS
KYSPR 03-259

New Study; Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: To identify the operational effectiveness of warning signs on reducing operating speeds on highways.

BACKGROUND: Warning signs are typically placed to inform drivers of situations ahead that may require adjustment to their operating speed. Guidelines exist that govern the placement of these signs and certain types are augmented with advisory speed signs or flashing lights to properly communicate the intended warning level to drivers. Warning signs for curvature are such a type of signs, since curves often require an adjustment on operating speeds. There is a suspicion, however, that these signs are often disregarded and motorists do not reduce their speeds to reflect the intended operating speed. Thus, the effectiveness of such signs is reduced and some times not moderating speeds may lead to a crash. A study that would examine the effectiveness of these signs and identify potential safety concerns is proposed here. The evaluation of speed reductions due to warning signs would allow for the development of guidelines based on the effectiveness of location and warning sign to be used in addition to those presented in the MUTCD. The proposed research will augment existing guidelines for the implementation of warning signs and identify areas where potential improvements can be made by increasing the compliance with the intended operating speed.

FY 2003 PROPOSED WORK: To properly identify the effects of speed changes from such signs, it is desirable to identify locations where the signs are considered and have not been installed yet. This will allow for a before-and-after evaluation of the changes and provide a basis for understanding the impact of the sign. Such sites could also include curve warning signs that are considered to be augmented with flashers or speed advisory signs. The focus of work for the upcoming year will be to select case study sites and and initiate a data collection effort to determine the potential effect of warning signs on operating speeds.

PROGRAMMED COST FY 2003: $67, 500

TOTAL ESTIMATED COST: $135,000

IMPLEMENTATION OF REMOTE SENSING TECHNOLOGY
KYSPR 03-260

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

BACKGROUND: Availability of inexpensive remote sensing and communications systems enables bridge owners to remotely monitor real time data transmitted from an in-service bridge.

OBJECTIVE: The objective of this study is to demonstrate the capabilities afforded by remote sensing technology on a bridge in Kentucky. For illustrative purposes one or two bridges will be instrumented with strain gauges, LVDTs, temperature gauges, etc. to remotely measure strains, deflections, temperature, etc. The data can be viewed in real time on a web site that, if desired, will require a password for access.

EXPECTED BENEFITS: This will be the first bridge that is instrumented for remote sensing in Kentucky. The lessons learned will be instrumental in monitoring of critical bridges in the future (e.g. Maysville and Owensboro cable-stay bridges, Brent-Spence Bridge, etc.)

FY 2003 PROPOSED WORK: Identify bridges for remote sensing, prepare plans for instrumentation, and purchase part of the equipment.

PROGRAMMED COST FY 2003: $27,000

TOTAL ESTIMATED COST: $63,000

MULTI-BARGE FLOTILLAS IMPACT FORCES ON BRIDGES
KYSPR 03-261

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2005

BACKGROUND: On November 22, 1993, two major bridges over the Ohio River were struck by barge flotillas causing one of them to be closed for several days while repairs were completed. This is not an unusual occurrence. According to the Coast Guard reports, hundreds of accidents between flotillas and bridge piers take place every year. For this reason, AASHTO requires that all navigable waterway bridges be designed to resist flotilla impact forces. However, recent studies at the Kentucky Transportation Center have shown that AASHTO accurately predicts impact forces for single barge flotillas while considerably overestimating the multi barge flotilla impact forces, consequently increasing the cost of the substructure by up to 30%. On one bridge alone, savings could be over $10 million dollars if accurate prediction of flotilla forces are used.

OBJECTIVES: (1) To conduct theoretical finite element analysis on various types of flotillas impacting bridge piers. The flotillas and their barges will be of the type traversing Kentucky's waterways; and (2) To generate design equations for barge/flotilla impact loads.

EXPECTED BENEFITS: The current AASHTO equations for barge impact loads are based on scale models of barges, and generally predict excessive loads on bridge piers leading to overdesign of the substructure. The results of this study will produce more realistic flotilla impact design loads, leading to savings in the millions of dollars for one bridge over a navigable waterway in Kentucky.

FY 2003 PROPOSED WORK: Generation and evaluation of different nonlinear finite element models for single and multi-barge flotillas.

