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KENTUCKY INFRASTRUCTURE

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EXECUTIVE SUMMARY

Every day, Kentucky's infrastructure directly affects your life—from the roads you drive on to the schools your children attend. Civil engineers are responsible for planning, designing, constructing, and maintaining these infrastructure networks. Civil engineers have the task of assuring that the lights will turn on; roads will carry us safely to our destination; and clean water is available when we turn on our faucets.

Founded in 1852, the American Society of Civil Engineers (ASCE) is a professional organization comprised of over 140,000 civil engineering members. It is recognized as the lead organization for the stewardship of our nation's infrastructure. The most recent report card, "2009 Report Card for America's Infrastructure," was published by ASCE on a national level. The report reviewed and evaluated the condition of the following 15 different infrastructure categories: aviation, bridges, dams, drinking water, energy, hazardous waste, inland waterways, levees, public parks and recreation, rail, roads, schools, solid waste, transit, and wastewater. It assigned grades to the different infrastructure areas in the same way a school report card assigns grades by subject. America's Infrastructure GPA was calculated as a D.

The Kentucky Section of ASCE, founded in 1936, has prepared a similar report for Kentucky's infrastructure through an ad-hoc committee of over 27 engineers and numerous other volunteers. The Kentucky Section published a previous evaluation of Kentucky's infrastructure in "2003 Report Card for Kentucky's Infrastructure." It is not the intention of this report card to assign blame to any group for any infrastructure area that has earned a low grade. The purpose of this report is to document the factual findings and evaluation of the condition of the Commonwealth's infrastructure systems and bring public attention to the need for investing in our infrastructure.

The following categories have been evaluated for the Commonwealth of Kentucky: aviation, bridges, dams, drinking water, energy, hazardous waste, roads, school facilities, solid waste, transit and rail, and wastewater. The following report card and issue briefs for each category were prepared by the Kentucky Infrastructure Report Card Committee using existing public documents, and from discussions with public officials responsible for the various categories. Each category was evaluated on the basis of condition and performance, capacity versus need, and funding versus need. Grades were also influenced by whether future funding was known to be increasing or decreasing. The grades indicate that the Commonwealth as a whole is performing marginally better than the Nation.

While reviewing each area of infrastructure it became apparent that areas performing well had common threads. When good public policy, long-term planning, and good funding streams are woven together, infrastructure is well-maintained. Some areas are performing well. Yet for other categories, much more needs to be done to ensure that Kentucky's infrastructure can support current and future public demand and meet tightening regulations.

There are many steps that you, as an individual, can do to help improve our infrastructure. As outlined in the ASCE “Renewing America’s Infrastructure: A Citizen’s Guide”

- Be an Informed Citizen: Learn about your community’s infrastructure needs. Get to know your Legislative Representatives and discuss your concerns with them.
- Demand Continuous Maintenance: If roads, bridges and other infrastructure facilities are not kept in sound condition, they cannot support the level of service they are designed to handle. Regular maintenance prolongs life and minimizes the need for costly repairs.
- Think Long Term: Renewing the Commonwealth’s infrastructure is an ambitious goal and cannot be accomplished overnight. Furthermore, the facilities built today must last for decades to come.

Comprehensive planning and long-term investments are necessary parts of sound decision making. It is imperative that we realize that the infrastructure is a public asset. We all have a stake in its upkeep and operation. We all share in the cost of capital investments and maintenance. We need to treat infrastructure as an investment and demand the best returns.

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GRADING SUMMARY

In issuing grades, the Kentucky Infrastructure Report Card Committee used a grading system based on percentages since much of the infrastructure data is reported in percentages. Grades have been assigned using the following scale:

- A = 90 – 100% (Exceptional)
- B = 80 – 89% (Good)
- C = 70 – 79% (Fair)
- D = 41 – 69% (Poor)
- F = 40% or lower (Inadequate)

If more than one category is considered in an issue brief, the percentages are weighted based on relative importance in the opinion of the committee. This same scaling has been used by ASCE in issuing the national report card. The grades are then reviewed against a subjective assessment based on funding that has been budgeted to address the problem and whether the budget situation looks promising or worse in the near future.

In reading this report it must be remembered that the issue briefs and grades have been developed based on a statewide assessment. Such an assessment does not preclude a much lower or higher grade being assessed in an individual metropolitan area, county, or area development district. Evaluation of the infrastructure in each area of the Commonwealth requires an “infrastructure audit.” An infrastructure audit is a more in-depth analysis of a community’s existing infrastructure to determine whether it currently meets the needs of that area and if it will continue to do so in the next 10-20 years. It also determines whether an adequate plan is in place to meet those needs. Such a study is beyond the scope of this report.

ISSUE BRIEF



KENTUCKY AVIATION

2011 Kentucky Grade: C+

Date: February 1, 2011

CURRENT CONDITIONS

Airports and those who depend on them have a quantitative economic impact on Kentucky. When airports aren't kept in working order, it negatively affects a broad array of services to our state, including military, healthcare, transportation of goods and services just to name a few.

Kentucky's aviation system was last evaluated by the ASCE Kentucky Section in 2003. At that time, a grade of C+ was assigned. The grade assigned to the nation's aviation system was a D, but Kentucky earned a C+ because additional funding was given to the major international airports in the state. Although the study has not been updated since 2003, Kentucky is still considered as C+.

Over the last seven years, Kentucky's aviation system has remained stable despite the challenge of Congress not reauthorizing the Airport Improvement Program (AIP) legislation, which expired in September 2007. A jet fuel tax was implemented in 2000 and went into effect in Kentucky in 2003. The tax was put into place to help support capital infrastructure needs at public airports across the state; however, that tax has since been capped within the state, reducing the amount of available funds.

There are currently 60 public-use airports in the state, a decrease from the 65 reported in 2003. Since the 2003 Kentucky Report Card, one airport closed due to lack of use, two closed due to maintenance issues and the remaining two transitioned to private use only. Of the 60 airport facilities in the state, seven are identified as commercial service airports, and just five have commercial service today.

Greater Cincinnati International Airport (CVG) is located in northern Kentucky and is the largest airport in the state. CVG is ranked by the Federal Aviation Administration (FAA) in the hub category of "medium" and enplanes more than 4.3 million passengers annually. Louisville International Airport at Standiford Field (SDF) is located in Louisville and fluctuates between being the smallest "medium" hub or the largest "small" hub at any given point with approximately 1.7 million annual enplanements. SDF is currently classified as a "small" hub status with the FAA and is also the home to the all-points domestic hub for United Parcel Service (UPS). Blue Grass Airport (LEX), located in Lexington, is also a "small" hub with nearly a half million enplanements annually. Barkley Regional Airport (PAH) in Paducah and Owensboro-Daviess County Airport (OWB) in Owensboro are the last of the primary airports in the state, both with a "non-hub" status. PAH enplanes nearly 20,000 annually, while OWB enplanes slightly more than 10,000 passengers each year. The remaining two commercial service

airports in the state are Bowling Green (BWG) and Somerset (SME). With less than 10,000 enplanements annually, these two facilities are classified as non-primary airports.

The size classification of an airport is important because it is directly tied to funding. A “non-hub” is an airport with less than 0.05% of the nation’s total number of passengers; a “small” airport is one with at least 0.05% but less than 0.25%; a “medium” airport is one with at least 0.25% but less than 1%; and a “large” airport has at least 1% of the nation’s total number of passengers.

The remaining 53 public-use airports in the state are listed as “general aviation” airports. The “general aviation” classification applies to an airport with fewer than 2500 annual passengers and is not used for commercial aviation. This airport type is the largest single group of airports in the system.

Of the 60 public-use airports in the state, all but one are equipped with hard paved surfaces for their runways and associated taxiways. Dawson Springs Airport has the only remaining turf runway in the state. CVG, SDF and LEX each maintain concrete runways and taxiways. The primary commercial service airports will utilize federal entitlement dollars generated from the FAA’s Airport Improvement Program (AIP) to assist with pavement remediation while the remaining airports will seek discretionary funding from the state to support their needs.

While maintenance of existing infrastructure at each of the airports is certainly of concern, the larger issue involves flight delays in the national airspace system (NAS). Since each airport feeds to other destinations, the ability for another airport to efficiently accept and turnaround aircraft is important to the NAS. Therefore, while the condition of paved surfaces is one of many vital components, the ability for aircraft to arrive and depart during inclement weather, and the navigational systems needed to support such activity, are also crucial. Forty-three of the 60 Kentucky airports support some level of navigational system to sustain other than visual approaches at the various airports. An example of this includes the localizer and the glideslope—both ground-based systems that use radar to assist aircraft in landing during inclement weather.

Economic Impacts

Kentucky airports have a total economic impact of nearly \$15 billion annually, yielding nearly 115,000 jobs. CVG and SDF airports account for more than 88 percent, or approximately \$13.25 billion, of the total economic impact annually. All airports in the state play a role in generating economic activity for their surrounding areas.

Both CVG and SDF have seen a dramatic increase in the construction of warehouses and other commercial buildings in close proximity to their airports. These are known as warehouse or “end-of-the-runway” service logistics. SDF, with its connection to UPS and Worldport, has seen a number of businesses locate to the Louisville area to be close to the Worldport facility. Comparably, CVG has seen a similar attraction from businesses with the DHL facility located on the airfield in northern Kentucky. In all, Kentucky’s airports have a quantifiable economic impact on the surrounding area. Some other benefits derived from airports include search and rescue, medical transportation/evacuation and military training.

Investment Needs

By 2025, the FAA anticipates completing its rollout of NextGen – the Next Generation Air Transportation System. NextGen is the transformation of the radar-based air traffic control system to a satellite-based system. The benefits are tremendous for both the FAA and the end-user. Benefits include a reduction in flight delays at the larger commercial service airports by an expected 21 percent and money saved from the reduction of fuel and emissions.

The implementation of NextGen is an evolutionary strategy. It will have taken nearly 25 years to roll out the technology and equipment, plus years of modeling and demonstration activities. The ability of the state's airports to support the NextGen initiative is critical. One of the first steps toward the NextGen evolution is nationwide automatic dependent surveillance – broadcast (ADS-B). The ADS-B is a radar system located within the airplanes themselves, allowing for real-time location identification between airplanes sharing the same airspace. While current ground-based radar information is updated every six to eight seconds, the plane-based radar (ADS-B) provides accurate location in less than one second. This means planes can take off and land at closer intervals, leading to the reduction in delays, fuel usage and emissions. ADS-B is expected to be complete by 2013. By 2020, aircraft flying in controlled airspace in the U.S. must be equipped with ADS-B avionics that broadcast their position. And while the implementation of NextGen will assist commercial service airports with improving capacity and reducing delays, money that has been saved by reducing delays can be applied to infrastructure at the general aviation facilities to help support their needs for replacement and rehabilitation of infrastructure.

Until NextGen is completely rolled out and the benefits realized, Kentucky airports could benefit today by considering an increase to the cap on the jet fuel tax. An increase in the tax would address funding gaps for projects and lessen the need to compete nationally for discretionary funds. This type of solid funding stream would enable Kentucky airports to plan and implement key replacement and rehabilitation projects.

Legislative Needs

In September 2007, the authorizing legislation for the FAA's AIP expired and since that time, 17 extensions have been passed by Congress. The extensions represent a discontinuous cycle of funding for those airports eligible for AIP entitlement funding. This irregularity leads to gaps in potential discretionary funding for the remaining general aviation airports in the state. Congress must focus on approving legislation to return stability to the AIP program and funding throughout the NAS.

At the state level, the consideration of an increase to the cap on the jet fuel tax would improve the funding position of many of the general aviation facilities.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- Support for an effort by Congress to approve legislation for the FAA, including an increase in the passenger facility fee to support the AIP.

- Consider increasing the fuel tax cap on air carrier/transport companies, allowing the jet fuel tax to support aviation facilities within the state.
- Continue to improve the facilities at existing airports and consider opportunities to expand air service to areas that can sustain such development.
- Continue to coordinate the six-year roadway plan with the six-year aviation plan to allow more efficient transportation of people, goods and services.

GRADE

The nation's aviation system received a grade of D in the 2009 *Report Card for America's Infrastructure*. ASCE noted that airport capacity has increased only one percent in the past 10 years, while air traffic has surpassed pre-9/11 levels. Additionally, commercial service airports are faced with an additional challenge of accommodating the new larger group VI aircraft, such as the Airbus A-380 and the Boeing 747-800.

Certainly in late 2008 and 2009, the state of the country's economy yielded dramatic decreases in enplanements for most of the nation's airports; many of those facilities started rebounding in 2010. The FAA is reporting forecast projections for enplanements to grow by 3.6 percent annually through 2030. This additional growth, coupled with the need for enhanced facilities to support group VI aircraft, will certainly impact the capacity and efficiency of the NAS.

Funding for general aviation airports in the state continues to remain under-funded as compared to projected needs. Funding from the American Recovery and Reinvestment Act of 2009 (ARRA) provided some level of assistance to a few general aviation facilities in the state, but this was a one-time infusion of funding.

Beyond the ARRA investment, the jet fuel tax funds have not been able to keep up with the needs of general aviation airports. Commercial service airports continue to maintain good facilities that support their respective communities and local economic development endeavors. An infrastructure grade alone would certainly be higher, but coupled with the uncertainty of the AIP legislation, the implementation and rollout of NextGen, and the added burden of improvements for group VI aircraft, collectively rate a grade of C+.

ACKNOWLEDGEMENTS

The Aviation Sub-Committee wants to recognize the support of the Federal Aviation Administration and the Kentucky State Department of Aviation for the resources provided in compiling the report card.

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ISSUE BRIEF



KENTUCKY BRIDGES

2011 Kentucky Grade: D

Date: February 1, 2011

Whether bridges are used in the daily commute or to increase commercial development, over the long term, maintaining bridges affects all Kentuckians.

CURRENT CONDITIONS

Kentucky's bridges were last evaluated by the ASCE Kentucky Section in 2003. At that time, a grade of C- was assigned. This grade was based in large measure on progress that had been made over the preceding seven years – from 1996 to 2003 – addressing the backlog of deficient bridges that existed in the Kentucky inventory. Unfortunately, the improvements made prior to 2003 have been lost between 2003 to 2010. At the beginning of 2003, 29.7% of Kentucky bridges were deficient. The national combined deficiency average at that point was approximately 27.6%. Data available in 2010 indicates that the national combined average had fallen to 24.8% while the deficiency rate in Kentucky had risen to 32.2%. Kentucky's bridge inventory is trending in the wrong direction when compared to the national average.

The current grade reflects the ability of Kentucky's bridges to support the current demands of inter- and intra-state commerce and the personal travel demands of residents and visitors. The grade is not a reflection of the safety of individual bridges or the bridge system. All bridges included are deemed safe.

The cost to repair or replace all deficient bridges in Kentucky is estimated to be more than \$1.2 billion and the cost to raise Kentucky's grade from a D to the national average is estimated to be more than \$283 million. Currently, \$98,099,379 in combined state and federal funds is available in the FY2010 budget to upgrade the status of deficient Kentucky bridges.



*Figure 1 – Signs of deterioration in the aging U.S. transportation infrastructure system
(Dr. John J. Myers)*

There are many definitions of the term “bridge.” This report utilizes the National Bridge Inspection Standards (NBIS) definition, which generally identifies bridges as spans of greater than 20 feet. Using this definition, there are currently 13,729 highway bridges in Kentucky; 8,860 are owned and maintained by the state, and 4,604 are owned and maintained by one of Kentucky’s 120 counties. The remaining 265 bridges are owned by other entities, including municipalities and the federal government

All Kentucky bridges are inventoried and inspected every two years and the results of the inspections are reported by the state to the Federal Highway Administration (FHWA) as part of the National Bridge Inventory (NBI). A bridge is determined to be structurally deficient if significant load-bearing elements are found to be inadequate or the waterway adequacy, which is the ability of the bridge to remain open to traffic during varying levels of flooding, is insufficient. A bridge is determined to be functionally obsolete if it does not meet current design standards such as lane width, vertical clearance or approach conditions. Neither condition implies that the bridge is unsafe, rather that it is in need of repair or upgrade. Bridges determined to be unsafe are taken out of service. Deficient bridges, for the purposes of this report, are the sum of the bridges that have been found to be either structurally deficient or functionally obsolete.

The expected life of a highway bridge is approximately 50 years. In Kentucky, nearly 63 percent of bridges are more than 30 years old and 31 percent are more than 50 years old. The average age of highway bridges in the United States is approximately 40 years.

To provide a better assessment of bridge performance, the FHWA has developed a sufficiency rating system. Bridges with a sufficiency rating of less than 80 percent are eligible for rehabilitation using federal matching funds. Nearly 56 percent of Kentucky’s bridges fall into this category and the average age of these bridges is 49 years. Bridges with a sufficiency rating of less than 50 percent are eligible to be replaced using federal matching funds. More than 12 percent of Kentucky’s bridges fall into this category and the average age of these bridges is 54 years. A comparison of Kentucky’s state and county bridge sufficiency ratings is shown in *Table 1*.

Table 1 – Comparison of sufficiency ratings for state and county bridges

Owner	Number of Bridges	Number of Bridges with Sufficiency Less Than 80% (inclusive)	Percentage of Bridges with Sufficiency Less Than 80% (inclusive)	Number of Bridges with Sufficiency Less Than 50%	Percentage of Bridges with Sufficiency Less Than 50%
State	8,860	4,649	52.50%	715	8.10%
County	4,604	2,841	61.70%	1,006	21.80%
Totals	13,464	7,490	55.60%	1,721	12.90%

Status of Bridges in Kentucky and the Nation

In the 2003 Kentucky Infrastructure Report Card, bridge data indicated that over the preceding 10 years, the percentage of deficient bridges in Kentucky had steadily declined and, based largely on that decline, assigned a grade of C- to bridges.

