

Optimization and Standardization of Pavement Management Processes

[KTC-04-22/SPR-209-00-1F] Principal Investigator: David Allen

Study Advisory Committee Chair: John Dade

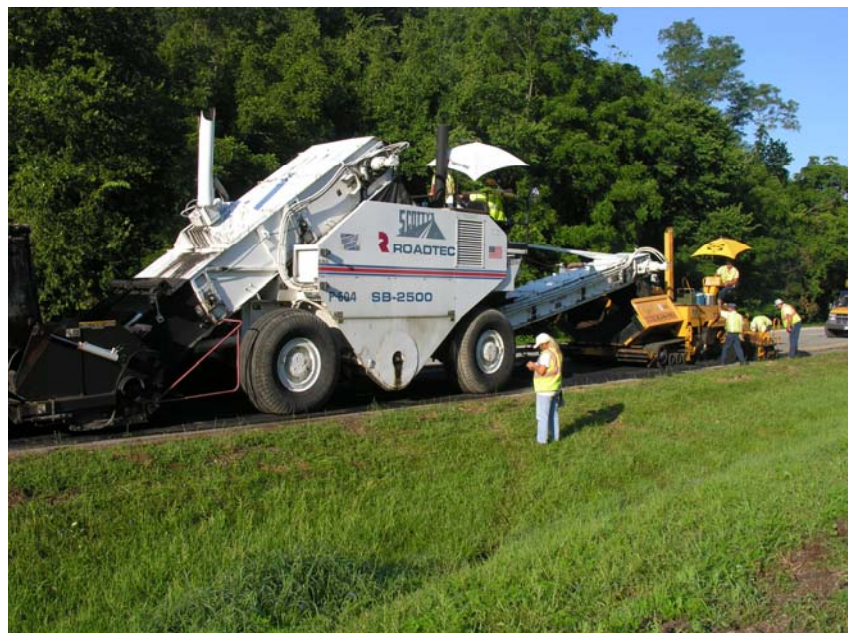
Purpose: Management of Kentucky's pavements is a significant and costly effort. It requires an assessment of conditions (visual surveys, ride quality, rutting measurements, etc.) and balancing the need for improvement with remaining structural life, funding and the needs of users. The type of improvement, the timing of the improvement, and the pavement design are all critical factors in determining what gets done. The aim of this study is to assist the Cabinet in improving the processes for setting priorities and optimizing funding for pavement management.

Objective:

1. Analyze historical pavement preservation records and determine the general decision criteria.
2. Determine the effectiveness of previous treatments.
3. Develop an evaluation process for utilization of various rehabilitation alternatives and treatments.
4. Evaluate other criteria that might be applied and date needed.

Conclusions/Recommendations

1. Based on historical data a large variation in the threshold criteria for determining pavement rehabilitation treatments exists.
2. PCC pavements are primarily maintained or rehabilitated on rideability, therefore a uniform definition and usage of the critical roughness values are essential.
3. AC pavements are primarily resurfaced based on distress conditions, consequently, the threshold values should be based on protecting the integrity of the pavement structure.
4. Models were developed to predict the life of the pavement at various stages of deterioration and also to verify the effectiveness of treatments.



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Evaluation of Work Zone Safety Operations and Issues