PROGRAMMED COST FY 2003: $ 27,000

TOTAL ESTIMATED COST: $126,000

LESSON LEARNED SYSTEM FOR KENTUCKY TRANSPORTATION PROJECTS
KYSPR 03-262

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2003

OBJECTIVES: The goal of this study is to develop a lesson learned database for the Kentucky Transportation Cabinet and identify how such a system can be integrated into a constructability process and other processes within the cabinet. The following objectives have been identified for this study:

1. Identify lessons learned systems currently used by other transportation organizations and other industry organizations
2. Define the desired functional capabilities of a lessons learned system for KyTC.
3. Develop a system design for a lessons learned system.
4. Recommend a lesson learned system for integration into the KyTC's design/construction process.

BACKGROUND: Over time, those involved in construction have the opportunity to acquire a tremendous base of knowledge from personal experiences. Unfortunately, without a formal mechanism to retain this knowledge, much of this experience is not passed on from project to project, or from person to person. If this wealth of construction knowledge could be retained and used in planning and execution of future projects, there are tremendous potential benefits in terms of improved cost, schedule, safety, and quality.

Traditionally, lessons learned during the construction phase of a project are not effectively incorporated into the design and construction phases of future projects. Lessons learned from what worked well and what didn't work well in construction is usually transferred informally. A formal mechanism to archive and disseminate lessons learned could reduce or eliminate time spent in trial and error during construction.

FY 2003 PROPOSED WORK: A Review of lesson learned systems utilized by other DOTs and other industry organizations will be conducted. The research will identify the functional capabilities of the proposed lesson learned system. Next, the system architecture will be designed to support the desired functional capabilities. Finally, the researchers will develop a lesson learned system including a full working prototype and test bed to identify required modifications. The research will develop recommendations of implementing a lesson learned system on KyTC systems.

PROGRAMMED COST FY 2003: $ 54,000

TOTAL ESTIMATED COST: $ 54,000

KENTUCKY HIGHWAY USER SURVEY
KYSPR 03-263

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2003

OBJECTIVES: The major activity of this project will be a phone survey sample of Kentucky licensed drivers. The questionnaire has undergone some changes this past year but will still largely give comparable data over the past few years. Due to additional information needs of the Cabinet, the Center also proposes to administer a series of focus groups to help gather information of a type not susceptible to telephone survey. To supplement this information and keep it current, the Center proposes to create a "quick-response" web site, that would create for the Cabinet and Highway Districts a venue where pressing issues or ideas could be mounted and evaluated by a distributed population. Even with the known sampling problems of self-selected participants, the Cabinet could use such a site to quickly zero in on potential weaknesses and strengths of a particular proposal.

BACKGROUND: The purpose of this project is to track Kentucky highway users' opinions on highway satisfaction and to compare those opinions with prior years' survey results. From the data collected, information can be derived that can be used to help guide highway investments and strategic planning. In addition, each year there are many kinds of information requests from various parts of the Cabinet that cannot be accommodated by a telephone survey, and more current issues cannot be tracked by an annual survey. These elevated information needs call for more innovative efforts to reach out to the user base of Kentucky's transportation system.

FY 2003 PROPOSED WORK: Plans are underway to administer the phone survey. Results will be compared to earlier surveys, and analyzed. Focus groups and a quick response web site will be used to collect additional data.

PROGRAMMED COST FY 2003:	$67,500
TOTAL ESTIMATED COST:	$67,500

STATE TVS COUNT ESTIMATION PROCESS
KYSPR 03-264

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: The purpose of this project is research the current state TVS system to determine possible changes in the system that would better reflect the traffic estimation process. In part one of this project, the current system will be thoroughly analyzed by the UKTC working in conjunction with the Kentucky Transportation Cabinet. In part two of the project, the new system that will be devised as a part of the existing system as well as new applications of research and technology, will be applied in order to optimize usage of the TVS information and make better usage of updated research and information.

BACKGROUND: The information that is provided as a result of this source file is used statewide for traffic estimation processes, which are in turn used within the planning process by the Cabinet, Districts, and various other organizations and agencies. Thus, it is fundamental to many derivative applications that rely on the accuracy and currency of traffic count data.

FY 2003 PROPOSED WORK: A review will be conducted of the current TVS estimation process. Results will be analyzed and changes recommended.