NBI data available from 2002 indicates that deficient bridges amounted to 29.7 percent of the total Kentucky bridge inventory at that time, while the national combined average was 27.6 percent. The difference between the percentage of deficient bridges in Kentucky and the U.S. as a whole was more than 2 percent at that time.

NBI data available at the end of 2009 indicates that Kentucky has 13,729 publicly maintained bridges, of which 1,362, or 9.9 percent, are structurally deficient and 3,064, or 22.3 percent, are functionally obsolete. A total of 4,426, or 32.2 percent of Kentucky's bridges are rated deficient. Nationally, the 2009 NBI lists 603,245 bridges, of which 71,179, or 11.8 percent are structurally deficient and 78,468, or 13 percent, are functionally obsolete, amounting to a total of 149,647, or 24.8 percent, deficient bridges. Thus, the difference between the percentage of deficient bridges in Kentucky and the U.S. as a whole has increased steadily since 2002 and now stands at more than 7 percent – an all-time high. (See *Figure 2*)

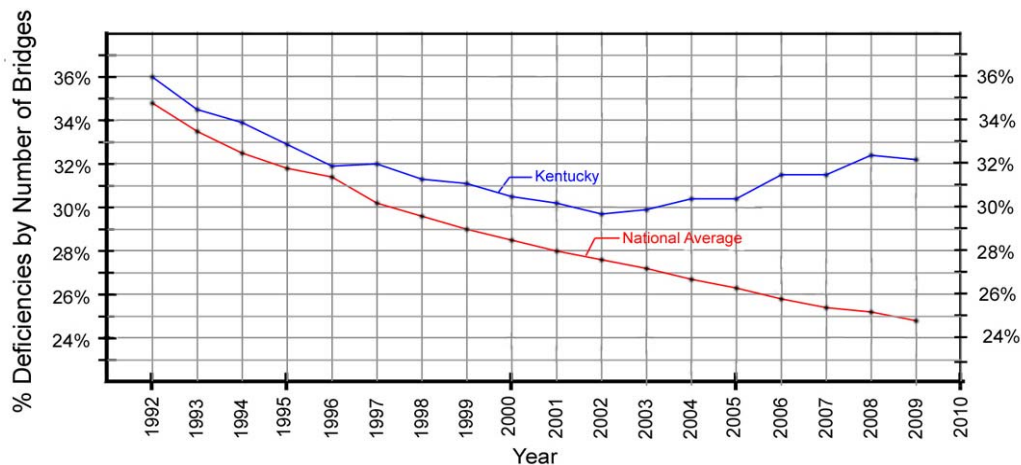


Figure 2 – Bridge deficiencies – Kentucky vs. national average

Figure 3 shows the percentage of deficient bridges by county. Figure 4 shows the percentage of deficient bridges by deck area in each county. Rural counties in Kentucky have many bridges over back roads and waterways that do not carry the same volume or density of traffic as bridges in more urban counties. The per-bridge cost to remedy deficiencies will not be the same in both circumstances. Analysis of deficiencies by both the gross number of bridges and the gross deck area of bridges helps to bring the relative magnitude of the deficiencies into focus.

See Appendix Table 2 and Table 3 for more detail. (www.kyasce.org/report-card)

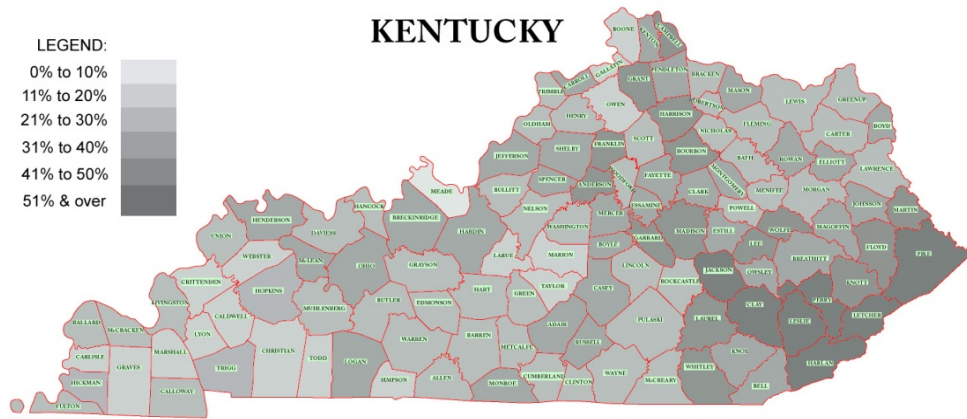


Figure 3 – Map showing percentage of deficiencies of bridges in counties by number of bridges

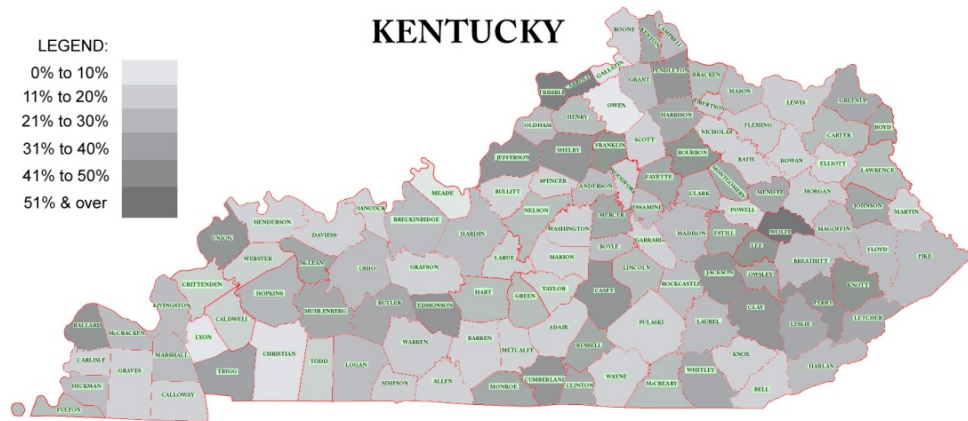


Figure 4 – Map showing percent deficiencies of bridges in counties by deck area

Cost to Upgrade the Kentucky Bridge Inventory

Costs were estimated for the purpose of this issue brief by dividing the most recent Kentucky Bridge Office cost data, which is the information publicly available from the Kentucky Department of Transportation from which the current unit cost to repair and replace bridges can be determined, by the deck area of bridges rehabilitated or replaced for the costs expended. The result is an average cost of \$110 per square foot for projects that involve total bridge replacement or bridge widening, including additional lanes and structure. This figure does not include the cost of purchasing the land where a bridge may sit, designing or engineering – only the cost of construction. For projects that involve only bridge deck overlay, meaning no additional lanes or structure were constructed, the Kentucky Bridge Office estimates a cost of \$40 per square foot.

This issue brief provides a reasonable professional assumption that half of the projects undertaken for the costs expended involved \$110 per square foot bridge replacement or addition of lanes and structure and that the other half involved \$40 per square foot bridge deck overlay. On that premise, the average composite cost to upgrade deficient Kentucky highway bridges would be \$75 per square foot of bridge deck. The total, estimated cost to repair all deficient

highway bridges in Kentucky, calculated by deck area as described, is more than **\$1.2 billion**. *Figure 5* includes a map comparing costs for each county.

It may be unrealistic to assume that funding can be provided to correct all deficiencies and bring all of Kentucky’s highway bridges up to 21st century standards in the short term. No state has been able to reduce its deficiency rating below 11 percent – Kentucky currently stands at 32.2 percent. Therefore, an alternative cost analysis was performed to estimate the cost of bringing Kentucky highway bridges up from their current status to that of the national average, which would cost more than \$283 million. Data available from the Kentucky Transportation Cabinet indicates that \$98,099,379 is budgeted for repair and replacement of Kentucky highway bridges in the current fiscal year.



Figure 5 – Estimated cost of bridge repairs by county

RECOMMENDATIONS SUPPORTED BY ASCE

It is recommended that a Bridge Committee partnership be established among ASCE Kentucky Section, FHWA, KYTC (Maintenance Division) and one or more public interest representatives outside of state government and the engineering community. The committee should be comprised of at least one representative from each group. The goal would be to increase the efficiency of gathering and analyzing data and formulating conclusions based on that data. It could be a source of ready, reliable data, a motivating factor, and of great assistance to the agencies that provide the funds and perform the corrective rehabilitation and maintenance of bridges.

Functions of the Bridge Committee would include:

- Working in unison with state government to set a reasonable goal and timetable for reducing bridge deficiencies in Kentucky to a level below the combined national average.
- Working in unison with state government and the legislature to develop a sustainable source of funding to support the bridge rehabilitation and replacement program.

Any program that is developed should be evaluated on a yearly basis to assure that the overall condition of Kentucky bridges is making progress toward meeting, and exceeding, the national average within a reasonable time period and that Kentucky bridges are maintained at or above the national average thereafter.

GRADE

The condition of highway bridges in Kentucky has deteriorated since the 2003 Kentucky Infrastructure Report Card. As in 2003, Kentucky lags the national average, but the gap between Kentucky and the national average has widened significantly. The sufficiency ratings of highway bridges place Kentucky in the lowest quartile of the nation.

Accordingly, an overall D grade has been assigned to Kentucky's bridges.

ACKNOWLEDGEMENTS

The Bridge Sub-Committee wants to acknowledge the support of the KY Transportation Cabinet/Division of Maintenance and The Structural Design Office/The Federal Highway Administration for input into this Report.

KENTUCKY BRIDGE SUB-COMMITTEE

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ISSUE BRIEF



KENTUCKY DAMS

2011 Kentucky Grade: D+

Date: February 1, 2011

Dams are a critical part of Kentucky's infrastructure both in terms of benefits and associated risks to human life, and other infrastructure located downstream. Many dams in the state are approaching or exceeding their intended design life. As these dams continue to age they will require continued inspection in order to function as intended. Without this attention, dams are at risk of falling into disrepair, increasing the risk of future failures. Recent dam failures across the nation highlight the importance of maintaining dams as part of the infrastructure.

CURRENT CONDITIONS

Kentucky's dams were last evaluated by the ASCE Kentucky Section in 2003. At that time, a grade of C- was given due to the additional funding that was required to address dam repair needs in a timely manner. The funding also addressed the need for training programs for the owners of dams, the regulatory officials and the general public. Over the past seven years little or no progress has been made and, therefore, the grade is now D+.

Dams meet a variety of life-sustaining needs. The purpose of a dam is to impound water, wastewater or liquid-borne materials for a variety of reasons, including flood control, water supply, irrigation, energy generation, containment of mine tailings, recreation and pollution control. The resources generated from dams are a valuable part of Kentucky's economy. The most common purpose for a dam is recreation.

Even though dams provide the population with many practical needs and recreational activities, most people take dams for granted. If a dam fails, the destruction can be catastrophic, leading to economic losses, environmental damage and even the loss of human lives. Due to the significant potential impact of dams, they require frequent inspections to identify issues in a timely manner.

The majority of dams are privately owned and operated, which is unlike other types of infrastructure. According to the Association of State Dam Safety Officials (ASDSO), approximately 58 percent of dams are privately owned, 16 percent are owned by local governments, four percent are owned by state governments, and the remaining 22 percent are owned by the federal government, public utilities and other groups. Dam owners are responsible for dam safety, which includes financing maintenance, upgrades and repairs.

The Federal Emergency Management Agency (FEMA) was granted administrative responsibility for the nation's dam inventory by the National Dam Safety Act of 1996. In Kentucky, the responsibility of funding safety inspections falls under the jurisdiction of the Division of Water (DOW). The DOW is part of the Kentucky Department for Environmental Protection. These offices are responsible for the permitting required for dam construction. The DOW is also

responsible for conducting or reviewing periodic inspections of existing dams, with the exception of dams regulated by other agencies, such as those related to coal mining.

Through inspection programs, dam safety in Kentucky has improved, although inspection programs by themselves do not guarantee that a dam will not fail. The inspection program needs to evolve into more detailed and frequent inspections as the dams increase in age. Typical causes of dam failure are internal erosion or seepage, slope stability failure and overtopping from a flood event. Another critical component involves communicating risks of dam failures to the public. A particularly useful and necessary tool is the development and active implementation of emergency action plans for dams. It is especially critical for high hazard dams, although it is suggested for all dams.

Currently, there are more than 1,000 regulated dams in Kentucky. These dams include all three hazard class categories. Dams are classified based on the potential threat to downstream life and property. A dam is classified as Class A (low hazard) if its failure is likely to cause no loss of human life, low economic losses and/or low environmental losses. Class B (significant hazard) structures are those that if failure or improper operation occurs, result is no probable loss of human life, but significant economic loss, significant environmental damage and/or probable disruption of lifeline facilities, including electrical power, gas and liquid fuel, telecommunications, transportation, water and sewer lines. The third category, Class C, is the highest hazard classification. In the event of failure or improper operation of a Class C dam, there is a high probability of loss of human life, high economic loss and negative environmental impact.

Each year the Division of Water (DOW) inspects approximately 300 dams, using a dedicated staff of approximately three inspectors, giving an inspector to dam ratio of 1:100. Each inspection consists of a file review of previously identified deficiencies, followed by a complete visual inspection. After the visual inspection, a letter and report are prepared for the owner that describes the observations and instructs the owner to fix any identified deficiencies. DOW inspectors will follow up when necessary to ensure that required remedial work is completed. Sometimes it is necessary to force an owner to properly maintain or modify a dam by taking enforcement action. These actions might include breaching of the dam and draining the lake or impoundment. In addition, DOW will take emergency action if a structure is in known danger of failing and poses a threat to life, or if it is likely to cause serious property damage. DOW is empowered to take emergency action if an owner abandons a dam or refuses to take necessary remedial actions.

Investment Needs

Despite growing hazards, deteriorating dam conditions and an increasing number of dams, funding for the dam program has declined over the past 30 years. A significant investment is needed to improve dams and the dam safety program in Kentucky. Funds are needed to hire and train an adequate staff of professional inspectors, rehabilitate critical dams, improve the communication and notification systems, and update inspection methods and equipment. The 1996 Dam Safety Act has been a helpful source for additional grant funds. These funds assist DOW in financing equipment purchases and other needs. Even with the additional grants, though, funding levels are not adequate to fulfill all capital needs in the state.

More than \$160 million in funds has been identified for repairs on state-owned dams, excluding the Kentucky River and Green River locks and dams, which are owned by the U.S. Army Corps of Engineers. Each dam on the Kentucky and Green rivers is at least 90 years old and has not been consistently upgraded. The average cost to repair each lock and dam on the Kentucky River is \$30 million. If these locks and dams are put under Kentucky's ownership in the future, the funds needed for repair would increase significantly. Of the dams that have been identified in need of repairs, 88 are considered deficient.

ASDSO recommends ten state regulators for every 250 dams, so that the oversight of the permitting and inspection components of state dam safety programs can be carried out in an effective manner. To comply with this recommendation, Kentucky would need to have approximately 40 individuals to regulate the dams. Currently, Kentucky employs six full-time professionals dedicated to dam activities. Kentucky employs three dam safety inspectors, which is below recommended levels. The cost to hire and train two additional inspectors would be approximately \$300,000 per year.

DOW does not offer a formal educational program to teach private dam owners about their responsibilities, proper inspection and maintenance techniques, or repair methods. An educational program would cost approximately \$100,000 per year. However, literature is currently available to dam owners, along with a website of comprehensive resource information. Until an official education program can be initialized and funded, DOW will develop and provide a formal seminar that will be made available to the public.

Private dam owners often have difficulty funding dam repairs, resulting in dams being breached and drained. Some form of assistance from the government would be helpful in maintaining the resources within the state, rather than destroying the dam. Government assistance could come in the form of low-interest loans, with an estimated cost of \$1 million.

Additional efforts will be needed in the near future to assist in analyzing and upgrading the state's dams, many of which were constructed more than 40 years ago. Dams typically have a design life of about 50 years.

RECOMMENDATIONS SUPPORTED BY ASCE

Overall, Kentucky has good dam safety programs, but due to recent funding reductions, the increasing age of the dams, and the recognition of additional safety measures, several recommendations have been made by ASCE:

- Increase staff to accommodate current and future inspection needs.
- Increase government appropriation and other funding sources for the repair and rehabilitation of dams.
- Develop a long-range capital program that accommodates the needs of state and municipally owned dams.
- Develop a long-term strategy to control downstream development through easements, purchases or partnerships.

- Create a more comprehensive inspection program that includes more than just visual inspections, but would include underwater, remote-controlled video cameras to inspect conduits through dams.
- Develop a formal education program to train private property owners in proper dam maintenance and how to recognize signs of structural problems in dams.
- Develop an emergency action plan (EAP) for all high hazard potential dams.

GRADE

DOW has done well overseeing the state's dam safety and floodplain compliance programs given the current level of resources. Of the more than 1,000 dams in Kentucky that are inspected on a regular basis, none of them are currently declared unsafe. However, significant needs have been identified such as the need to hire personnel, train dam owners, and find additional sources of funding, and therefore a D+ grade has been given.

ACKNOWLEDGEMENTS

The Dams Sub-Committee wants to recognize the support from the Kentucky Division of Water and the Association of State Dam Safety Officials (ASDSO) for the information made available for the dams issue brief.

KENTUCKY DAMS SUB-COMMITTEE

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ISSUE BRIEF



KENTUCKY DRINKING WATER

2011 Kentucky Grade: B

Date: February 1, 2011
Revised: February 17, 2011

Kentuckians need to be aware of the quality of their drinking water and the reliability of their drinking water infrastructure. Deteriorating drinking water infrastructure adversely impacts public health. In some communities, a reliable and abundant drinking water supply provides water for fire protection and is critical for business and economic development.

CURRENT CONDITIONS

The coordination of community-based planning for drinking water infrastructure statewide is under the direction of the Kentucky Infrastructure Authority (KIA). KIA serves as a clearinghouse for federal and state funding of drinking water projects, including the state revolving loan program, as well as state grant and loan programs authorized by the Kentucky Legislature. KIA also manages drinking water grant program of the American Recovery and Reinvestment Act of 2009.