[KTC-06-08/SPR 287-05-1F] Principal Investigators:
Jerry Pigman and Ken Agent

Study Advisory Committee Chair: Allen Ravenscraft

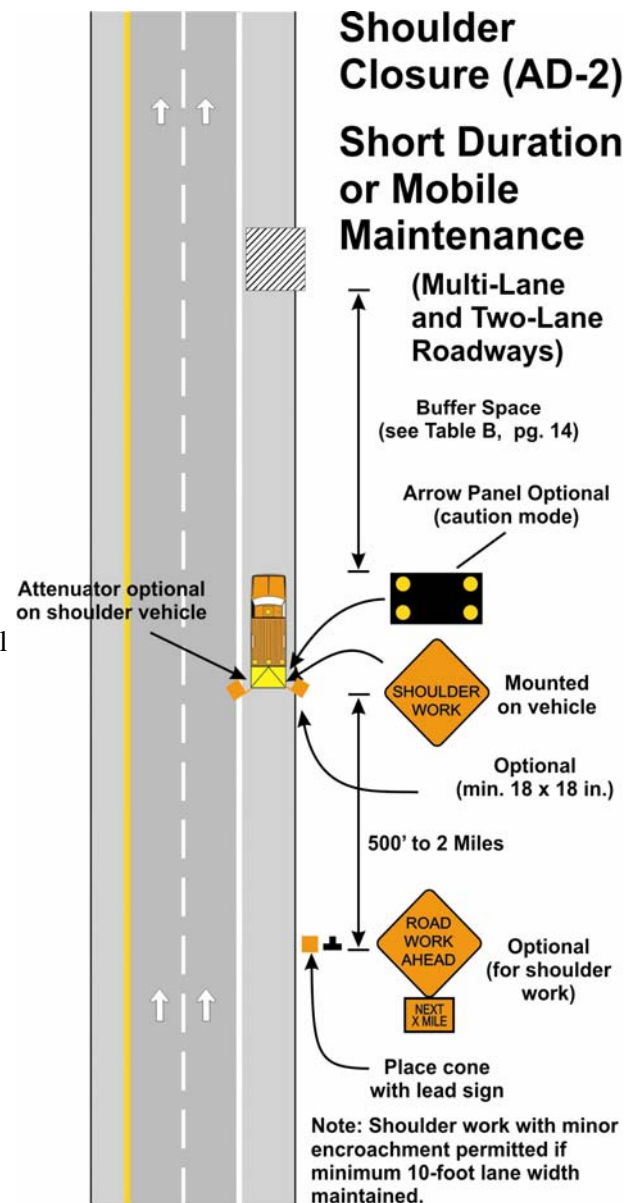
Purpose: Work zones have a high potential for compromised safety of workers and road users. Statistics indicate that more than 1,000 fatalities per year occur in work zones throughout the US. In Kentucky, an average of 739 collisions occur in construction and maintenance areas each year resulting in an average of five fatalities. Various measures have been taken to improve the level of safety in work zones including increased fines for speeding; radar detected speed displays; use of enhanced stop/slow sign paddles; and increasing the visibility of flaggers by using reflective clothing. Suggestions have been made regarding the use of more automated equipment in order to reduce flaggers and other techniques. This study evaluates some of these alternatives and their effectiveness in reducing work zone accidents and injuries.

Objectives:

1. Evaluation of measures and procedures to alter or control the speed of motorists in work zones.
2. Investigate the feasibility of using automated equipment to replace flaggers.
3. Develop policy and guidelines for use of elevated platforms near traffic.
4. Evaluate the safety issues associated with mobile and short-term activities.

Conclusions/Recommendations:

- A handbook providing guidelines for traffic control in work zones was developed for maintenance and utility workers.
- Provide flashing STOP/SLOW paddles (using LED-type flashers) for work routinely performed during nighttime hours.
- Implement a test of automated flagger devices at sample high-volume, high-speed locations.
- Include work zones enforcement as a separate bid item in major construction projects.
- Expand to major maintenance activities the use of radar speed signs which display motorists' speeds.
- Encourage the use of police enforcement for maintenance activities.
- Assign a statewide work zone safety coordinator to interact with enforcement and contractors.
- Develop a certification process for all flaggers.
- Expand the use of signs doubling fines in work areas to include major maintenance activities.



Disposal of Bridge Paint Residue

[KTC-05-40/SPR-292-05-1F] Principal Investigators: Ted Hopwood and Sudhir Palle

Study Advisory Committee Chair: Bob Meade

Purpose: Many of Kentucky's steel bridges contain lead paint and when removed it is a hazardous waste. This requires KyTC to obtain a hazardous waste generation permit and EPA ID number for each site to dispose of it properly. In addition to the proper disposal, KyTC also bears the liability for the waste material regardless of their acceptance, treatment and disposal by a private landfill. However, a long-term goal for Kentucky is to minimize hazardous waste such as lead paint on their structures.

Objectives:

1. Review hazardous waste disposal actions for lead paint removal and identify key operations.
2. Identify laws and recommendations impacting hazardous waste disposal and recycling.
3. Investigate commercially available additives for stabilizing hazardous paint debris.
4. Assist in development of experimental projects incorporating recycling and hazardous waste stabilization.
5. Prepare recommended practices for identifying the appropriate methods for disposing/eliminating hazardous waste.

Conclusions/ Recommendations

1. Recycling is the best option for reducing both hazardous and solid waste and should be employed on future painting projects.
2. Recyclable steel grit should be specified to permit recycling as a commercial substitute.
3. Future transport of hazardous materials should be by carriers licensed to ship hazardous materials in all the appropriate states.
4. KyTC inspectors must be diligent in preventing co-mingling of wastes with lead paint residue which eliminates the option of recycling the material.