PROGRAMMED COST FY 2003: $22,500

TOTAL ESTIMATED COST: $40,500

EVALUATION OF THE PAVEMENT MANAGEMENT SYSTEM AND THE PAVEMENT MAINTENANCE RATING SYSTEMS
KYSPR 03-265

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2005

OBJECTIVES: (1) To evaluate Kentucky's Pavement Management System (2) To evaluate Kentucky's Pavement Maintenance Rating System, and (3) To attempt to determine if the data in both databases might be made compatible with each other.

BACKGROUND: Kentucky has had a pavement management system (PMS) for over 20 years. This system is based on visual inspections that are performed periodically and on roughness measurements. This information is then compiled to yield a composite number identified as rideability index (RI) for each section of the highway network tested. This information is used to determine the condition and the needs of a particular highway network. From this, future funding needs can be estimated. Also, information in the PMS database has been used to assist researchers and designers in developing performance models or estimating remaining life of an existing pavement. As methods of collecting distress and performance data evolve, review of collecting techniques, methods of rating or assigning distress numbers, methods of storing or retrieving data must be reviewed or updated periodically, in order to be able to extract the best information from the data.

Kentucky has used a Pavement Maintenance Rating System for the last several years to assess the methods and efficiency of maintenance activities. This information has also been used to evaluate on a district level the condition of the various components of the highway system. Some of these components include, but are not limited to, such items as guardrail, mowing, drainage systems, signs, various bridge components, paint striping, cut slopes, ditching and some pavement items. This information gives the administrator or policy makers some measure of the overall condition of the highway system.

FY 2003 PROPOSED WORK: The proposed work plan will be developed by the researchers, reviewed, and approved by the Study Advisory Committee. A thorough review will be made of the Pavement Management System, including rating systems, rating techniques, threshold values, methods of storage and retrieval, and compatibility with other data systems. A preliminary review of the Pavement Maintenance Rating System will be initiated.

PROGRAMMED COST FY 2003: $81,000

TOTAL ESTIMATED COST: $243,000

UTILIZATION OF PAVEMENT PROFILING EQUIPMENT TO DETERMINE AS-BUILT TRANSVERSE AND LONGITUDINAL PROFILES OF EXISTING HIGHWAYS
KYSPR 03-266

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: (1) Determine the feasibility of utilizing inertial pavement profiling equipment to determine both transverse and longitudinal profile of existing highways; (2) Compare these types of surveys with traditional rod and level surveys for determining profile grade and leveling and wedging quantities for pavement construction.

BACKGROUND: In rehabilitation and resurfacing of pavements it is necessary to insure proper longitudinal and transverse grades are maintained. In the establishment of the final grade for a rehabilitation or resurfacing, accurate existing longitudinal and transverse profiles are necessary. Once existing conditions are determined, calculations may be made to determine the quantity of asphaltic concrete leveling and wedging which is necessary to correct any discontinuities. Historically the existing conditions have been determined from as-build plans, low level ariel surveying, or conventional surveying techniques. Each of these methods presents different challenges to the highway designer. Using as-built plans do not allow for the changes in profile which may occur during the life of the roadway surface. Both ariel and conventional surveys can be very costly and dangerous on high volume facilities. In the absence of actual pavement surface surveys, estimates are typically made based on experience with similar projects across the state. For some interstate projects leveling and wedging may cost as much as $100,000 per lane mile. Therefore accurate estimation of these quantities is extremely important.

Recent advancements in the Global Positioning System (GPS), inertial vehicle orientation, and laser surface scanning of highway pavements has permitted the determination of longitudinal and transverse highway profiles at highway speeds. This data can then be used to establish the quantities necessary to bring an existing roadway structure to a desired grade. The use of this technology will allow highway designers to produce better estimates of required leveling and wedging requirements on projects; therefore, better utilizing the available funding resources.

FY 2003 PROPOSED WORK: A review of available equipment and technologies will be completed. Pilot projects will be selected for evaluation of conventional surveying techniques and pavement profiling equipment in determining the corrections which are necessary to the pavement profile.