KIA maintains an up-to-date inventory of water system infrastructure. This inventory is managed in a statewide geographic information system (GIS) database, known as the Water Resources Information System (WRIS). WRIS is updated annually with information provided by water utilities to regional water management councils.

Through an extensive utility assessment, KIA has quantified areas of Kentucky not served by a potable water system (unserved areas) and deficient water systems (underserved areas). The U.S. Environmental Protection Agency (EPA) defines a potable water system as a water system that meets established drinking water standards.

Since 2000, the state expanded water service from approximately 37,000 miles of water main to 56,500 miles. A significant portion of these additional mains has increased the percentage of the state's population of 4.3 million being served by a public water supply system. The percentage has increased from 85 percent in 2000 to 95 percent in 2010. Less than five percent—215,000 residents or approximately 65,000 households—are without access to a public drinking water supply. Kentucky is among the top five of all states for percent of population served. The goal of the state is to provide access to a public drinking water supply to all Kentuckians by 2020.

Drinking Water Compliance

Kentucky has 464 public water systems (401 community and 63 non-community water systems), a reduction from 595 public water systems in 2002. A 22 percent reduction indicates a proactive approach to consolidating systems to improve drinking water quality and efficiencies. The Kentucky Division of Water reviews public water systems annually for compliance with the Safe Drinking Water Act. Drinking water violations are identified in five categories, including a maximum contaminant level violation, a treatment technique violation, failure to properly monitor water quality, failure to report water quality information, and failure to notify the public of a drinking water violation. In Kentucky, the vast majority of violations are reporting and monitoring violations. As illustrated in *Figure 1*, the total number of drinking water violations has declined from 1,407 in 2006-07 to 817 in 2008-09, a 42 percent improvement.

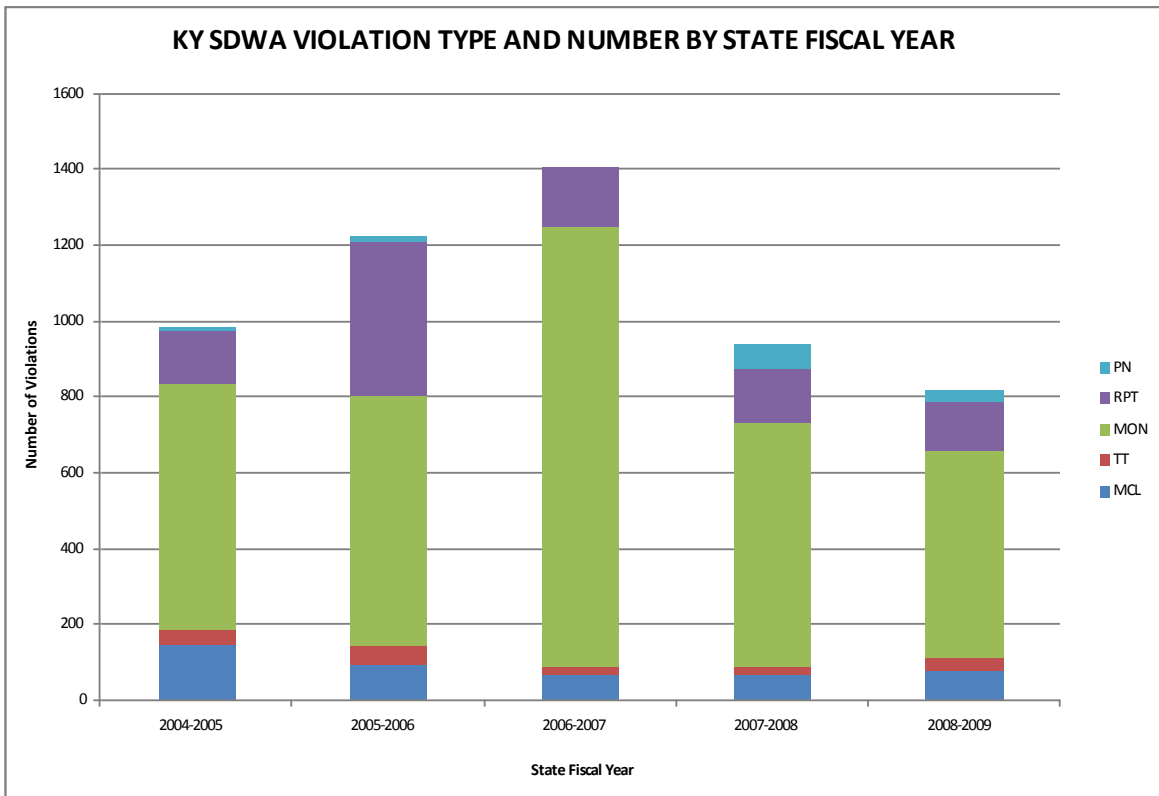


Figure 1 – Drinking water compliance. The abbreviations for drinking water violations are: PN: Public Notification, RPT: Reporting, MON: Monitoring, TT: Treatment Technology, MCL: Maximum Contaminant Level.

The Kentucky Division of Water established a unique partnership with the drinking water industry in Kentucky. In 2007, a stakeholders group was established with representatives from regulatory agencies, funding agencies, water utilities and industry associations. The Drinking Water Stakeholders Group meets quarterly to discuss regulatory compliance and industry best practices. This collaborative approach has led to proactive development of regulations for

capacity development, water quality, permits, operator certification and engineering design standards.

Investment Needs

In the 2007 Drinking Water Infrastructure Needs Survey and Assessment, the EPA identified a need for \$4.9 billion of investment for Kentucky’s drinking water infrastructure over the next 20 years. Kentucky is in the process of updating of both the Drinking Water Management Plan and the Drinking Water Needs Survey and Assessment. Final reports are expected to be published in 2011 and these reports will update the EPA estimate for investment need in Kentucky’s drinking water infrastructure.

In order to effectively plan and manage Kentucky’s investment in drinking water in infrastructure, 15 water management councils (see *Figure 2*) were established throughout the state. Annually, area water management council’s identify drinking water system needs on a regional basis.

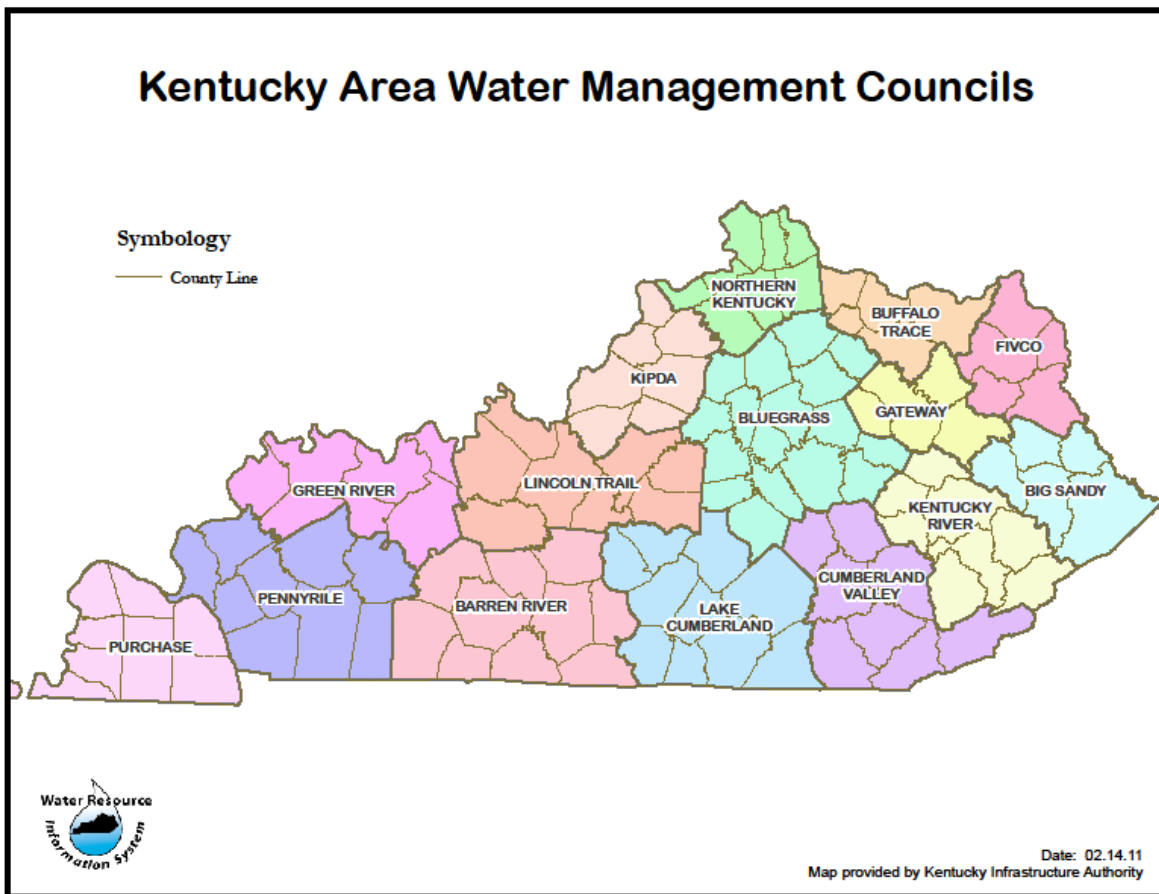


Figure 2 - Kentucky Regional Water Management Councils

Water projects are developed for these areas using a 20-year planning horizon. Each water management council prioritizes projects on a regional basis with input from water providers and elected officials. The councils develop a statewide priority list, and projects are selected for funding. Using this process from 2000 to 2010, the Kentucky Legislature awarded \$806 million in grants for 2,135 drinking water improvement projects. In addition, more than \$153 million has been awarded through the state revolving loan fund (SRF), bringing the total grant and loan investment in drinking water to \$959 million.

In *Figure 3*, the blue lines represent 20,000 miles of water main improvement projects since 2000. These projects improved water service to over 1.5 million people in Kentucky with project funding from water rates, grants, and loans.

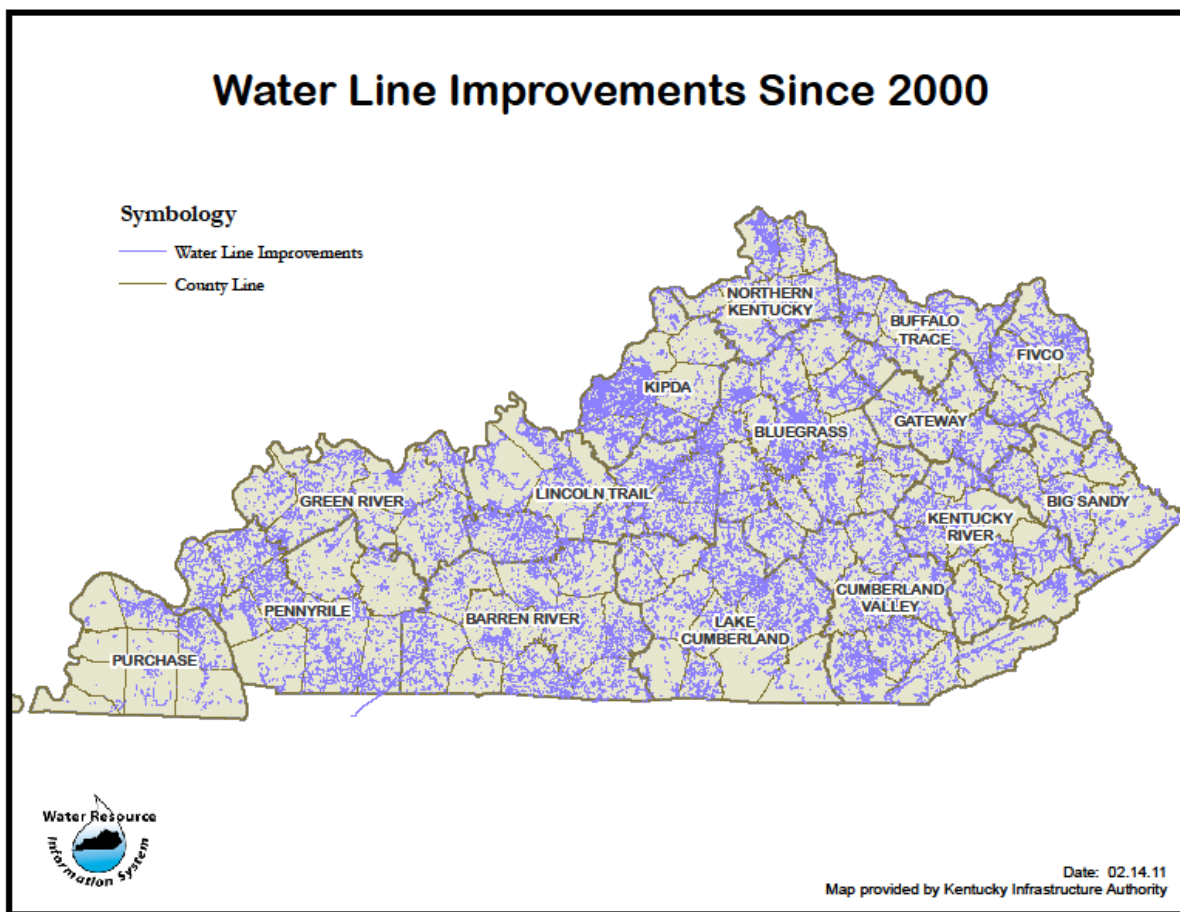


Figure 3 – Kentucky Water Line Improvement Projects from 2000 to 2010

The Commonwealth is making significant progress towards the goal of providing access to a public water supply for all Kentuckians by the year 2020. As this goal is achieved, Kentucky must begin a transition towards assessing aging water infrastructure. Kentucky has a total of

56,500 miles of water main with an estimated 2,500 miles over 60 years old (installed prior to 1950) and another 7,000 miles of water main with an unknown age. This is approximately 17 percent of the total distribution system pipe inventory. Over the next 25 years the age and condition of Kentucky's water infrastructure will require investment to assure system reliability and assure quality water reaches the customer. Proactive plans and programs need to be developed for condition assessment and upgrade of Kentucky's aging infrastructure.

RECOMMENDATIONS SUPPORTED BY ASCE

In order to continue the progress of improving Kentucky's drinking water systems, the following recommendations are supported by ASCE:

- Continue regional water planning and coordination of drinking water infrastructure
- Maintain the Water Resource Information System.
- Continue periodic updates of the state's Water Management Plan and 20-year Drinking Water Survey and Needs Assessment for un-served and under-served areas of the state every three to five years.
- Perform a comprehensive assessment of drinking water system condition and performance. Where appropriate, develop plans for replacing and upgrading aging drinking water infrastructure to assure system reliability and high quality water.
- Continue to promote cost-of-service water rate methods and annual water loss audits.
- Pursue water system mergers and regional solutions where economically beneficial.
- Continue loan programs offered by rural development and the state revolving loan program to improve the water supply.
- Continue Community Development Block Grants and Kentucky Economic Development Grants to improve the water supply.
- Annually fund the 2020 Drinking Water Program with a combination 20-year revolving low-interest loan and grant incentive fund program.
- Continue to monitor and report compliance statistics to determine the effectiveness of the programs to enhance drinking water quality in the state.

GRADE

In the 2009 *Report Card for America's Infrastructure*, a grade of D- was assigned to the nation's drinking water infrastructure. The 2003 Kentucky Infrastructure Report Card assigned a grade of C to the state's drinking water infrastructure. In 2010, the Drinking Water Committee recommended a grade of B for the state's drinking water infrastructure.

A well-managed improvement plan and a diversified funding program are in place. Funding is being coordinated by state agencies to ensure capital is invested wisely. Since 2000, Kentucky has invested nearly \$1 billion of grant and low-interest loan funds in drinking water infrastructure projects and significant progress has been made in extending potable water service throughout the state, with currently 95 percent of the population served. Progress has been made

collaborating among industry representatives and drinking water regulators through a stakeholders partnership program. Drinking water regulatory compliance has significantly improved since 2007. In that time the number of violations has gone from 1,407 in 2006-07 to 817 in 2008-09, a 42 percent improvement.

Considering the significant progress since 2003 in planning, funding, implementation and compliance for drinking water systems in Kentucky, the state's drinking water infrastructure is assigned a grade of B.

ACKNOWLEDGEMENTS

The Drinking Water Sub-Committee wants to recognize the support from the Kentucky Division of Water and the Kentucky Infrastructure Authority for the resources provided in compiling the report card.

KENTUCKY DRINKING WATER SUB-COMMITTEE

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ISSUE BRIEF



KENTUCKY ENERGY

2011 Kentucky Grade: B-

Date: February 1, 2011

Kentucky has historically had one of the lowest energy costs in the country. This is one of the factors that have allowed the state to attract energy-intensive industries. Maintaining the infrastructure of this vital sector of our economy is imperative for the livelihood of citizens and the protection of the industrial base.

CURRENT CONDITIONS

The energy industry in Kentucky is currently at a crossroads. To date, electricity has primarily been provided by central station, coal-fired generation. Coal is used to generate 92 percent of Kentucky's electricity. Peaking power, which is electricity that is provided during times of high use, is generally provided by simple-cycle gas turbines. Residential heating in rural areas is provided by propane or electrical sources, although wood furnaces and stoves play a major role in rural residential markets. Natural gas is an alternative in urban areas.

The U.S. Environmental Protection Agency (EPA) has issued proposed rules for public comment and Congress is considering legislation that will further tighten emission limits for sulfur dioxide, nitrogen oxides and particulates. Additionally, the EPA is considering the regulation of fly ash from coal-fired power plants as a hazardous waste. Meanwhile, the issue of carbon dioxide regulation is continuing to confound decision-making in all sectors of the energy industry. In order to comply with these regulations, electric utilities are considering increasing usage of natural gas, biomass, and in some cases, investments in nuclear generation. Because Kentucky has a law that forbids issuing a permit to construct a nuclear power plant, nuclear energy would have to be imported unless legislation is passed to allow for the construction of nuclear facilities. Electric utilities are also focusing investments on conservation and energy-efficiency measures, thereby avoiding emissions and moderating the need for additional generation.