Development, Deployment, and Evaluation of a Remote Monitoring System and a Virtual Weigh Station

[KTC-05-38/SPR-240-02-1F] Principal Investigator: Joe Crabtree

Study Advisory Committee Chair: Jeff Bibb

Purpose: Kentucky has 17 weigh stations, with 14 of them located on the Interstate highways and the others on major US routes. The vast majority of the state-maintained road mileage in Kentucky has no fixed monitoring capability and installation of fixed facilities is expensive. Kentucky Vehicle Enforcement personnel conduct mobile enforcement operations to augment the fixed facilities. However, there is a concern that truckers can generally avoid or bypass enforcement activity. To address this problem, Kentucky established and evaluated a Remote Monitoring System (RMS) for screening trucks on a typical by-pass route. This system consisted of cameras, a computer, detector loops and a height detector. Trucks passing the system could be viewed from a nearby permanent weigh station and, if necessary, enforcement personnel could be dispatched. The virtual weigh station (VWS) expanded on the RMS concept by adding weigh-in-motion technology (WIM) to measure and report the weight of the truck.

Objectives: The objectives of this study were to develop and implement a Remote Monitoring System and a Virtual Weigh Station and to assess their effectiveness in expanding enforcement coverage to additional roadways.

Conclusions/Recommendations:

1. The Remote Monitoring System proved to be successful and effective at capturing images of trucks and transmitting that information to a manned facility.
2. The Virtual Weigh Station showed that WIM and image capturing technologies could be successfully integrated. However, the image quality was poor, producing unsatisfactory results for reading USDOT numbers from the images.
3. Capturing USDOT numbers at night proved to be a challenging task.
4. System effectiveness could be enhanced through standardization of the placement, font style, and contrast of the USDOT number displayed on the truck.
5. It is possible that a license plate reader would be more effective at identifying vehicles. This should be considered in the next generation of VWS.

Virtual Weigh Station

Data

General Data

Date	06/19/20	Class	9
Time	10:56:48	Weight	80000
Sequence	1794	Length	62.400001
Nbr Axles	5	Speed	

Axle Separation

1-2	151	5-6	0
2-3	42	6-7	0
3-4	273	7-8	0
4-5	42	8-9	0

Axle Weights

1	102	5	179
2	162	6	0
3	170	7	0
4	188	8	0

Data Input

US DOT	
ICC NC	
KYU	
Plate	
State	
Other Data	

Image Review Options

Current Image: 1 | Camera 1 | Camera 2

Zoom

Zoom Factor: x1

Buttons: Pause, Enter Data, Quit, Save, Cancel

Early Stage Benefit Cost Analysis for Estimating Economic Impacts

[KTC-06-11/SPR 306-05-1F]

Principal Investigator: Doug Kreis

Study Advisory Committee Chair: Steve Ross

Purpose: Each day millions of commuters and freight haulers utilize the nation's highway network. Continued traffic growth has made many facilities congested, slowing traffic and impeding economic development. One of the solutions for this problem is to build added capacity, but transportation planners are confronted with a dilemma. The demand for new facilities is growing faster than the revenues to pay for them. This study addresses the question of "How can the state transportation agency make optimal use limited highway funds to best serve the transportation needs of their constituents?"

Objectives:

1. Review software packages and methods used in estimating economic impacts.
2. Evaluate the various methodologies for assessing the non-user economic and other benefits of proposed highway projects at an early stage.
3. Make recommendations on software or tools that would increase accountability, objectivity, and transparency for selecting highway projects for funding.

Conclusions/ Recommendations:

1. A total of 13 economic software packages were examined as potential applications in meeting KyTC business needs.
2. The models from TREDIS (Economic Development Research Group, Inc.) and TransSight (Regional Economic Models, Inc.) were determined to meet Kentucky's needs.
3. Both models predict employment by industry, output by business/industry, wage rates, gross domestic/regional product.
4. The cost for either of these software packages is between \$100,000 to \$300,000 depending upon capabilities.