PROGRAMMED COST FY 2003: $ 90,000

TOTAL ESTIMATED COST: $180,000

DEVELOPMENT OF A PAVEMENT DISTRESS IDENTIFICATION MANUAL
KYSPR 03-267

Submission of Work Plan Pending
Anticipated Completion Date: FY 2004

OBJECTIVES: (1) Document the types of distresses observed in Kentucky; (2) The establishment of levels of severity and evaluation of extent of each distress will also be documented; (3) This manual will provide photographic examples of each type of distress at several severity levels and extent of occurrence; and (4) Evaluate the current method of condition rating in order to determine if changes or modifications should be made to maintain uniform condition rating.

BACKGROUND: Pavement management is an integral part of the transportation system. Essential to an effective pavement management system is a uniform method of identifying and quantifying pavement distresses. Kentucky currently does not have a formal documented methodology for quantifying and identifying pavement distresses. A distress manual developed by SHRP does not match the general observed distresses in Kentucky. A distress manual identifying distresses in Kentucky would provide a uniform assessment of pavement conditions throughout the state. By standardizing pavement distress identification, a more uniform evaluation of Kentucky's pavements would be achieved. This manual would allow for calibration of an engineer's pavement distress identification technique. A "calibrated" technique for distress identification will provide a means for consistent comparison of both historical and future pavement performance evaluations. The 2002 Pavement Design Guide currently under development by NCHRP requires input relating to specific pavement distress. Information is required regarding both the severity and extent of these distresses based on an agency's past experience. This information is utilized to establish the performance thresholds, which are then used for pavement structural design. Therefore, a consistent documented methodology is required to implement this procedure.

FY 2003 PROPOSED WORK: A review of the pavement management input requirements of the 2002 Pavement Design Guide will be initiated. Documentation of typical distresses which occur in Kentucky will also begin. This will include photo documentation of both distress type and severity levels.

PROGRAMMED COST FY 2003: $45,000

TOTAL ESTIMATED COST: $90,000

SAFETY AND HEALTH CONCERNS FOR KYTC AND CONTRACTOR PERSONNEL
KYSPR 03-268

New Study, Submission of Work Plan Pending
Anticipated Completion Date FY 2004

OBJECTIVES: The objectives for the study include:

1. Conduct literature reviews of pertinent Kentucky OSHA (and US OSHA) regulations impacting KyTC and contractor personnel working on construction projects. Also conduct historical review/survey on typical OSHA/KOSHA citations of highway agencies/contractor for highway-related construction/maintenance activities.
2. Identify all safety requirements mandated by those regulations that are applicable to KyTC construction/maintenance projects. Determine current KyTC oversight/ accommodations for worker safety/environmental regulations impacting KyTC personnel and any liabilities that KyTC may incur for the actions of contractor personnel working on KyTC projects.
3. Determine current KyTC/contractor practices related to worker safety and environmental issues.
4. Provide guidance for additional duties, training, skills, facilities and equipment required by KyTC personnel and resident engineers working at construction sites. Provide guidance on oversight required for contractor qualifications and regulation-compliant working practices.

BACKGROUND: KYOSHA is becoming more aggressive in monitoring KyTC construction activities. To date, significant fines have been levied and regulatory oversight may increase. Additionally, regulatory agencies are placing more responsibility on owners for construction activities by contractors. KyTC needs to take further steps to identify safety and health problems impacting KyTC and contractor personnel and to enact proactive measures to limit (and hopefully eliminate) unfavorable exposures.

FY 2003 PROPOSED WORK: KTC researchers will conduct reviews of pertinent Kentucky OSHA (and US OSHA) regulations impacting KyTC and contractor personnel working on construction projects. All safety requirements mandated by those regulations that are applicable to KyTC construction/maintenance practices will be identified. Determine current KyTC oversight/accommodations for worker safety/environmental regulations impacting KyTC personnel and any liabilities that KyTC may incur for the actions of contractor personnel working on KyTC projects.

PROGRAMMED COST FY 2003 $31,500

TOTAL ESTIMATED COST: $85,500

SURVEY OF WELDING PROCESSES
KYSPR 03-269

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2003

OBJECTIVES: The objectives for the study include:

1. Review current welding processes that are prohibited or restricted under AWS/AASHTO D1.5 and Kentucky Transportation Cabinet Special Provision 4 [e.g. flux cored welding (shielded and unshielded), electroslag (narrow gap) and electrogas welding, and gas metal-arc welding].
2. Contact/survey steel fabrication shops, the Federal Highway Administration, welding equipment manufacturers and other state highway agencies to identify current prohibitions and restrictions on those processes and variations of those with the Cabinet Special Provision.
3. Determine "best practices" and future welding trends incorporating those welding processes and identify which ones the Cabinet may employ in limited or unrestricted applications.
4. Seek sources of training to educate Cabinet designers and construction officials in the specification and use of those welding processes.