The economic conditions of the U.S., including those in Kentucky, have reduced growth in electricity demand. Although the state has been effective in attracting new industry and several companies have announced expansions of existing facilities, the resulting demand increase for that growth has not outpaced the reduction in demand due to the economic downturn. Over the years, Kentucky has benefited from industrial growth due to low electricity prices. If the EPA is successful in establishing lower limits on emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x) and particulates and successful in establishing carbon dioxide emission limits, energy prices in Kentucky could rise. Some industries have stated that they may leave the state if energy prices rise. Losing industries in the state would reduce demand further and delay the need for future generation.

East Kentucky Power Cooperative announced that the 278-megawatt fluidized bed unit planned for Clark County will be postponed. EKPC also announced that The Louisville Gas and Electric - Kentucky Utilities 750 MW Trimble Station Unit 2 recently came online in Trimble County. The Tennessee Valley Authority has issued an integrated resource plan that calls for the lay-up of 4,700 megawatts of coal-fired generation. This generation would be replaced with gas combined cycle, nuclear and renewable generation. Other utilities are exploring the joint construction of nuclear generation facilities outside the state in order to reduce their carbon footprint.

Utilities are also considering switching to either natural gas or biomass in order to reduce carbon emissions. There are five major gas pipelines operating in the state, bringing natural gas from the Gulf Coast and the Northeast. These pipelines are mainly used for interstate transport. Upgrades to the infrastructure would be required if the electric utilities switch to natural gas as a primary fuel source.

A large-scale fuel switch to biomass (a biological material of recent origin used for energy production) or a blended fuel of biomass and coal would require fuel processing/loading infrastructure that currently is not available at the level needed to supply central station power plants. Several biomass projects are in the planning stages, but without either an environmental requirement or funding incentives, the switch to biomass is cost-prohibitive and unlikely.

The disposal of coal byproducts is also under review by the EPA. After the failure of a TVA coal byproduct storage facility, the EPA issued a notice of proposed rules regarding the treatment of fly ash from power plants. The most restrictive of the proposals is to treat the waste as hazardous, which would require lined, hazardous-waste-quality landfills for ash storage. In addition, existing fly ash storage areas would require upgrades. If fly ash is deemed hazardous, combustion byproduct handling is not adequate as constructed today. New hazardous waste landfills and upgrades to existing landfills would be required.

Environmental regulations will require the construction of additional environmental control equipment for sulfur dioxide (SO₂) and nitrogen oxides (NO_x). If enacted, carbon legislation will create an immediate demand for construction of additional pollution-control equipment and possibly pipelines for transport of carbon dioxide to underground injection sites. If utilities choose to burn biomass to aid in their carbon dioxide compliance, the industry must prepare for growing, harvesting and transporting the biomass product. Wood or agriculture type biomass is handled adequately today, but not at the scale required if biomass is deemed a viable fuel source.

Kentucky's transmission system was originally constructed as separate utility company systems to deliver power within each utility service territory. Selected interconnection points allowed for minimal transfers between systems. With the deregulation of the wholesale power market, the transmission grid has been pushed to the limit to function as a conduit for large transfers of power from north to south. However, as these transfers do not directly benefit the consumers within Kentucky, utilities have been reluctant to construct transmission to alleviate the congestion caused by these north-south transactions, thus creating instability in the grid system.

In 2005, the Kentucky Public Service Commission (PSC) issued a report reviewing the transmission grid. The report concluded that the transmission system is aging and the current capacity is generally adequate for in-system and minimal off-system transfers of power.

However, large transfers are pushing the capacity and additional investment is needed to ensure the integrity of the system for intrastate transfers, as well as interstate transfers.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- Continue energy conservation efforts to reduce the load on Kentucky’s grid
- Continue research in alternative energy sources
- Anticipate changes in EPA regulations and prepare to invest in infrastructure to keep Kentucky in compliance with new regulations

GRADE

Kentucky’s transmission grid currently meets the state’s need to transmit power within the state. However, it is not adequate for large-scale, north-south transmission. Kentucky’s power plants meet current EPA requirements, but proposed emission requirements could create the need for construction of additional scrubbers. In addition, proposed EPA regulations could classify coal combustion products as a hazardous waste, and landfills would have to meet new design requirements to handle those wastes. Utility companies are investigating alternative fuel sources and are focusing on reducing consumer demand to reduce the demand on the grid.

As a result, energy infrastructure is assigned a grade of B-.

KENTUCKY ENERGY SUB-COMMITTEE

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ISSUE BRIEF



KENTUCKY HAZARDOUS WASTE

2011 Kentucky Grade: C

Date: February 1, 2011

Proper management of hazardous waste is essential to protect human health and the environment from exposures to toxic chemicals. Hazardous waste is tracked from the point of generation until it is properly disposed or treated. In the past, hazardous waste was not tracked nor was there adequate infrastructure in place to manage the increasing waste quantities of an industrialized society. Long-term environmental damage to industrial sites as well as to the waste-receiving facilities resulted. Many of these environmentally damaged sites are still undergoing corrective action today at great expense. Hazardous waste oversight and infrastructure must be maintained to prevent similar damages in the future.

CURRENT CONDITIONS

Hazardous waste is regulated under the federal Resource Conservation and Recovery Act of 1976 (RCRA); Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA); and state law. Kentucky assumed authority to carry out the federal hazardous waste permitting and enforcement programs in 1982 and to implement the RCRA corrective action program in 1996.

In 2009, Kentucky produced 132,710 tons of hazardous waste that required management in a permitted hazardous waste treatment, storage or disposal facility. Kentucky, like most states, relies on facilities both inside and outside its borders for recycling, treatment or disposal of hazardous wastes. Kentucky remains a net exporter of hazardous waste—the state exported 163,658 tons and imported 75,083 tons of hazardous waste for recycling, treatment or disposal in 2009. Three commercial hazardous waste treatment facilities are currently operating in Kentucky. Since the 2003 Kentucky Infrastructure Report Card, a large commercial hazardous waste incineration facility declared bankruptcy and has undergone remedial actions under federal CERCLA.

Enforcement and Compliance

Kentucky began regulating hazardous waste in 1979. The Kentucky Division of Waste Management (DWM) is the principal regulatory agency in the state responsible for ensuring that hazardous wastes are properly managed and disposed. State hazardous waste permitting and enforcement programs were put in place in 1982. A number of sources are subject to hazardous waste laws and regulations in Kentucky, including 285 large-quantity hazardous waste generators; 14 permitted treatment, storage and disposal facilities; 127 transporters; 445 small-quantity generators; 1,906 conditionally exempt small-quantity generators; 83 recyclers; and 44

used-oil burners. In addition, the state continues to pursue facilities that fail to report hazardous waste generation and illegal disposal of hazardous waste.

In 1997, Kentucky adopted the federal Universal Waste Rule, which includes batteries, pesticides, thermostats and spent lamps. The Universal Waste Rule eases regulatory restrictions on these products and streamlines administrative requirements, making for easier collection and proper disposal. Currently, there are 26 large-quantity handlers of universal waste and no destination facilities.

Contaminated Waste Sites

The Superfund and Hazardous Waste branches of DWM oversee cleanup of hazardous waste sites. The Hazardous Waste Branch's Corrective Action Program deals primarily with cleanups at large active hazardous waste facilities that treat, store or dispose of hazardous wastes or have done so in the past. These sites are in the RCRA program. The Superfund Branch oversees cleanup at hazardous wastes sites that were either operational prior to RCRA or fall outside of RCRA.

RCRA Sites

The Hazardous Waste Corrective Action Program oversees cleanups at approximately 94 sites, all of which have a clearly defined responsible party. Although there are not many sites in the program, it includes some of the largest and most complex remedial sites, including several large chemical manufacturers and military installations.

Significant accomplishments have been made in meeting the U.S. Environmental Protection Agency's (EPA) goals charting remedial progress at RCRA sites. The EPA goals consist of the following four environmental indicators: current human exposures under control, migration of contaminated groundwater under control, remedy decision and remedy construction. A total of 61 facilities are being measured with these criteria.

At the end of 2009, 50 facilities met the requirements for current human exposures under control. This amounts to 81 percent of facilities, compared to an annual goal of 65 percent of facilities meeting these requirements. At the end of 2009, Kentucky met its goal of 42 facilities meeting the requirements for migration of contaminated groundwater under control, representing 68 percent of facilities compared to an annual goal of 59 percent. A total of 22 facilities met the criteria for remedy decision at the end of 2009, representing 36 percent of facilities. This does not meet the annual goal of 44 percent. At the end of 2009, 16 facilities met the requirements for remedy construction, representing 26 percent of total facilities. This falls below the annual goal of 36 percent.

Federal Superfund Sites

In Kentucky, hundreds of old or abandoned waste sites pose threats to the environment and public health. Sites that are highly contaminated or pose an immediate public health threat may be proposed for inclusion on the EPA's National Priority List (NPL), better known as Superfund.

Contaminated sites that do not qualify for federal Superfund status become the state's responsibility.

Kentucky has experienced progress in the remediation of its federal Superfund sites. Seventeen of the 20 federal Superfund sites in Kentucky completed remediation or require no further action. Eleven sites are in stages of long-term remediation and require no further construction activities.

The Paducah Gaseous Diffusion Plant is a major federal Superfund and RCRA site. The facility is an active uranium enrichment plant that has been in operation since 1952. From 1988 to the present, the Department of Energy (DOE) invested \$1.8 billion in environmental cleanup and restoration. More than 15 tons of trichloroethylene has been removed from the groundwater. More than six million cubic feet of waste has been removed. More than 800,000 cubic feet of materials have been generated and disposed at another facility. Comprehensive remediation of the site is governed by a federal facilities agreement between DOE, the EPA's Region IV, which is the southeast region of the U.S., as well as Kentucky. Multiple cleanup schedules have been structured and abandoned over the years due to DOE's inability to obtain funds sufficient to meet the agreements. Currently, DOE has requested that EPA and Kentucky schedule an additional 12 years to accommodate flat funding through 2016.

Maxey Flats and National Southwire Aluminum Co. have not yet been removed from the NPL. Installation of a synthetic liner over the landfill was completed at Maxey Flats in the spring of 2003. The facility is currently under a long-term remediation program. This program consists of utilizing natural stabilization, which will allow the materials in the trenches to subside naturally to a stable condition prior to installation of a final engineered cap, at which point construction will be considered final and complete. Natural stabilization is predicted to take 35 to 100 years.

Beginning in 1995, National Southwire Aluminum Co. underwent long-term groundwater treatment and completed remediation efforts in 2007, achieving closure with restrictions. Monitoring at the site continues and it has not yet begun the delisting process from the NPL.

State Superfund Sites

Potentially contaminated sites that fall into the state's jurisdiction are placed on the state's Superfund list. The state Superfund list includes a wide variety of incidents with different types of hazardous waste releases, including large facility-wide releases at industrial sites, manufacturing and chemical plants, and isolated chemical spills, such as transportation accidents or abandoned drums. Some sites have minimal overall environmental impact or may have no evidence of releases once assessed. Other sites may have significant soil, sediment or groundwater contamination that can take years to remediate.

Once a site is investigated and remediated, it is closed and no longer considered an active state Superfund or petroleum site. However, many of these sites may still require groundwater monitoring and long-term maintenance, which will keep them on the state Superfund site list.

As of September 2010, 2,570 Superfund sites were listed within the state. Of the 2,570 sites, 743 are considered active, meaning they are undergoing active investigation or remediation. These investigations can either be conducted by the responsible party or the state in the instance where

the responsible party cannot be located or is financially unable to assist in the investigation and/or remediation. A total of 1,140 sites assigned to the state have been restored and granted “no further action” status. Currently, there are 87 sites that have been closed with restrictions. These sites will have environmental controls in place, such as caps or environmental covenants, and undergo annual certification as well as a site review every five years.

The state incorporates a subsection of sites referred to as “capital construction state led” sites. These sites’ characterization and remediation are state-funded through the Hazardous Waste Management Fund, which collects revenue from hazardous waste generators. Capital construction sites are those that are led by the state, but also include extensive projects that require the expenditure of a large amount of personnel time and field costs. As of September 2010, 24 sites were listed as capital construction accounts. Except for environmental emergencies, funding for investigation and/or remediation must be conducted in accordance with competitive bidding procedures for state-funded construction projects. Since 1994, there have been 64 capital construction sites remediated and closed, either by receipt of a “no further action” status or managed closure options. In addition, 493 state-led sites did not require capital account expenditures and have been remediated and/or closed.

There is no average length of time for a site to remain on the state Superfund list. Variables that influence the length of time include:

- The primary responsible parties’ ability to perform or fund investigations and/or remediation measures
- The type and extent of contamination (e.g., isolated contaminated spills with little overall environmental impact or abandoned, compared to bulk plant spills requiring years of remediation)
- The need to undergo long-term remediation measures, such as pumping and treatment of contaminated groundwater, to prevent further spread of contaminated plumes

Brownfield Sites

Brownfields are abandoned, idle or underused industrial or commercial facilities where redevelopment is complicated by real or perceived environmental contamination. Many brownfields sites are located in the urban core and consequently are well-served by urban infrastructure. Capital investments for brownfields do not promote urban sprawl, because roads and utilities are already in place and existing property is being utilized.

By broad consensus of both regulators and engineers, an obstacle to brownfields redevelopment is the stringent liability scheme in CERCLA, which imposes strict and retroactive liabilities on past and present facility owners and operators, individuals who transported hazardous substances to a facility, and individuals who arranged for disposal or treatment of hazardous substances at a facility where there was a release, or threatened release, of hazardous substances.

Since CERCLA contains no provisions that relax its liability provisions for purchasers of brownfield sites for redevelopment and cleanup, the U.S. Senate passed the Brownfields Revitalization and Environmental Restoration Act of 2001. This legislation provided liability

exemptions for owners of land contaminated by a source on contiguous property and holds purchasers of known contaminated sites for redevelopment from future liability resulting from the initial contamination after the land is cleaned. Kentucky adopted similar liability protections in the state Superfund law.

The 2003 Kentucky Infrastructure Report Card noted that DWM proposed regulations that were not well received by the regulated community. The rules have since been withdrawn. Following the withdrawal, the Cabinet Secretary of the Energy and Environmental Cabinet convened a task force consisting of a broad cross-section of stakeholders. Through this process, new regulations for the cleanup and closure process have been adopted.

In 2005, Kentucky established tax incentives to encourage brownfields redevelopment; however, this has not had a major impact on redevelopment because the tax incentives were too small and because there is an abundance of green fields to develop. In addition, several utilities offer brownfields tariffs. These tariffs allow for reduced rates for redevelopment of existing facilities. The discount is usually for five years. Existing facilities typically have utility infrastructure in place that is not being utilized. The tariffs are used to encourage redevelopment and better use of existing electrical infrastructure, resulting in increased interest in brownfields redevelopment.

Through the federal brownfields program, the state receives grant money to perform environmental site assessments of abandoned or publicly owned facilities to evaluate environmental concerns and contamination. Since the beginning of the program, the state has conducted assessments of nearly 60 properties. The state also helps communities to apply for individual EPA brownfields grants. Over the past four years, the Kentucky Brownfield Program helped local governments secure \$5.2 million in brownfields grants. The program also assists public, private and non-profit groups in determining additional funding sources and guides them through the assessment and cleanup processes.

Investment Needs

State Superfund sites are contaminated waste sites that threaten the environment or public health. The program to clean up abandoned waste sites is financed by a hazardous waste assessment fee from entities that generate certain hazardous wastes. This assessment fee, which generated nearly \$1.2 million in 2010, was reauthorized for another two years in the 2010 legislative session. The funds generated represent a 40 percent decrease in fees since 2003, largely due to waste minimization efforts and the utilization of more recycling exemptions. As funding decreases, it becomes more difficult to implement the state's Superfund program. Since 1994, total costs of highly contaminated abandoned sites, also known as capital construction sites, are more than \$29 million. Cleanups are planned at 24 of these sites at an estimated cost of more than \$2.6 million. DWM estimates that approximately \$80 million is needed to address Kentucky's Superfund sites.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- Continue to ensure that adequate treatment and disposal of hazardous waste is consistent with state and federal rules.
- Continue to ensure that hazardous waste generators and handlers are brought into compliance with state laws and regulations within the shortest possible time after the detection of any violation.
- Promote a dry cleaner fund, similar to neighboring states, to assist with the hazardous waste cleanups that typically exceed the financial capability of owners.
- Provide other funding sources to the state's Superfund program as the hazardous waste assessment fee continues to decrease.

GRADE

The 2003 Kentucky Infrastructure Report Card assessed a grade of D+ on hazardous waste infrastructure. In Kentucky, 17 of 20 NPL Superfund sites either have a remedy in place or have been closed and removed from the priority list. Significant work and progress have been made at each of the three remaining sites, but none have achieved NPL milestones since 2003. In addition, hundreds of contaminated sites not on the federal NPL list require cleanup at an initial estimated cost of \$80 million. Approximately \$1.2 million per year is generated from hazardous waste fees to address cleanups at state priority sites or sites where viable responsible parties cannot be identified.

At RCRA sites, progress has been made in attaining the EPA's environmental indicators goals. Since 2003, Kentucky has made 13 percent and 28 percent increases in its migration of contaminated groundwater under control and current human exposures under control goals, respectively. Kentucky has already exceeded the 2014 goal for current human exposures under control, and it is currently close to reaching the 2014 goal for migration of contaminated groundwater under control. The two new environmental indicators – remedy decision and remedy construction – were not in place at the time of the 2003 Report Card. Although Kentucky currently falls below its annual goals for these two environmental indicators, the Hazardous Waste Branch believes that the 2014 goals can be attained.