Privitizing Transportation Through Public-Private Partnerships: Definitions, Models, and Issues

[KTC-06-09/SPR 302-05-1F]

Principal Investigator: Merl Hackbart and Juita-Elena Yusuf

Study Advisory Committee Chair: Russell Romaine

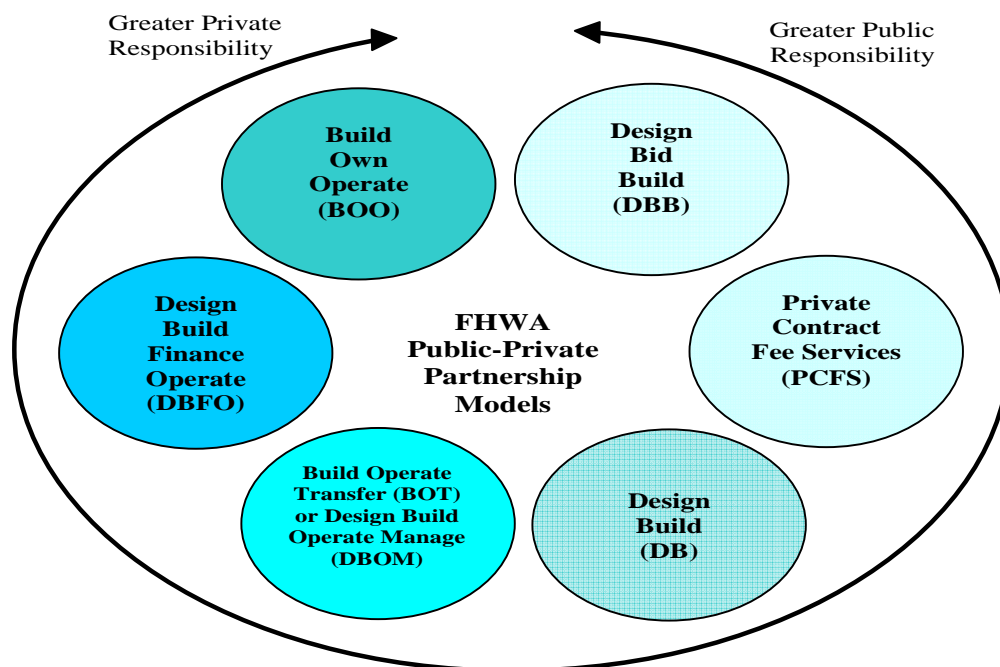
Purpose: While competitive contracting has been the predominant methods of privatization, there has been considerable emphasis in recent time on public-private partnerships (PPP). These arrangements differ from traditional contracting in that the partners develop products together and share the risks, cost and revenues. These PPP are the result of a need for a greater reliance on private capital to fund critical infrastructure and to tap the resources of the private sector to deliver high quality projects on time and on budget. This study serves as an overview of the PPP and how it might be applied in Kentucky.

Objectives:

1. Provide an overview of the PPP as a tool for delivering transportation infrastructure and services.
2. Identify the major issues surrounding the PPP concept and how to address those critical factors for a successful partnership.

Conclusions/Recommendations

1. PPP is a broad privatization approach to transportation financing.
2. PPP require joint production and decision making by both parties.
3. A strategic decision making framework for privatization determination is provided.



Kentucky Highway Research Projects Underway for 2006/2007

- 07-327 Forensic Evaluation of Premature PCC Pavement Distress
- 07-328 Evaluation of Traffic Signal Installations
- 07-329 Evaluation of Median Barrier Safety Issues
- 07-330 Evaluation of Pavement Marking Performance
- 07-331 Criteria for Justification of Auxiliary Lanes
- 07-332 Documenting Value of KVE on Highway Infrastructure
- 07-334 Archaeological Impact through GIS Analysis
- 07-335 Heat Straightening of Impacted Steel Girders
- 07-337 Integrating Geotech Drill Hole Data with Geologic Information
- 07-338 Geotech Guide to Cored Rock in Kentucky
- 07-339 Dynamic Compaction of Hard Rock/Soft Shales
- 07-340 Evaluation/Calibration of a New Bearing Capacity Model
- 07-341 Pipe Performance in Kentucky
- 07-342 Experimental Methods Evaluation Procedure
- 07-343 Cost Effectiveness of Pavement Treatments
- 07-344 Analysis and Comparison of Automated Distress Equipment
- 07-345 Guidelines for Installation of Buried Utilities in Right-of-Way
- 07-347 QC/QA—Evaluation of Effectiveness
- 07-348 Endangered Species Issue
- 07-349 Future Management Strategies for State Maintained Wetlands
- 07-350 Recruitment, Retention and Staffing Issues
- 07-351 Documenting the Value of ITS in Kentucky

If you have a transportation issue that needs studied or a research project idea, please let us know. You can call any staff person or simply go to our web site's home page and click on the [research idea button](#). You will be asked to provide a brief statement about the issue or idea and some contact information. Give it a try!

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transportation systems.

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products and services.

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In all that we do.



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