BACKGROUND: Several currently restricted welding processes offer advantages of high weld deposition rates and lower fabrication costs for steel bridges. Since KyTC Special Provision 4 was prepared, some of those processes have been modified. New consumables and base metals have been developed that may permit less restrictive use of those processes. For example, the Japanese have begun using gas metal arc widely in conjunction with ultra-low carbon structural steels in bridge construction. The FHWA is promoting the use of narrow-gap electroslag welding and is providing training on that process.

FY 2003 PROPOSED WORK: KTC researchers will conduct literature reviews, surveys and interviews to determine current specifications (e.g. AASHTO) and practices in use by state highway agencies. Instances where new or more productive welding processes are in use, or are being studied, for highway fabrication will be identified and specific details on those will be obtained. KyTC officials will be provided with sources for training designers and construction personnel in the specification and use of those processes.

PROGRAMMED COST FY 2003: $13,500

TOTAL ESTIMATED COST: $13,500

ENGINEERING PROPERTIES OF THE SOFT SOIL LAYER AT THE TOP OF HIGHWAY SOIL SUBGRADES
KYSPR 03-270

New Study, Submission of Work Plan Pending
Anticipated Completion Date: FY 2006

OBJECTIVES: Major objectives are to identify and examine the engineering properties and behavior of the "soft layer' of material that has frequently been observed at the top of highway pavement soil subgrades. This study is intended to determine the frequency of occurrence of this weak layer of material in pavement subgrades. The study will focus on determining the causes and engineering properties of the weak layer at numerous sites. Alternative methods of preventing the development of the soft layer will be studied. The means of minimizing the effects of this soft zone of soil on pavement performance will be examined.

BACKGROUND: Past research studies that have focused on soil subgrades have frequently shown the presence of a "soft layer" of soil located at the top of the subgrade and lying directly below the aggregate base material. For instance, at many highway sites in a recently completed study, moisture contents near the surface of the soil subgrade were consistently greater, by some 3 percent, than the moisture contents measured at some depth below the surface of the subgrade soils. The data demonstrated that a soft, or weak, layer of material is frequently present near the surface of soil subgrades. The presence and prevalence of a soft layer of soil located at the top of the soil subgrade has great engineering significance in the design and performance of highway pavements. The presence of such a zone can cause cracking of the pavement and influence future pavement performance. Moreover, this weak zone of material directly affects the amount of thickness needed to prevent pavement failure.

What needs to be known is how prevalent and the general depth of this layer of soft layer of soil. Since strength of the subgrade determines the thickness of a pavement, the presence of this zone of weak soil greatly influences the performance, service life, future maintenance requirements and costs of the pavement. Findings of this study could lead to great economical benefits to the Cabinet and provide new improved methods of designing pavements and soil subgrades

FY 2003 PROPOSED WORK: Several pavement sections will be analyzed for testing. In-situ testing will proceed at a few sites. In situ CBR tests will be performed in each boring at different depths. Thin-walled tube samples of the soil subgrade will be obtained for detailed laboratory tests. The soil specimen from each tube will be sliced into small finite intervals. The depth of each interval below the surface of the subgrade will be noted. Moisture contents of each interval of soil will be determined so that a moisture content–depth curve can be plotted. This curve will define the soft layer of material when it is present. One-dimensional consolidation tests will be performed on undisturbed specimens of the soil subgrades on specimens retrieved from different depths of the subgrade. The consolidation tests will be used to determine and compare the preconsolidation pressures of the soft zone and the zone of soil located below the soft zones. If the soft zone of soil is present, then it could be expected that the preconsolidation pressure of the soft zone would be less than the preconsolidation pressure of soil located below the soft zone. When the stress in the soft zone increases due to an application of traffic wheel stresses, little settlement occurs in the soft zone and subgrade when the applied stresses are less than the preconsolidation pressure of the soft zone of material.

PROGRAMMED COST FY 2003: $ 22,500

TOTAL ESTIMATED COST: $ 265,500

APPENDIX C

Certification for Federal-Aid Contracts

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such subrecipients shall certify and disclose accordingly.