Many of ASCE's recommendations from the 2003 report card have been met. The Division of Compliance Assistance has been created to educate and reach out to the regulated community regarding all hazardous waste issues and brownfield cleanups. Kentucky continues to work with local governments and the regulated community to develop a complete inventory of contaminated sites suitable for redevelopment, which is maintained by the Division of Compliance Assistance. The passage of the environmental covenants law, along with the promulgation of cleanup regulations, has resulted in consistent cleanup criteria considerate of future land use. New laws are also in place that protect the liability of purchasers of contaminated or potentially contaminated property. Tax credits have been implemented to assist with cleanups of property by owners not responsible for the contamination.

Since 2003, both staff and funding for the hazardous wastes programs have decreased. However, new regulations and statutes have solved many of the problems for both the agency and the regulated community. As a result, the state's hazardous waste infrastructure is assigned a grade of C.

KENTUCKY HAZARDOUS WASTE SUB-COMMITTEE

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<http://waste.ky.gov/Pages/default.aspx>

ISSUE BRIEF



KENTUCKY LEVEES

2011 Kentucky Grade: D+

Date: February 1, 2011

Kentucky has communities in flood-prone areas. Because of the 2005 Katrina disaster in New Orleans, Louisiana, Kentucky citizens need to be aware that the state's flood protection systems need to be upgraded and repaired.

CURRENT CONDITIONS

Kentucky's levees have not been previously evaluated by the ASCE Kentucky Section; they have been assigned a grade of D+. This grade reflects the current capacity of Kentucky's federal and non-federal flood protection systems to provide protection to communities at risk of flooding. The grade is a reflection of the collective safety of the entire system, including individual levees, floodwalls and pumping stations. Although there are federal standards, there is no system to specifically cover Kentucky. Flood protection systems that are under-maintained or that incorporate structures considered unsatisfactory were considered in the data utilized in this report.

The U.S. Army Corps of Engineers' (USACE) Levee Safety Program was created in the wake of Hurricane Katrina in New Orleans, Louisiana, in 2005. The mission of the Levee Safety Program is to assess the integrity and viability of levee systems and recommend actions to reduce the associated flood risks to the public, property and environment. Regulations developed by USACE are part of the effort to implement a more rigorous inspection program for levee systems, improve communication about the overall condition and associated risks of levee systems, and ensure more consistent national application of inspection standards. The Levee Safety Program resulted in several simultaneous initiatives designed to comprehensively address the safety of levee systems throughout the United States. The initiatives include the Periodic Inspection Program, the National Levee Database, the formalizing and updating of the Annual (or Routine) Inspection Program and levee safety evaluations associated with Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP).

The purpose of a periodic inspection is to verify proper operation and maintenance of levee systems, evaluate their operational adequacy and structural stability, and identify specific components and features to monitor over time. Periodic, detailed inspections are performed approximately every five years by teams of experienced engineers who assess the condition of a flood protection system and make recommendations for repairs and improvements or for addressing life safety issues. USACE performed periodic inspections in the 1970s, but the program was suspended after two rounds of inspections were completed. The first periodic inspections performed since the 1970s are now complete.

The National Levee Database was created as a result of direction from Congress to collect data on all existing levee systems. Such a database allows Congress to understand, perhaps for the first time, the magnitude of U.S. flood protection systems. For example, the number of miles of levee and floodwall in the national inventory is now known. This information can be paired with condition assessments and inspection results to rate flood protection systems to determine repair and investment priorities.

The Routine Inspection Program involves annual inspections of every federally funded flood protection system. The inspection program was revamped after Hurricane Katrina in 2005 to focus on areas of weakness in the inspection program that were recognized to be contributing factors to the failures of New Orleans' levees and floodwalls.

As part of the National Flood Insurance Program (NFIP), FEMA develops flood insurance rate maps (FIRMs) to identify areas that may be subject to flooding, for both determining flood insurance rates and floodplain management activities. Floodplain maps have been published by FEMA since the beginning of the NFIP in 1968.

Starting in 2003, FEMA embarked on a nationwide program called the Flood Map Modernization (Map Mod) Program. In Phase 1 of the Map Mod Program, FEMA provided digital flood hazard data and maps known as Digital Flood Insurance Rate Maps (DFIRMs), which are more reliable, easier to use and more readily available than the previous hardcopy FIRMs. As part of the remapping process, FEMA is verifying that all levees recognized on previous FIRMs have specific structural requirements certified by a registered professional engineer or a federal agency with responsibility for levee design, such as USACE. In addition, the levee must have been adequately designed and constructed to provide reasonable assurance of excluding a 100-year-flood from the levee protected area and thus meet NFIP levee system evaluation requirements.

The purpose of an NFIP levee system evaluation is to determine how flood hazard areas behind levees are mapped on FIRMs. A levee system consists of a levee or levees and associated structures, such as closure and drainage devices, which provide reasonable assurance of excluding flood water from an associated separable floodplain. The maps are used to determine flood insurance rates and federal, state and local floodplain management requirements, as well as inform other floodplain management decisions.

Cost Impact Items

Corrugated metal pipe (CMP) culverts and drainage structures located beneath vital transportation and flood management infrastructure have significantly deteriorated over the last several decades. The design life of a CMP is approximately 50 to 65 years, and most were installed beginning in the late 1930s and continuing into the early 1960s. Failure of these culverts can cause the structure above to collapse, potentially causing injuries and fatalities, along with reduced flood protection. Remediation of these deteriorating structures will cost millions of dollars nationwide, but the cost of inaction is economically crippling and a threat to public safety.

For more than a decade, USACE has observed continued significant deterioration in CMP drainage structures as they reach the end of their life expectancy. Failures, typically collapse, have also been observed in these structures in Kentucky. Conventional repairs of failed or failing CMPs have been costly because the typical repair method is an open-cut excavation with complete pipe replacement.

The state's flood protection projects contain approximately 776 gravity drainpipes, 593 of which are CMPs. Of those, only 78 CMPs have been rehabilitated to date. The remaining 515 CMPs will eventually need to be either removed and replaced using conventional methods, or they will need to be relined with new pipe.

Most of Kentucky's pump stations were constructed in the 1940s and 1950s. The electrical systems that control the pumps are aging and replacement parts are generally no longer available. Similarly, the pumps are aging and replacement parts may not be available. Although the pumps are infrequently under service loads, damage to pumps can happen in any flood event. All pump stations are generally in need of upgrades.

Investment Needs

Estimated costs were obtained to repair deficiencies in just 11 of the 29 flood protection systems in Kentucky. The reported total estimated cost is approximately \$77 million. If it is assumed that the other 18 projects have similar levels of deficiencies, the total cost for Kentucky may approach \$200 million. It may be unrealistic to assume that funding can be provided to correct all deficiencies and bring Kentucky's flood protection systems up to current USACE standards in the short term.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- ASCE should consider partnering with USACE for this category
- One person from USACE, one person from one of the local sponsors who also represents the National Association of Flood Plain Managers and one person from ASCE should be included on the Committee for Flood Protection Systems
- More funding for maintenance, repair and upgrades to Flood Protection Systems in Kentucky is needed

GRADE

The condition of Kentucky's flood protection systems has continued to deteriorate as these systems age. Most of the projects were constructed between 1940 and 1960. Of Kentucky's 29 projects, only five had an acceptable rating, five had an unacceptable rating and the remaining 19 projects were all rated minimally acceptable. The Corps inspector provides the rating of individual items during annual inspection of flood protection projects. The District Levee Safety Officer provides the overall system rating after reviewing the ratings of all individual items within a system. A rating of "Acceptable" means the system is being maintained to a very high level and no major problems were found. A rating of "Minimally Acceptable" means there are

some items found that require maintenance or repair actions within a period of time established by the District. A rating of "Unacceptable" means the system is on notice that it has an item or items in poor enough condition to render the project potentially unsafe in the event of a flood. An Unacceptable rating automatically starts a process that will result in the system being removed from the Routine Inspection Program within a period of two years unless corrections are made. Federal funding, which paid for most construction costs, is no longer provided for operations and maintenance, and it must be funded by local sponsors. In the projects for which cost data was available, the total cost of five years of current operating and maintenance budgets is generally only a fraction of the estimated repair, upgrade and replacement costs.

As a result, an overall D+ grade is assigned to Kentucky's levees.

KENTUCKY LEVEES SUB-COMMITTEE

Terry M. Sullivan, PE, Committee Chair, U.S. Army Corps of Engineers

Christina Neutz, U.S. Army Corps of Engineers

SOURCES

1. Phone conversations with local sponsors for all Louisville District Federal flood protection projects.
2. U.S. Army Corps of Engineers, Huntington District; Periodic and Annual Inspections for all Federal projects.
3. U.S. Army Corps of Engineers, Louisville District; Periodic and Annual Inspections for all Federal projects.
4. U.S. Army Corps of Engineers, Nashville District; Periodic and Annual Inspections for all Federal projects.

ISSUE BRIEF



KENTUCKY ROADS

2011 Kentucky Grade: D

Date: February 1, 2011

Kentuckians depend on the transportation network to travel to and from work and school each day and to obtain goods and services. The transportation system must expand and adapt to meet the needs of the state as the economy and population continue to grow, which requires continuous improvement and investment in the safety and capacity of the network.

CURRENT CONDITIONS

According to the Kentucky Transportation Cabinet's (KYTC) Statewide Maintenance Rating Program for 2010, the statewide maintenance levels of service for all roads average 79.7 percent, which is slightly below their target performance level of 80 percent for good condition. The target serves as a benchmark to help identify best practices and opportunities for improvement. *Table 1* shows roadway classifications and their collective score.

*Table 1 – Statewide Maintenance Levels of Service**

Statewide Scores FY 10		
<i>Classification</i>	<i>Score</i>	<i>Grade*</i>
Interstates	89.0	B
National Highway System	87.0	B
State Primary and Secondary	81.9	B
Rural Secondary	73.9	C
All Roads	79.7	C

**These scores are used by the KYTC as an internal measure of maintenance service levels. These grades are not associated with the overall Kentucky Roads Report Card.*

Congestion and delays are growing problems in Kentucky. According to data from the Kentuckiana Regional Planning and Development Agency (KIPDA), between 1982 and 2003, growth in hours of delay in the Kentucky area (specifically the Louisville metropolitan area and Northern Kentucky/Cincinnati area) outpaced the average growth for a medium area, which is defined as an area with a population between 500,000 and 1 million. *Figure 1* shows a summary of KIPDA's freeway level of service data.



Figure 1 – KIPDA Level of Service Map of Jefferson County and Surrounding Counties

All freeway segments shown in red in *Figure 1* are routinely operating at or above capacity, while those sections shown in green are routinely operating below capacity. Level of service is categorized from A to F. An A level indicates a free flow of traffic at average speeds, while an F level is characterized by every vehicle moving in lockstep with the vehicle in front of it, with frequent drops in speed to nearly 0 MPH, severe delays, high volume and extensive queuing. Once demand exceeds capacity on a freeway segment, efficiency suffers and drivers begin to experience unacceptable delays.

Delays per person due to traffic congestion nationwide increased 236 percent from 1982 to 2000. Highway travel during that time increased 72 percent, while the U.S. population grew by 19 percent. At the same time, new road mileage grew only 6 percent. This trend has continued from 2000 to 2010 and will continue to increase unless improvements are made to increase capacity on Kentucky roads.

The Road Information Project (TRIP) publishes average pavement conditions for metropolitan areas. According to TRIP, 14 percent of pavement in the Louisville area is in poor condition, compared to 13 percent in Cincinnati, 7 percent in Nashville and 27 percent in Indianapolis. As a result of poor pavement conditions, motorists in Louisville pay an additional \$391 in vehicle operating costs per year, compared to \$285 in Cincinnati, \$177 in Nashville and \$490 in Indianapolis.

KYTC pavement condition data indicates that the percentage of pavement on primary state routes in poor condition increased from 13 to 21 percent between 2005 and 2007. During this same time, District 5 (the Louisville metropolitan area), increased from 21 to 25 percent. Even

In 2009, 730 individuals were killed and 25,063 were injured on Kentucky's highways. Based on these numbers, one in 16 drivers was involved in a traffic collision, one in 126 was injured in a traffic collision and one out of every 3,200 was involved in a fatal accident. The Kentucky fatality rate is 1.68 fatalities per 100 million vehicle miles traveled, whereas the national average is 1.16.

In 2008, Kentucky had the 45th lowest seatbelt usage rate in the U.S. at 73.3 percent. The usage rate increased 6 percent since Kentucky passed a primary seat belt law in 2006. According to the National Highway Traffic Safety Administration, states with stronger belt enforcement laws exhibit generally higher usage rates than those with weaker laws. Fifteen states have 90 percent or higher seatbelt usage rate.

Investment Needs

Significant improvements are needed across the state to increase capacity of the transportation system and safety of existing roads in rural settings and to maintain pavements in a minimally acceptable condition of service.

KYTC maintains a list of unscheduled projects, which includes roadway projects in various stages of planning and design that have not yet been funded. Currently, more than \$40 billion in projects is on the KYTC unscheduled projects list. In addition, individual counties have their own roadway projects that have been planned but do not have a funding source.

Pavement in poor condition affects the safety and comfort of the motoring public and increases vehicle operating and maintenance costs. Postponement of improving poor pavements accelerates deterioration and may result in more expensive improvements and repairs in the future. The Six-Year-Highway Plan allocates less than \$1 billion annually to meet roadway infrastructure needs. Consequently, Kentucky currently has a project-funding backlog of more than 50 years worth of projects.

In addition to the scarcity of funding for roadway construction, there is also a shortfall in maintenance funding. The price of asphalt has risen dramatically with the price of oil. Neither KYTC nor individual counties can keep up with their annual paving schedules. From 2005 to 2007, the cost per mile to resurface primary state routes increased 28 percent, while the amount of miles resurfaced per year decreased 27 percent. The reduction in paving by individual counties is even more drastic.

KYTC's Operations and Pavement Management Branch proposed implementing preventive maintenance techniques to extend pavement life to align with its current resurfacing cycle. This comes at a cost of 20 to 25 percent of the current paving budget in additional funding, which is between \$16.7 and \$20.9 million. In order to maintain pavements at their current conditions while also maintaining the current "worst-first" paving strategy, an additional 40 to 80 percent of the current budget, which amounts to between \$32.5 and \$70.5 million, would be required. If current paving strategies and funding are maintained, 30 to 40 percent of pavements will deteriorate to poor condition in the next three years.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- Dedicate funding to reduce the backlog of unfunded roadway improvement projects
- Prioritize projects that will ease congestion and promote economic development throughout the metropolitan areas
- Develop and adopt improved preventive maintenance programs at both the state and county levels to slow the decline in pavement conditions.
- Provide additional funding for preventive maintenance projects
- Coordinate congestion relief efforts with mass transportation improvements
- Find alternative methods of funding
- Increase education around seatbelt safety

GRADE

Kentucky continues to struggle with a growing list of roadway improvement needs and has inadequate funding to support improvements. Without sufficient roadway funding, Kentucky counties will have difficulty providing adequate levels of service and ensuring safety.

The primary funding source for roads in Kentucky is the gas tax, which provided \$500 million in 2007 for transportation projects statewide. As gas prices rise and vehicle miles traveled decrease as a result, gas tax revenue will also decrease. Lack of interest in mass transportation in Kentucky is a contributing factor in roadway congestion and poor road conditions.

Roads in Kentucky are assigned a grade of a D.

KENTUCKY ROADS SUB-COMMITTEE

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3. Kentuckiana Regional Planning and Development Agency. *Congestion Management Process Overview for the Louisville (KY-IN) Metropolitan Planning Area*. Retrieved January 19, 2011: http://www.kipda.org/files/PDF/Transportation_Division/Information?CMPOverview.pdf

4. Operations and Pavement Management Branch, Kentucky Transportation Cabinet. *Condition of Pavements on Kentucky Highways State Primary, State Secondary, Supplemental, and Rural Secondary Roads 2007*. Retrieved January 2011: <http://transportation.ky.gov/Maintenance/PM%20Reports/statewide%20Report-.pdf>
5. TRIP. *Keep Both Hands on the Wheel: Metro Areas with the Roughest Rides and Strategies to make our Roads Smoother* Retrieved January 2011: <http://www.tripnet.org/research.htm>

ISSUE BRIEF



KENTUCKY SCHOOL FACILITIES

2011 Kentucky Grade: B-

Date: February 1, 2011

Kentucky has 174 school districts that serve approximately 673,000 students in public schools that include regular, special education, vocational and alternative educational facilities.

CURRENT CONDITIONS

Enrollment in Kentucky's schools during the last decade increased 2.8 percent and from 2000 to 2010; state enrollment in elementary and secondary schools increased by 40,000 students, a 6.3 percent increase. In FY2010, average per-student revenues were approximately \$2,300 less than the national average of \$13,673, while average per-student expense spending of \$9,325 was approximately \$1,181 less than the national average, excluding debt service, facilities and fund transfers. Kentucky translates 94 percent of per-student revenue to per-student expenditures, compared to the national average of 86 percent.

Kentucky's 1,197 school facilities are evaluated every four years using a grading system that ranges from "like new" to "needs replacement." Based on this assessment, only 1.4% (or 17 facilities) are in need of replacement. An additional 10% need major renovation. The rest are in acceptable or better condition.

Technology

Although technology is typically not considered part of the infrastructure, the following facts coupled with the statistics noted above indicate increasing demands for adequate electrical wiring and power in Kentucky's schools:

- 100 percent of schools have Internet access
- 100 percent of schools use email
- Ratio of students to modern, high-performance computers is 2.73-1, exceeding the goal of 6-1
- Ratio of teachers to modern, high-performance computers is 0.91-1, with a goal of 1-1
- 76 percent of all classrooms are considered "intelligent," with interactive, collaborative learning environments.

Investment Needs

Current estimates indicate that Kentucky faces a \$3.1 billion cost for school modernization, which includes \$2.4 billion for infrastructure and \$686 million for technology needs. The average per-student expenditure of \$6,829 needs to increase to \$7,015 in order to match the national average.

Meeting Modernization Needs

The Kentucky Department of Education's Division of Facilities Management, in partnership with local school districts, implements approximately 500 construction projects each year at a value of \$300 to \$350 million. Since 1993, approximately two-thirds of all public school construction has been renovation or addition to existing school sites, while the remaining third is new construction for growth and replacement.

Kentucky's school-building program is a partnership between local and state government with shared funding, responsibility and authority. Kentucky has three state-supported funding mechanisms:

- Capital Outlay – \$100 per student each year based on student attendance. Capital outlay is part of Support Educational Excellence in Kentucky (SEEK).
- Facility Support Program of Kentucky (FSPK) – Provides authority for local 5-cent tax per \$100 of assessed property value to be matched by state equalization to the state's average assessment per student. Funding is provided through SEEK.
- School Facilities Construction Commission (SFCC) – Assistance is provided based on facility needs.

Long-range district facility plans, which establish organizational structure, facilities, capacity and capital construction priorities, are required from all schools and districts. Decisions on new construction, renovation, organizational structures and consolidation are made locally. Evaluation of facilities is consistent using standard criteria and design professionals. Feasibility for renovation is provided for each school. The determination is based on the residual value of the facility and its ability to support a modern educational program.

RECOMMENDATIONS SUPPORTED BY ASCE

As Kentucky continues to grow and develop, the demand on the public school system will increase. A continued and concerted effort must be made by the commonwealth to ensure that funding and support are available for an adequate school system. ASCE recommends the following:

- Conduct a comprehensive, quantitative evaluation of the public school systems at regular intervals
- Encourage school districts to adopt and implement comprehensive maintenance and construction programs to allow for proper planning and capital reserve funding
- Encourage continued support and funding of the building aid program

GRADE

Approximately 1.4% (or 17 facilities) are in need of replacement. An additional 10% need major renovation. The rest are in acceptable or better condition. Apart from state funding support, each school district is allowed to assess a local 5-cent tax per \$100 of assessed property value to support construction.

Thus, Kentucky's school infrastructure is assigned a grade of B-.

ACKNOWLEDGEMENTS

The School Sub-Committee wants to recognize the Kentucky Department of Education for resources in compiling the report card.

KENTUCKY SCHOOL FACILITIES SUB-COMMITTEE

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Tommy Knoy, Jefferson County Public Schools

SOURCES

1. Kentucky Department of Education (KDE). 2010.

ISSUE BRIEF



KENTUCKY SOLID WASTE

2011 Kentucky Grade: B

Date: February 1, 2011

CURRENT CONDITIONS

Solid waste issues became a major focus in Kentucky in the late 1960s when the first solid waste legislation was passed. Early legislation furthered development of county authority and responsibility for penalties for non-compliance and development of five-year solid waste plans. The five-year solid waste plans provide all households access to garbage collection, cleanup of illegal dumps and litter, recycling and solid waste education. There are currently 29 permitted solid waste facilities, including contained landfills and construction demolition debris landfills, in 28 Kentucky counties.

Solid Waste Management

The Division of Waste Management (DWM) is one of six divisions of the Department for Environmental Protection in the Energy and Environment Cabinet (EEC). The Solid Waste Branch of DWM manages the solid (non-hazardous) waste program. First and foremost, the mission of the Solid Waste Branch is to minimize waste generation. Secondly, emphasis is placed on the reclamation and recycling of waste generated. Finally, requirements are developed to ensure that the remaining waste is disposed of properly. The Branch ensures proper solid and special waste management practices through the implementation of comprehensive permitting, monitoring and training. It is also responsible for the review and issuance of permits for solid waste landfills, land farming and composting facilities, and registration for permit-by-rule facilities.

Kentucky counties offer a system of universal waste collection. Universal waste collection means that collection service is available to households, either through curbside collection or through drop-off centers, collection centers or transfer stations. As Kentucky's population increases, so does the amount of waste generated in the state. In 2009, Kentucky experienced a 7 percent decrease in waste disposal in landfills—a 5 percent decrease of waste generated in Kentucky and a 2 percent decrease in out-of-state waste. Kentucky exported 7 percent of its waste to out-of-state landfills, an increase of 5 percent from 2008. Kentucky's recycling rate on common household items, such as aluminum, cardboard, ferrous and nonferrous metal, plastic, newspaper, glass and paper, decreased from 34.7 percent in 2008 to 29.7 percent in 2009. In 2006, the average recycling rate in the southeast region was 22 percent, while the national average was 28.5 percent. The recycling rate in Kentucky continues to be above the national average.

The average cost for waste disposal at Kentucky’s landfills in the 2008-2009 fiscal year was \$32.44 per ton.

Table 1 – Comparison of Landfilled and Recycled Solid Waste in Kentucky

Kentucky Solid Waste			
	Amount of Waste in Tons		
	2003	2008	2010
Landfilled Out-of-State Waste	605,760	870,637	851,541
Landfilled KY Waste	4,036,800	4,273,781	4,048,176
Total Landfilled in KY	4,642,560	5,144,418	4,899,717
Recycled in KY	919,802	2,398,863	1,838,574

Participation in curbside garbage collection has remained relatively flat since 2003, with an average of 87.6 percent participation. Since 2003, waste haulers and recyclers have been required to annually register and report the number of households utilizing collection service to the county. The average participation rate for collection systems in the 2009-2010 fiscal year was 86.2 percent, which means approximately 13.8 percent, or 245,141 households, are not accounted for by current tracking methods. Self-haul to a transfer station or convenience center is a legal method of disposal that most counties have difficulty tracking. Increased reporting requirements from transfer stations and convenience centers are needed to ensure adequate tracking for households participating in proper disposal of municipal solid waste. Multi-unit housing is also difficult to track and is often overlooked.

Permitting

The Solid Waste Branch continues to operate essentially backlog- free. On average, the Branch issues three or four permits per week and has an average of 60 permit applications under review at any given time. These numbers are almost evenly split between landfill permits and registered permits-by-rule activities.

Many permits in the Solid Waste program, such as registered permits-by-rule, are issued for the life of the facility. There is firm regulatory mechanism to close out permits that are no longer in use. The Solid Waste Branch, in conjunction with the Field Operations Branch, has begun evaluating old permits with the intent of closing out those which are no longer in use. The goal is to ensure that TEMPO, the departmental database of facility and permitting information, is as accurate as possible.

Historic Landfills

The Historic Landfill Program was established as a section within the Solid Waste Branch in 2003. Its purpose is to address the closure and remediation of historic landfills, commonly

known as “old town dumps.” In 2003, there were an estimated 628 historic landfills. In addition to remedial work, the Branch has also become more active in closing sites with money from the Solid Waste Restoration Fund.

The following is a summary of the Historic Landfill Program progress and results for the 2009-2010 fiscal year.

- Ten landfill construction projects for closure/remediation have been completed.
- Two landfill closure projects are currently under construction.
- Three landfill closure projects have completed the design phase and are scheduled for construction in the next budget cycle.
- Four landfill closure projects are in the design phase.
- Six landfills are contracted for full-site characterization, or review.
- Three landfill owners have completed closure with assistance from the Solid Waste Branch Closure Section.
- Five landfill owners are currently working with the Solid Waste Branch Closure Section to perform remediation and closure of their landfills.
- Site characterization work at two sites has determined no further action is warranted.

Initial characterization (or review) of 159 historical landfill sites has been completed. There are plans to fund the initial site characterization of an additional 85 sites in 16 counties in fiscal year 2010 – 2011. The total estimated cost for initial site characterization, excluding direct and indirect personnel expenses, is \$750,000.

In the wake of the 2008 Kingston, Tenn., coal ash impoundment failure, the Environmental Protection Agency (EPA) proposed new regulations concerning coal combustion waste. One option is to regulate coal ash under the hazardous waste provisions of the Resource Conservation and Recovery Act (RCRA), Subtitle C. Another option is to have states impose new regulatory requirements under RCRA Subtitle D, the solid (non-hazardous) waste provisions. While the rule is proposed at this time, either option will likely increase the design requirements for landfills disposing of coal combustion waste. This nationwide effort has already led to new developments such as the introduction of a geosynthetic clay liner specifically designed for leachate from coal ash.

Recycling

The Recycling and Local Assistance Branch (RLA) provides continuous technical assistance and training to public and private entities on solid waste issues and regulatory requirements, and promotes individual responsibility and accountability for proper solid waste management.

County recycling data illustrates a steady increase through 2009 in the statewide recycling rates of common household items, such as glass, aluminum cans, newspapers, mixed and white office paper, cardboard, metal and plastics. In 2003, the recycling rate was 17.9 percent and has since increased to 29.7 percent. Beginning in March 2004, recyclers were required to report the

amount of municipal solid waste collected by volume, weight or number of items recycled to the county on an annual basis.

The Glass Pulverize Loan Program has taken a new direction since the demise of the loaner machine that produced 110 tons of pulverized glass aggregate across the state in a four-year span. Now several counties have taken advantage of the recycling grant program and have purchased higher capacity pulverizers, capable of pulverizing up to 3,000 pounds of glass per hour.

Waste Tire Trust Fund

The Waste Tire Trust Fund was created in 1998 to address waste tires. Funding comes from a \$1 fee on the sale of all new motor vehicle tires sold in Kentucky. The fund is used to conduct waste tire amnesty programs, award crumb rubber grants and facilitate market development for the use of waste tires.

During fiscal year 2008-2009, tire amnesties were conducted in 33 counties in the Bluegrass, Pennyriple, Barron River and Lincoln Trail development districts. A total of 1,196,816 passenger-tire-equivalents were recovered and recycled through these amnesties at a cost of nearly \$1.2 million. This represents less than a 1 percent decrease in passenger tire equivalents recovered from these same ADDs compared with the last amnesties conducted in 2004 and 2005.

DWM proposed reauthorization of the Waste Tire Trust Fund during the 2010 legislative session. The new-tire fee was not extended during the regular session. Later, the fee was extended as part of the budget bill. The fee will continue to be collected until June 30, 2012.

Crumb Rubber Grants

During fiscal year 2008-2009, the Kentucky Transportation Cabinet awarded 11 grants totaling \$199,457 for crumb rubber projects to be completed during the year.

Kentucky Pride Fund

The environmental remediation fee of \$1.75 per ton of waste disposed of in Kentucky is placed into the Kentucky Pride Fund. This money is used for closure of historic landfills, remediation of illegal open dumps, recycling grants and household hazardous waste management grants.

Litter Abatement

In 2001, DWM began tracking the cost of litter activities and the number of bags of litter collected. The Kentucky Pride Fund was established in fiscal year 2002 as a state litter abatement grant program. The Kentucky Transportation Cabinet distributes \$5 million annually to counties and incorporated cities for litter abatement activities. In 2009, counties cleaned 819,352 bags of litter on 425,898 miles of roadways. Litter collection costs totaled nearly \$7.2 million, an average cost of 44 cents per pound. Most items found on roadways are plastic bottles and food containers. Litter is costly at \$878 per ton, compared to the average landfill disposal rate of \$32.44 per ton.

Cleanup of Illegal Open Dumps

Since 1993, more than 24,711 illegal open dump sites have been cleaned at a cost of \$65.2 million. In 2009, counties cleaned 281 illegal open dumps at a cost of \$0.4 million. The average cost to cleanup each dump site was \$8,654. There were 338 known dump sites remaining as of June 30, 2010.

Financial assistance through the Kentucky Pride Fund Illegal Open Dump Grant Program has provided counties with the incentive and necessary financial help to identify and rid communities of their old dump sites. Since 2002, the program has funded the cleanup of 1,292 dump sites at a cost more than \$7 million. The fifth round of illegal open dump grants were awarded in January 2009 for the remediation of 253 dump sites at a cost of \$2.9 million.

Recycling and Household Hazardous Waste

In 2006, the Kentucky Pride Fund was amended to provide grants for the development and expansion of recycling programs in household hazardous waste management, which would otherwise have been disposed of at municipal solid waste landfills. In 2009, 38 recycling grants were awarded for a total of \$2 million. Thirty-eight recycling grants were awarded to cities, counties and universities in 2009; three of the recycling grants awarded were for regional efforts that included two or more counties. The new recycling grant and education efforts by local governments should result in continuing increases in the recycling rates. In 2009, household hazardous waste grants were awarded to nine counties, with one serving three counties.

Electronic waste, or E-scrap, collection is growing in the state with approximately 48 counties offering some type of e-scrap collection. Year-round e-scrap drop-off programs are increasing with 19 counties now offering them. Another 21 counties offer some type of e-scrap collection, whether periodic or annual event. More than 2,341 tons of e-scrap was collected in 2009. The Finance and Administration Cabinet awarded an e-scrap recycling contract to a national vendor, allowing the government, school districts, universities and any other public (not-for-profit) entities convenient access to recycling. The contract provides for statewide pickup and recycling services, with effectively 0 percent of the scrap going to landfills. Since the contract took effect, more than 1,500 tons of e-scrap have been collected from 482 agencies/locations and refurbish recycled in an environmentally sound and data-secure manner.

The End of Life Vehicle Solution – 2009 (ELVS) targets mercury-containing switches removed from automobiles before the autos are salvaged for scrap metal. The 105 participants collected 17.75 pounds of mercury from 8,066 switches.

Field Operation

DWM's Field Operation Branch performs inspections at sites managing solid waste, hazardous waste, underground storage tanks and PCBs. The primary duty of a regional inspector is to check the compliance of waste facilities. During 2009, the branch conducted 7,188 inspections. The underground storage tank program made up 49 percent, or 3,547, of the branch's total inspections, with 1,510 notices of violations issued. There were 2,504 inspections conducted

under the solid waste program. Violations were found during 447 inspections, which resulted in 251 notices of violation issued.

Underground Storage Tanks

The mission of DWM's Underground Storage Tank Branch is to provide for the prevention, abatement and control of contaminants from regulated underground storage tanks that may threaten human health, safety or environment.

Kentucky's compliance rate for underground storage tanks has risen from 42 percent to 46 percent, which is still below the 68 percent average compliance rate for other states in EPA Region 4. Underground storage tank compliance should increase when the regulations incorporating the Energy Policy Act of 2005 are passed.

Program Administration

DWM, along with the rest of the state government, is facing significant budget difficulties and there is strong potential for additional budget cuts. Previous cuts have prevented DWM from filling vacant positions, thus decreasing the staff that delivers services, implements programs and protects the environment. These cuts have also limited the funding utilized by the programs.

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE.

- Continue training and technical assistance to public and private entities on solid waste issues and regulatory requirements through the Recycling and Local Assistance Branch
- Continue the Kentucky Pride Fund to provide financial assistance to waste programs
- Continue to enact new-tire fee to support Waste Tire Trust Fund for proper disposal of tires.
- Anticipate landfill design requirement changes for coal combustion waste due to proposed EPA regulations and plan to bring landfills into compliance

GRADE

The 2003 Kentucky Infrastructure Report Card assigned solid waste a C- grade. A major concern in 2003 was historic landfill sites that were going to be costly to correct and close. Since 2003, the Historic Landfill Program has completed 10 landfill closure projects and other projects are in the construction or design phases.

Recycling of household items has increased from 17.9 percent in 2003 to 29.7 percent. Several counties have used the recycling grant program to purchase higher capacity pulverizers to aid in recycling.

Although Kentucky has made progress in controlling solid waste, there are still some concerns. It is anticipated that landfills used to dispose of coal combustion waste will have to meet more stringent design requirements due to new proposed EPA regulations. Although compliance rates for underground storage tanks have increased from 42 percent to 46 percent, rates are still well below the average of 68 percent for other states in EPA Region 4. DWM is also facing budget difficulties.

As a result, Kentucky's solid waste infrastructure is assigned a grade of B.

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ISSUE BRIEF



KENTUCKY TRANSIT AND RAIL

2011 Kentucky Grade: C-

Date: February 1, 2011

Kentucky's transit and rail systems move 100 million of tons of freight and move people 100 million miles annually. As population increases and highways become more congested, transit and rail will become important alternatives for commuters and businesses. Having a long-term vision for the future is important to the growth of Kentucky.

CURRENT CONDITIONS

For the purposes of this report card, transit facilities include both public and private heavy rail, light/commuter rail, trolleys, city buses, and rural on-demand bus service. Other facilities considered part of the transit system, for which statewide data is not available, include things such as bike lanes, bus stops, airport shuttles, etc. In this report, the "golden triangle" refers to the group of large urban areas in Kentucky, Louisville, Lexington and Northern Kentucky.

Kentucky has an extensive transit history, especially with barges, ports, heavy rail, ferries and interstate bus lines. In fact, Louisville was created by a portage at the falls of the Ohio River. Meanwhile, Fulton was a major barge to east-west rail transfer on the Mississippi River prior to the interstate highway system.

Heavy rail, commuter rail, interstate passenger bus lines and ferries peaked in Kentucky prior to the interstate highway system. Coal production and the trains needed to transport coal began to decline during this time as well.

In 2010, the majority of trips – both passenger and freight – in Kentucky were made by car or truck. Highways are the main transportation resource in Kentucky, while commercial/industrial railroad, commercial bus lines, recreational railroads, steamboats, ferries and river ports are all secondary transportation resources. Major manufacturers are currently the main industry that requires rail access in addition to highway access.

Rural public transportation in Kentucky is generally a demand-responsive, door-to-door service. Public transportation for older adults and people with disabilities is also a separate, on-demand door-to-door service. In 2010, 24 public and private agencies provided service to approximately 1.7 million unlinked passengers, and operated 1,294 vehicles that traveled 30.4 million miles. ADA (Americans with Disabilities Act) standards are met by 820 million of those vehicles. (An unlinked trip is a single component of a trip, such as a segment of a bus trip. If one transfer is required as part of a trip, it is counted as two unlinked trips.)