PART III B

RESEARCH & DEVELOPMENT

KENTUCKY PLANNING AND RESEARCH PROJECT
WORK PROGRAM - PART IIIB
FISCAL YEAR 2003

LINE ITEM NO.	STATE STUDY NO.	STUDY TITLE	PRINCIPAL INVESTIGATOR	ESTIMATED COST FY 2003
1	03-50	General Administration	Toussaint	$ 50,000
2	03-51	Equipment Acquisition and Maintenance	Toussaint	67,800
3	03-52	Student Assistance	Toussaint	60,000
			TOTAL	**$ 177,800**

GENERAL ADMINISTRATION
KYP 03-50

The general administrative costs associated with payroll distribution, personnel actions, accounts, receptionist, office equipment, and preparation of line items, proposals, and detailed work plans, consultant fees and associated Center administrative expenses including food and refreshments for necessary meetings are combined in this section inasmuch as a pro rata apportionment of time and other accountable costs among the several studies would be impractical from the standpoint of accounting.

PROGRAMMED COST FY 2003: $50,000

EQUIPMENT ACQUISITION AND MAINTENANCE
KYP 03-51

Acquisition and maintenance of laboratory and field test equipment are combined in this section anasmuch as a pro rata apportionment of these accountable costs among several studies would be impractical from the standpoint of accounting.

PROGRAMMED COST FY 2003: $67,800

STUDENT ASSISTANCE
KYP 03-52

OBJECTIVE: To provide a work experience in the transportation area for university students.

BACKGROUND: The Kentucky Transportation Cabinet endeavors to recruit young engineers through various means such as the Cabinet's Scholarship Program. Some of those students and others have worked part time within the Kentucky Transportation Center facilities. Those students receive financial compensation, but more importantly, gain valuable experience. Cabinet officals are of the opinion that the Center is an excellent recruitment area for potentially promising engineers and have included a line item for support of part-time students. Financial assistance for student empolyees shall be for student salaries only and shall not include indirect costs.

PROGRAMMED COST FY 2003: $60,000

PART IV

RESEARCH & DEVELOPMENT

(Tentative Future Projects)

4/10/02-Research FY 2003

Green Reflects on going projects (or carry over $)

Blue reflects proposed projects for FY03

Yellow reflects projects not funded from SPR

* **carried over from FY2002**

[2003 rank], (2002 rank)

Project #	SECTION		FY2003	FY2004	FY2005	FY2006	
	POLICY/PLNG						
	Ky hwy users survey[2]		$75,000				
	State TVS count est.process[3]		$25,000	$20,000			
	Public education and outreach[4]			$75,000			
	State SPRS qualification program[5]			$65,000			
KHIT	Long term maint. need plng[1]		$100,000				
	SUB-TOTAL		$100,000	$160,000	$0	$0	
	PVMT/MATL						
01-223	Devel. of Load Spectra for Pvmt. Design[1]	c/o	$180,000				
02-243	Eval. of Incentive/Disincentive Proc.(1)		$75,000	$75,000			
02-244	Eval. of NDT and Geo physical techniques(6)		$125,000	$80,000			
02-245	Eval. of Agg. Segregation on Pvmt. Perf. (3)		$120,000	$50,000			
	* Eval. of PMS and Maint. Rating System(2)[2]		$90,000	$90,000	$90,000		
	Use of PVMT profiling equip for as built hwys[3]		$100,000	$100,000	$0		
	Devel of Pvmt distress manual[4]		$50,000	$50,000			
	* Strategies for Const. of Intersections(4)[5]				$100,000	$100,000	
	SUB-TOTAL		$740,000	$445,000	$190,000	$100,000	
	ENVIRONMENT						
00-210	Var. in Des. & Const. that Impact Env.	c/o	$54,000				
01-224	Environmental Impact of Bridge Cleaning	c/o	$39,000				
01-225	Case Study of 4f Litigation/Rulings	c/o	$55,000				
02-237	Eval of Water Quality in Karst Areas(1)		$75,000				
	* Safety/Health Concerns for KYTC personnel(2)[1]		$35,000	$60,000			
	* Survey of Welding processes(3)[4]		$15,000				
	Intergrated Roadside Vegetation Management[2]			$70,000	$70,000		
	Groundwater flow information mapping[3]			$50,000	$50,000		
	Acid runoff from hwy cuts[4]			$75,000	$75,000		
	* Eval of Mitigation of Environmental Impacts(5)[5]				$65,000	$65,000	
	SUB-TOTAL		$273,000	$255,000	$260,000	$65,000	
	GEOTECH						
01-227	GeoTech Data Bank		$240,000				
01-228	Reduction of Stresses on Buried Rigid Struct.		$80,000	$97,000			
01-229	Resilient Modulus for Compacted Crushed Agg.		$50,000	$75,000	$75,000		
02-238	Anal. of Base Matl reinforcement w/geofabric(1)		$65,000	$65,000			
02-239	Corrosion Eval of MSE walls(2)		$50,000	$50,000			
	Engr prop of soft soil layer at subgrd[1]		$25,000	$90,000	$90,000	$90,000	
	* Compaction of rock/shales w/non-linear compct(3)[2]			$97,000	$97,000	$97,000	
	* Use of 3-D laser scanning techniques(4)[3]			$50,000	$25,000		
	Des/repair of rock slopes w/shales[4]				$80,000	$80,000	$80,000
	Settlement of embank/foundations[5]				$70,000	$70,000	$60,000
	SUB-TOTAL		$510,000	$524,000	$437,000	$337,000	