The three largest providers of public transportation in Kentucky are the Transit Authority of River City (TARC) in Louisville, the Transit Authority of Northern Kentucky (TANK) and the Transit Authority of Lexington (LEXTRAN). Bus transportation is the only mode currently offered by each. However, TARC and TANK have preliminary engineering efforts under way for light rail in Louisville and Northern Kentucky, which have not resulted in construction.

Statistics provided by the Federal Transit Administration's (FTA) National Transit Database (NTD) show that TARC, the largest provider of public transportation in the state, provided more than 15.7 million unlinked trips in Louisville in 2009. Meanwhile, TANK and LEXTRAN provided 3.7 million and more than 5.5 million unlinked trips, respectively. This brings the total for the golden triangle areas to nearly 25 million unlinked passenger trips annually. For non-urbanized areas, private and public service providers provided nearly 3 million unlinked passenger trips annually.

Transit, Rail and Port Facilities

Each of Kentucky's 120 counties has some form of transit. Most of these are limited to on-demand services, generally reserved for elderly or disabled riders.

As of 2002, there were approximately 2,800 miles of railways in Kentucky, with nearly 65 percent operated by CSX Transportation. Hazardous, chemical and equipment freight are major categories of rail traffic.

As of 2009, Amtrak had four stations in Kentucky – Ashland, Fulton, Maysville and South Portsmouth. Total ridership was 8,996. Funding from the American Recovery and Reinvestment Act for Amtrak in Kentucky totaled \$226,000 and was mostly used for ADA compliance projects in station houses.

The Kentucky freight system is comprised of eight railroads. Rail shipments account for more than 20 percent of Kentucky freight shipments by weight and approximately 4 percent by value. Major rail-highway intermodal facilities are located in Georgetown, Shelbyville and Louisville. In 2008, more than 100 million tons of freight were moved by rail in the state. Coal is by far the largest product moved on rail.

Two of the benefits to rail usage are fuel efficiency and reducing highway gridlock. One train can carry the load of 280 or more trucks. In 2008, 296.4 million tons of freight originated, terminated, or passed through Kentucky by rail. It would have taken approximately 15 million trucks to handle this freight.

Huntington-Tri-State, which includes Ashland, is one of the largest U.S. inland ports and handled 77.6 million tons of freight in 2003. The major destinations for this port include Cincinnati, Ohio, with 11.8 million tons; Louisville, Kentucky, with 8.5 million tons; and Elvis Stahr Harbour in Hickman, Kentucky, with 0.8 million tons.

Kentucky's waterborne shipments account for 9 percent of shipments by weight and 2 percent of shipments by value. In Kentucky, the overall top freight commodities by weight are coal and machinery, respectively.

Maintenance

The transit agencies in Louisville, Lexington and Northern Kentucky have much larger fleets than transit agencies in rural locations and generally have their own garage and fueling stations, although the number and size of these facilities are not published.

Of the state's 9,850 buses, 7,815 are currently drawing depreciation and are therefore still within their useful life, which is five years. Twenty percent, or 2,035 buses, are not drawing depreciation and have exceeded their useful life; however, this does not mean that they are in any way unserviceable, but may indicate they have been well maintained. The average age of the vehicle fleet is 2001 for urban and 2006 for rural systems. Vehicle replacement costs for 2010 are estimated to be more than \$41 million. State agencies have not estimated costs or volumes for transit other than buses since 2001.

The Kentucky school bus fleet has grown at a rate of more than 1 percent per year for the last 20 years. For 2010, this would amount to 100 buses at an average cost of \$85,391 each. This figure is accounted for in the \$41 million vehicle replacement costs.

Louisville Wheels has its own maintenance facility that serves five counties. Rural Transit Enterprises serves 13 counties and has its own maintenance garage, located in Mt. Vernon in Rockcastle County. Bowling Green Southern Kentucky Community Action has recently purchased a maintenance facility. Paducah Transit Authority also performs its own maintenance and recycles oil. In the city of Manchester in Clay County, Daniel Boone Development Council provides maintenance. Maysville Transit, Glasgow, Northeast Community Agency and LKLP Community Action of Hazard all perform their own maintenance as well.

Besides the above maintenance facilities, several of the rural transit agencies have built or purchased new transit facilities/transfer stations/parking garages across the state.

Needs Assessment

While a turnpike authority exists in Kentucky, a modern transit agency does not. Needs assessment is lacking and should be completed to appropriately address long-term transit planning. State agencies have not estimated costs or volumes for transit other than vehicles since 2001.

A recent report for Lexington Fayette Urban County Government (LFUCG) recommended further developing "park and ride" and development of light rail/monorail. The report also recommended expanding public transportation services to regional communities, such as HOV lanes and bike trails, both of which are part of local transit system.

The Paducah Transit System (PATS) has conducted a recent study for approximately 200 organizations in the city of Paducah and McCracken County. In 2009, phase one of a regional Mobility Service for All Americans (MSAA) Travel Management Coordination Center (TMCC) was completed. This project is expected to be completed in 2013. Phase one has implemented many new technologies to the bus system: intelligent transit system technologies, including automatic vehicle location, on-board cameras and digital video recording, upgraded telephone

systems, an agency server, interactive voice response, website, Google transit trip planner, and a connection to KY511.

New technologies will assist in current bus systems and will be applied to light rail cars when they are added in Kentucky. The current heavy rail system is privately owned and would not be coordinated with these technologies without new regulations.

The Georgia Department of Transportation (GDOT), Tennessee Department of Transportation and Kentucky Office of Transportation Delivery have entered into a MOU to participate and contribute to a study of the High Speed Rail Corridor between Louisville, Nashville and Atlanta.

This rail study will focus on a new coordinated high-speed rail corridor extending from Chicago, south through Indiana, Kentucky, Tennessee, Georgia and on to Florida. The study area is a section of the corridor starting in Louisville, moving south through Nashville, and finally south to Atlanta. The potential rail corridors previously studied in the CFS did not include this corridor. However, the Kentucky Office of Transportation Delivery, Tennessee, and Georgia Departments of Transportation, with technical guidance from FRA, intend to analyze this route segment in a new study as an extension and connection of the Midwest Network (Chicago to Louisville) and a segment of the Southeastern Corridor studied in the CFS by employing funding contained in the consolidated FY2004 appropriations, Public Law No. 108-199.

This new rail study will assess the viability of a public-private partnership for rail development in this corridor extension, where government agencies invest in capital construction and maintenance of HSR infrastructure and a private, non-subsidized operator provides for train operations.

The Kentucky Transportation Cabinet also is active with other transit projects, but such information is not readily available.

Trip Generation and Capacity

According to the 2000 Census, more than 80 percent of commuters travel alone to work. The remaining commuters either carpool, use public transportation, walk, work from home or use other methods to travel to work.

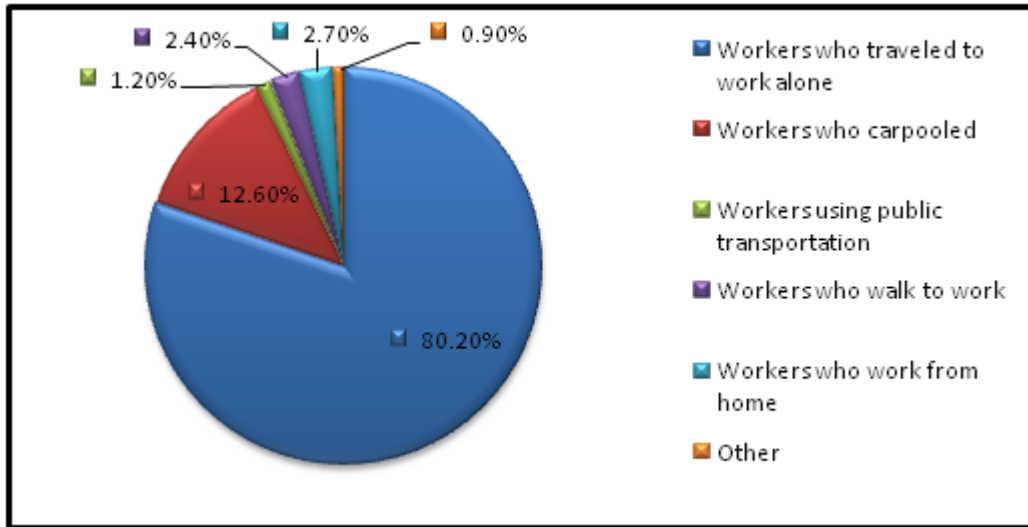


Figure 1 – Mode of Transit for Workers 16 and Over in Kentucky

The 2000 Census data shows the mean travel time to work is 23.5 minutes. However, workers in rural areas and suburban commuters along congested routes in the Golden Triangle may easily have travel times greater than 30 minutes each way.

The Kentucky Department of Education manages the state school bus program, which has experienced a 0.5 percent increase in bus ridership, while also experiencing a 2 percent decline in the student population from 2003 to 2009.

Rail capacity is not available to the public, as the railroad companies are private businesses. Port capacity was not readily available for this report.

Organization

The Kentucky Transportation Cabinet Office of Transportation Delivery has a division of Public Transit & Human Service Transportation Delivery. The Golden Triangle service providers provide detailed transit planning for their location. Locally, the regional metropolitan planning offices (MPO) are known in Kentucky as area development districts (ADD) and function as the transit planning and management bodies for basic transit services. Most of these agencies are limited in scope and funding to basic transit services (i.e. buses) at this time.

Financing

Because rail is currently a private business, information regarding rail is limited. The Federal Transit Administration (FTA) manages public systems and typically allocates funding for capital purchases, such as the purchase of new buses and the construction of maintenance facilities. For the program, operating financing is 50% federal and 50% local funds, and capital financing is 80% federal, with 10% local and 10% state.

In Kentucky, 58 percent, 76 percent and 65 percent of LEXTRAN, TANK and TARC's operating budgets, respectively, is provided by local sources, such as occupational, property or

general fund money. Ninety percent of funding for urban capital projects comes from the federal budget.

The largest funding source for capital and operating expenses for most rural providers in Kentucky is FTA. The exception to this is the Central Kentucky Community Council – 60 percent of their operating revenue is provided by local sources. Other similarly populated states, such as Tennessee, Indiana and Arkansas, also receive a high percentage of federal funding for capital projects. In 2010, the operating budgets of rural providers totaled \$51.2M and had capital expenditures of \$26.0 M.

Table 1 – Estimated Share of Statewide Transit Costs

Description	2004	2010
Replacement Vehicles	\$5.4 million	\$6.3 million
Expansion Vehicles	\$2.2 Million	\$2.6 million
Capital Cost Contracting	\$0.6 million	\$0.7 million
Capital Cost Maintenance	\$1.4 million	\$1.6 million
Northern KY Light Rail	-	\$23.0 million
Louisville Light Rail	-	\$48.0 million
Other	\$2.0 million	\$2.3 million
Total	\$11.6 million	\$84.5 million

Capital Projects

No public money has been spent for either a recent commuter rail study or construction. Because buses use on-system existing routes (roads), capital projects for bus routes are listed in Transportation Report Card section.

The Kentucky Public Transit Association in coordination with the Kentucky Transportation Cabinet/Office of Transportation Delivery has been progressive with statewide vehicle/fleet procurements. In several cases, new vehicles have been placed in transit operations months ahead of schedule.

During SFY09 and SFY10, the Transportation Cabinet/Office of Transportation Delivery processed \$4.5 million State-Of-Good-Repair grants for the replacement of old vehicles, radios and transit computer systems.

New State-of-Good-Repair grants (over \$5 million in federal funds) has been announced for SFY11 for transit renovations for Middle Kentucky River in Jackson, Federated Transportation Services in Lexington, Southern Kentucky Community Action in Bowling Green, and Transit Authority of Central Kentucky in Lebanon.

In addition, pending discretionary capital grants for SFY11 for rural is \$18,186,116 (includes the new State-of-Good-Repair) and urban capital grants \$13,173,892. This does not include formula capital dollars. Under ARRA, Kentucky urban/rural received \$51.5 million in federal dollars for transit capital projects to build or improve transit infrastructure.

Currently, the many smaller parts of a transit system are not grouped together by various agencies. Bicycle, airport connections and other areas are not tracked for their multi-modal components. However, connections between different modes of transit are critical to developing complete door-to-door routes for users.

Louisville and Lexington have established a vision and made substantial steps forward in bicycle and pedestrian facilities since 2003 with their Louisville Loop and Legacy Trail projects. In 2007, Lexington became a bronze-level community as rated by the League of American Bicyclists. Louisville is currently a bronze and aims to be a gold-level community by 2015 by adding facilities, education, encouragement, evaluation and planning, and enforcement.

However, the group rated Kentucky a "D" in infrastructure, "D" in planning, and "A" in enforcement, policies and programs. The group ranked Kentucky 22 out of the 50 states as a cumulative score.

In addition, trolley routes were established in Lexington to meet the transportation needs of World Equestrian Games, held in fall 2010, which had attendance figures of more than 500,000 people.

RECOMMENDATIONS SUPPORTED BY ASCE

Public transportation is critical to our vitality and quality of life, but these systems are underfunded. As a result, ASCE recommends the following:

- Determine and establish an ongoing funding mechanism to adequately fund public transportation in Kentucky
- Develop a dedicated statewide transit fund, which will provide a reliable source of funding and streamline the process of securing funds
- Utilize state university research programs to develop a statewide and region transit needs assessment each year
- Create a state transit authority, which would have additional powers similar to other states, including budgeting and oversight of transit fund
- Create a website for the general public that links all available transit providers and route information into an easy-to-use tool
- Increase the number of park-and-ride lots by 10 percent on surplus government property
- Create a task force that will study a tiered tax based on vehicle-miles-traveled and any other alternatives for a stable funding future
- Create a statewide employer tax credit for van-pooling, bicycle ridership, walkers or transit use
- Encourage Kentucky Transportation Cabinet to track transportation spending by mode, in addition to funding source

- Create a task force to study the possibilities of a public-private partnership with the proposed transit agency and existing heavy rail providers
- Promote an infrastructure awareness day for state legislators during the 2010-2011 session
- Encourage Kentucky's leaders to meet leaders in other states that have developed their transit organizations as we move into the future

GRADE

Kentucky's transit and rail systems were last evaluated in the 2003 Kentucky Infrastructure Report Card in which they were assigned a grade of D. Each of the 120 counties in Kentucky, however, now has some form of transit as a result of emphasis from the Area Development Districts. Eighty percent of commuters ride to work alone, and 1.2 percent ride public transportation. Louisville and Lexington have made substantial steps forward in bicycle and pedestrian facilities since 2003, with their Louisville Loop and Legacy Trail projects. In 2006, 7.1 million tons of freight was moved by rail in the state. Funding from the American Recovery and Reinvestment Act of 2009 for Amtrak in Kentucky totaled \$226,000 and was mostly used for Americans with Disabilities Act (ADA) compliance projects and bus replacements. While there is still significant work to be completed, Kentucky is moving in a positive direction and thus assigned a grade of C-.

ACKNOWLEDGEMENTS

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ISSUE BRIEF



KENTUCKY WASTEWATER

2011 Kentucky Grade: C-

Date: February 1, 2011

Effective wastewater treatment removes harmful pollutants from water and returns the water to the community's rivers and streams so that downstream users have a safe source of drinking water, a place for recreation and a healthy aquatic environment for plants and animals.

CURRENT CONDITIONS

One of the most common forms of pollution control in the United States is wastewater treatment. The infrastructure used for wastewater treatment is a system of collection sewers, pumping stations and treatment plants. Sewers collect wastewater from homes, businesses and industries, and the wastewater is then delivered to treatment plants. Most treatment plants were built to clean wastewater for reuse or discharge into streams or other receiving waters.

There are primary and secondary basic stages in the treatment of wastes. In the primary stage, solids settle and are removed from wastewater. The secondary stage of treatment removes approximately 85 percent of organic matter. Sometimes, the primary and secondary stages are combined into one operation. To complete treatment, the discharge from a wastewater treatment plant is usually disinfected before being discharged into receiving water. Disinfection is the process of treating the water to kill pathogenic bacteria. Done properly, disinfection will kill more than 99 percent of harmful bacteria in effluent.

Today's pollutants, such as heavy metals, chemical compounds, toxic substances and nutrients, such as nitrogen and phosphorus, are more difficult to remove from water. Increasing demands on the water supply aggravate the problem. In addition, the increasing need to reuse water calls for better wastewater treatment. These challenges are being met with improved methods of removing pollutants or pollution prevention at the source.

Pretreatment of industrial waste, for example, removes many troublesome pollutants at the beginning of the pipeline. In addition, treatment processes called tertiary or advanced waste treatment techniques have been developed. These techniques range from biological treatment that removes nitrogen and phosphorus to physical-chemical separation techniques, such as filtration, carbon absorption, distillation and reverse osmosis. These wastewater treatment processes, alone or in combination, can achieve almost any degree of pollution control desired. Waste effluents purified by these treatments can be used for industrial, agricultural and recreational purposes and even drinking water supplies.

Wastewater infrastructure can be placed in two categories – collection and treatment systems. Both systems must work in conjunction with each other to adequately protect the overall water quality of Kentucky's receiving streams. In communities throughout the state, these systems are

outdated, under capacity or in need of rehabilitation. The following table shows the treatment levels of wastewater treatment plants in the past and estimates 2028 treatment levels.

Table 1 – Commonwealth of Kentucky

Municipal Wastewater Treatment Plants					
Treatment Level		1972	2004	2008	Future 2028
Less Than Secondary	Number of Facilities	17	0	0	0
	Population Served	280,000	0	0	0
	Percentage Served	8%			
Secondary	Number of Facilities	43	149	117	115
	Population Served	463,000	1,566,266	1,184,448	1,572,426
	Percentage Served	14%	37.8%	28%	N/A
Advanced	Number of Facilities	16	91	120	126
	Population Served	164,000	912,458	1,206,985	1,840,860
	Percentage Served	5%	22%	28%	N/A
No Discharge	Number of Facilities	0	1	1	1
	Population Served		435	435	435
	Percentage				

In 2009, there were 259 municipally owned plants, 197 school plants, 121 subdivision plants and 836 package plants in Kentucky. Approximately 860,000 households, or 55 percent of households in Kentucky, have public sewers, while 690,000 households, or 45 percent, do not have public sewers. The statistics illustrate that the majority of homes with public sewers are in urban areas. Households without public sewers are served by septic tanks, other on-site systems or, in some rural areas, straight pipes to a receiving stream. As public water lines have been extended into unsewered areas, there has been an increase in on-site system failures, which has

been attributed to increased water use. In some cases, there are no on-site systems and raw sewage is discharged directly onto the ground or into a receiving stream.

Water Resources

Sedimentation/siltation and pathogens are the two major causes of pollution to water bodies. This type of pollution comes from runoff from agricultural activities and construction. Only 52 percent of the major streams in Kentucky support aquatic life. Meanwhile, 31 percent support swimming and 68 percent support boating.

Combined Sewers

Combined sewers collect and convey both storm water and domestic sewage. During dry periods, the collection system only conveys sewage to wastewater treatment facilities. However, during storm events, sewage and storm water are combined in the sewer pipe. The capacity of the collection and treatment systems are frequently exceeded in wet weather so that excess, untreated flows are diverted to receiving waters through various overflow points along the collection system. Combined sewer overflow (CSO) discharges have been identified as a significant threat to the water quality of much of the country's receiving waters. These systems are receiving a great deal of attention due to changing U.S. Environmental Protection Agency (EPA) regulations. For example, the EPA has approved a new CSO strategy for curbing water pollution from combined sanitary-storm sewers that overflow in wet weather. The Kentucky Division of Water (DOW) has 12 long-term control plans that are either approved, pending or under review. In addition, there are two communities opting to separate their sewers entirely and long-term control plans will not be required.

There are 17 communities that operate and maintain combined sewers in Kentucky. Combined, these 17 communities have more than 346 overflow points. The EPA's 2008 Clean Water Needs Survey indicated that \$312 million would be required to correct CSO-related problems in Kentucky, which is a 45 percent increase in funding needs since 2003. Since 2003, Kentucky has eliminated 72 CSOs and reduced overflow volume from 5.84 billion gallons to 3.101 billion gallons.

Sanitary Sewer Overflows

Properly designed, operated and maintained sanitary sewer systems are meant to collect and transport all sewage that flows into them to a publicly owned treatment works (POTW). However, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system, which are called sanitary sewer overflows (SSOs). SSOs have a variety of causes, including severe weather, improper system operation and maintenance, and vandalism. The untreated sewage from these overflows can contaminate drinking water supplies, causing serious water quality problems. In addition, untreated sewage can potentially create back-ups into basements, causing property damage and threatening public health.

Many Kentucky municipalities have not fully investigated SSO problems or determined the measures necessary to correct them. Some municipalities have not submitted needs for SSO correction measures because those measures may be considered maintenance with a low priority

because they do not expand the customer base and generate new revenue for the utility. Currently, 22 communities have an active sanitary sewer overflow plan to correct problems.

Kentucky's initiative to eliminate sanitary sewer overflows and dry weather overflows includes sanitary sewer overflow plans, sewer overflow response protocols and self-assessments in keeping with the EPA Capacity, Management, Operations and Maintenance Program.

The extent of the SSO problem is unknown, but Kentucky has initiated a new wet weather team to inspect complaints. Two percent of these inspections are referred to enforcement. Prior to 2003, 71 communities were under sanction with 34 sanctions lifted. Since then, 17 communities were added to the sanctions list and 15 communities have been removed from the sanctions list. However, 39 Kentucky communities remain under sanction.

Non-Point Source and Watershed Basin Plans

Non-Point Source (NPS) pollution comes from many diffuse sources such as rainfall or runoff moving over and through the ground surface. As the runoff moves, it picks up and carries away natural and human pollutants. Kentucky's approach to controlling NPS pollution includes both focused watershed projects and statewide initiatives. A watershed is the area that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer or ocean. A watershed-based plan is one that includes an evaluation of all of the activities occurring within a watershed that could affect its common waterway. Watershed projects address diverse NPS concerns through aggressive best management practices (BMPs) implementation and include water quality monitoring as a measure of success. Statewide programs help raise public awareness about runoff pollution, provide technical information on BMPs and develop and implement regulatory programs. Since 2002, eight watershed-based plans have been approved and 18 are under development.

On-Site Sewage Treatment Systems

Kentucky has a population of approximately 4.3 million. Wastewater service is provided to 2.4 million residents from municipal systems and an additional 836 small, private treatment plants, an increase from 633 plants in 2002. The remaining 40 percent of Kentucky's residents are served by on-site sewage systems, such as septic tanks and individual house treatments.

On-site wastewater treatment programs are administered by county health departments. The health departments regulate on-site evaluations to determine if the site and soil conditions are suitable for on-site wastewater systems. Certified inspectors are required to perform site evaluations and certified installers are required to construct the systems. In addition, health departments must address any complaints raised by malfunctioning systems. On-site septic tank systems require periodic emptying, which can be challenging given the limited number of septage receiving sites in the state. In fact, several counties do not have any septage receiving facilities.

Package Treatment Plants

Typically, package treatment plants are suitable for isolated or remote areas where it is not economically or geographically possible to extend centralized sewer services and wastewater flows are small. Because DOW's priority to regionalize package treatment plants for more cost effective treatment of wastewater and improved performance, Kentucky's regulations allow DOW to mandate connections of private package plants that are within one mile of an existing collection system. Even though the number of municipal treatment plants increased and service areas were extended, the number of package treatment plants increased from an estimated 633 in 2002, to 836 in 2010. The increase in plants highlights that areas difficult to serve using centralized systems are using package treatment plants. Since these areas initially used straight pipes, the introduction of package treatment plants has had a positive impact on water quality, because it treats and disinfects raw wastewater before discharging into a local stream. Even though package treatment plants are easy to install and operate, many are poorly operated and are in non-compliance due to the lack of full-time, certified operators.

Numeric Nutrient Criteria

The next triennial review by the U.S. Environmental Protection Agency in 2011 will focus on water quality criteria. This plan targets the promulgation of numeric criteria for wadeable streams, lakes and reservoirs. Larger boatable waters are also undergoing similar processes. Phosphorus is an essential plant nutrient, but excess concentrations can result in nuisance growth of aquatic plants and algae. Excessive plant growth may result in depletion of dissolved oxygen which negatively affects fish. Excessive nitrogen has a similar result.

Recently, the state initiated the development of a statewide nutrient reduction plan for phosphorus and nitrogen consistent with the Mississippi River Gulf Hypoxia task force recommendations.

Animal Feed Operations

In 2008, a new rule for controlling pollutant discharge concentrations from animal feeding operations was established. As this program is implemented, improvements to water quality should become more visible since animal feed operations contribute a significantly to non-point source pollution.

Storm water – Municipal Separate Storm Sewer System (MS-4)

The control of storm water is important because storm water runoff directly affects watershed functions and the water quality of receiving waters.

Kentucky has 40 municipal separate storm water sewer system communities with permits, plus 20 additional communities that share these types of permits. Of these, 38 have been added since 2003. This program includes public education and outreach, public involvement and participation, illicit discharge detection and elimination, construction site runoff control, post-construction storm water management, and pollution prevention.

Permitted communities must maintain a storm water management program with the goal of reducing pollution discharged from the separate storm water sewer systems. This means that these separate sewer system programs must be assessed and modified continuously. This new focus creates a quality-based standard for storm water discharges.

Investment Needs

Adequate investment from a variety of sources is required in order to maintain the water quality improvements made to date, address new threats to water quality and prevent deterioration of Kentucky’s infrastructure. Based on DOW’s 2008 Needs Survey, Kentucky will need a minimum of \$2.1 billion to meet wastewater collection and treatment needs over the next 20 years. The Kentucky Infrastructure Authority (KIA) reports that more than \$142.6 million is available in Clean Water State Revolving Fund low-interest loan program.

Table 2 – 2008 Kentucky Wastewater Needs for Municipalities

Kentucky Clean Water Needs Survey						
	2000*	2004*	Percent Change	2004**	2008**	Percent Change
Wastewater Treatment Plant	\$841,000,000	\$656,000,000	-22%	\$777,000,000	\$454,000,000	-42%
Wastewater Collection Combined	\$2,2027,000,000	\$1,978,000,000	-2%	\$2,344,000,000	\$1,351,000,000	-42%
Sewer Overflow	\$241,000,000	\$181,000,000	-25%	\$215,000,000	\$312,000,000	+45%
Stormwater Management Controls	\$2,000,000	\$27,000,000	+800%	32	Not Listed	-100%
Totals				\$3,336,000,000	\$2,110,000,000	

Approximately \$454 million is needed for improvements and expansions to treatment plants. The wastewater collection system has needs totaling \$1.35 billion, including collector and trunk sewers and sewer rehabilitation to remove known extraneous water infiltration/inflow that enters the sewer system. This extraneous flow sometimes causes sanitary sewer overflows due to limited pipe capacity. Most municipalities have been challenged to solve this problem in a cost effective manner. As these municipalities investigate sources of infiltration/inflow, costs may increase.

Likewise, 17 Kentucky municipalities are developing long-term control plans to reduce overflows in combined sewer systems. Current costs to reduce the overflows are estimated to be \$312 million over the next 20 years. As long-term control plans are developed, this number is expected to increase until overflows have been eliminated.

Table 3 – Commonwealth of Kentucky (*2004 Dollars, **2008 Dollars)

Small Community Needs			
Population	2000* Number of Facilities/Needs (Dollars, Millions)	2004* Number of Facilities/Needs (Dollars, Millions)	2008** Number of Facilities/Needs (Dollars, Millions)
< 1,000	89/\$177	86/\$166	17/\$51
1,000 – 3,499	112/\$297	99/\$247	36/\$175
3,500 – 10,000	51/\$259	50/\$259	49/\$186

RECOMMENDATIONS SUPPORTED BY ASCE

The following recommendations are supported by ASCE:

- Develop adequate funding sources. New sources of funding and full-cost pricing should be considered with a focus on the regionalization of collection and treatment systems. Consider low-interest loans for households that need more affordable public sewer connections.
- Continue the four pillars initiative, including better management, full-cost pricing, watershed approach and water efficiency
- Use a holistic approach to water quality management that integrates water quality and quantity and the benefits provided to the environment.
- Expand the use of watershed permitting throughout Kentucky.
- Assess and prioritize wastewater needs, promote interagency cooperation and implement strategies to improve public wastewater needs with the Kentucky Natural Resources and Environmental Protection Cabinet, the Cabinet for Health Services and county health departments
- Develop environmental legislation and regulations to define and consider the risks, costs and benefits of pollution abatement or environmental risk reduction
- Encourage citizens to take responsibility for protecting their environment.

GRADE

The 2003 Kentucky Infrastructure Report Card assigned wastewater infrastructure a grade of D- due to the enormous needs and funding shortfalls.

Since that time, progress has been made toward reducing active CSOs, mitigating SSOs, implementing long-term control plans for separate storm water sewer systems programs and for enforcing the Clean Water Act. However, because of aging infrastructure, the significant financial resources needed to upgrade wastewater systems, CSO and infiltration/inflow problems, and the lack of adequate funding sources, Kentucky’s wastewater infrastructure has been assigned a grade of C-.

KENTUCKY WASTEWATER SUB-COMMITTEE

Vicki Coombs, Committee Chair, Metropolitan Sewer District

Ralph Johanson, GRW Engineers, Inc.

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AMERICAN SOCIETY OF CIVIL ENGINEERS

KENTUCKY INFRASTRUCTURE REPORT CARD 2011

Category	KY 2003	U.S. 2009	KY 2011	
Aviation	C+	D	C+	Kentucky airports have a total economic impact on the state of approximately \$15 billion dollars, yielding nearly 115,000 jobs. Legislation for the FAA's Airport Improvement Program, Vision 100, expired in 2007. Congress has made 17 extensions of this outdated policy and has delayed new funding. Despite these funding challenges and the cap on the state's jet fuel tax, which supports aviation facilities, commercial service airports continue to maintain good facilities. However, a solid funding stream is needed to keep Kentucky's airports in running order and prepare them for growth.
Bridges	C-	C	D	The condition of Kentucky's bridges has deteriorated since the last report card, primarily due to lack of funding. The cost to repair or replace all deficient bridges in Kentucky is estimated to be more than \$1.2 billion. The cost to raise the condition of Kentucky's bridges to meet the national average is estimated to be more than \$283 million, but only \$98 million in combined state and federal funds are available. At the beginning of 2003, 29.7% of Kentucky bridges were deficient, compared to the national average of 27.6%. The national combined average has fallen to 24.8%, while the deficiency rate in Kentucky had risen to 32.2%.
Dams	C-	D	D+	Funding for the dam program has declined over the past 30 years, despite growing hazards, deteriorating dam conditions, and an increasing number of dams. Funds are needed to hire and train an adequate staff of professional inspectors, rehabilitate critical dams, improve the communication and notification systems, and update inspection methods and equipment. Approximately 58% of Kentucky's dams are privately owned and operated, which is unlike other types of infrastructure.
Drinking Water	C	D-	B	Since 2000, significant improvements have been made to Kentucky's drinking water systems with the assistance of nearly \$1 billion in grants and low-interest loans. Potable water is available to 95% of the population, and the state has established a goal of reaching 100% by 2020. In 2007, the Drinking Water Stakeholders Group was established with representatives from regulatory agencies, funding agencies, water utilities, and industry associations. This collaborative approach has led to proactive development of regulations for capacity development, water quality, permits, operator certification, and design standards.
Energy	B-	D+	B-	While Kentucky's transmission grid currently meets the state's needs, potential changes in regulations and increased usage place Kentucky at a crossroads. Previously, Kentucky has benefited from industrial growth associated with low electricity prices, and coal is used to generate 92% of Kentucky's electricity. However, Congress is considering legislation that will further tighten emission limits, and the Environmental Protection Agency (EPA) is considering regulating fly ash from coal-fired power plants as a hazardous waste. New regulations could drive an increase in the state's energy prices. In response, electric utilities are considering alternative fuel sources and focusing investments on conservation and energy-efficiency measures, thereby avoiding some emissions and moderating the need for additional generation.
Hazardous Waste	D+	D	C	Kentucky remains a net exporter of hazardous waste, exporting 163,658 tons and importing 75,083 tons in 2009. Of the state's 20 Superfund sites, 17 have a remedy in place or have been removed from the EPA's priority list. However, hundreds of contaminated sites not on the federal list require cleanup at an initial estimated cost of \$80 million. Currently, \$1.2 million per year is generated from hazardous waste fees to address cleanups at these sites.

Category	KY 2003	U.S. 2009	KY 2011	
Levees	Not Assigned	D-	D+	A significant portion of the levees in Kentucky were constructed between 1940 and 1960. The condition of this flood protection system has deteriorated as these systems have aged. Of Kentucky's 29 projects, five had an acceptable rating, five had an unacceptable rating, and the remaining 19 projects were rated minimally acceptable. Total costs to repair all systems could approach \$200 million.
Roads	D	D-	D	There are more than \$40 billion of unfunded road projects on the Kentucky Transportation Cabinet's work list. In addition, individual counties have their own roadway projects that have been planned but do not have a funding source. Road congestion is a growing problem, as delays have outpaced those experienced in areas of similar size. The percentage of poor pavement on primary state routes has increased from 13% to 21% between 2005 and 2007.
School Facilities	D+	D	B-	Kentucky's 1,197 school facilities are evaluated every four years using a grading system that ranges from "like new" to "needs replacement." Based on this assessment, only 1.4% (or 17 facilities) are in need of replacement. An additional 10% need major renovation. The rest are in acceptable or better condition. Kentucky faces a \$3.1 billion cost for school modernization, which includes \$2.4 billion for infrastructure and \$686 million for technology needs. The average per-pupil expenditure is \$6,829, compared to the \$7,015 national average.
Solid Waste	C-	C+	B	The state has made progress in controlling solid waste. Compliance rates for underground storage tanks have increased from 42% to 46%, but are still well below the average of 68% for other states in EPA Region 4. While recycling of household items fell from 34.7% in 2008 to 29.7% in 2009, the rate is still above the national average. And, since 2003, the Historic Landfill Program has completed 10 landfill closure projects.
Transit and Rail	D	D ^{Transit} C- ^{Rail}	C-	Each of the 120 counties in Kentucky has some form of transit as a result of the past decade of emphasis by the Area Development Districts. Eighty percent of commuters ride to work alone, and 1.2 percent ride public transportation. Louisville and Lexington have made substantial steps forward in bicycle and pedestrian facilities since 2003, with their Louisville Loop and Legacy Trail projects. In 2006, 7.1 million tons of freight was moved by rail in the state. Funding from the American Recovery and Reinvestment Act of 2009 for Amtrak in Kentucky totaled \$226,000 and was mostly used for Americans with Disabilities Act (ADA) compliance projects and bus replacements.
Wastewater	D-	D-	C-	Since the 2003 Report Card, progress has been made toward reducing combined sewer overflow, mitigating sanitary sewer overflow, implementing long-term control plans and enforcing the Clean Water Act. Kentucky will need a minimum of \$2.1 billion to meet wastewater collection and treatment needs over the next 20 years. Currently, \$142.6 million is available in the Clean Water State Revolving Fund low-interest loan program to help fund these projects.

Kentucky's Infrastructure Grade: C
U.S. Infrastructure Grade: D

A = Exceptional B = Good C = Fair D = Poor F = Inadequate

Each category was evaluated on the basis of condition and performance, capacity versus need, and funding versus need.