Project #	SECTION		FY2003	FY2004	FY2005	FY2006
	TRAFFIC/SAFETY					
02-247	Correlation between Lighting and Driver Safety (1)	c/o	$90,000			
02-250	Ident. of High Accid. Locations/Eval. of B/C (4)	c/o	$90,000			

02-251	Development of Access Mgt Stds & Process(7)		$100,000	$75,000		
	Effect of pvmt surf on safety[1]		$75,000	$75,000		
*	Traffic crashes at intersections[2,4]		$75,000	$125,000		
	Effect of warning signs on oper speeds[3]		$75,000	$75,000		
	Eval the effectiveness of RRXing TCD[5]			$75,000	$75,000	
	Eval of automatic incident recording syst-Louisville[3]			$50,000		
	Truck rollover syst eval-Owensboro[5]			$50,000		
	SUB-TOTAL		$505,000	$525,000	$75,000	$0
	ITS					
02-240	Deployment/Eval of Virtual Weigh Station(1)		$172,500			
02-241	Development of ITS Maint./Mgt. Plan (2)		$95,000			
02-242	Procurement Process analysis/recomm.(3)		$45,000			
*	Use and eval of ITS detector data(5)[2]			$100,000		
*	Auto. Veh. Location Syst. Eval (4)[4]			$60,000		
KHIT	Hwy crash site management[1]		$50,000			
	SUB-TOTAL		$312,500	$160,000	$0	$0
	STRUCTURES					
00-206	Eval. of I-24 Corr. for Mod. Seis. Events KY-00-206		$55,000	$74,000		
01-234	Earthquake Resp Trng./Assess. of Needs W.KY	c/o	$90,000	$55,000		
02-246	Eval of Western KY Parkway for seismic impact(1)		$50,000	$90,000	$215,000	
	Implement remote sensing technology[1]		$30,000	$40,000		
*	Barge Impact Anal (follow-up)(2)[3]		$30,000	$60,000	$50,000	
*	Eval of Ultra thin overlays(4)[5]			$50,000	$50,000	
FRT	Modeling of Owensboro bridge[2]		$40,000			
	SUB-TOTAL		$255,000	$369,000	$315,000	$0
	CONSTRUCTION					
02-236	Constructability Issues on Const. Projects (1)		$70,000			
*	Lessons Learned on KY const. projects(4)[1]		$60,000			
	Improved dispute/claim resoluton on KYTC proj.[3]		$0	$60,000	$60,000	
	Design-build on KYTC projects[4]			$60,000		
*	Traf Control Plans-Contractor Involvement(2)[5]			$60,000		
	SUB-TOTAL		$130,000	$180,000	$60,000	$0
	GRAND TOTAL-SPR PROJECTS		$2,825,500	$2,618,000	$1,337,000	$502,000

TOTAL NEW PROJECTS-2003	$760,000	new-14
ON-GOING PROJECTS -PRIOR YEARS	$2,065,500	on-going-22
TOTAL SPR	$2,825,500	