Testimony of

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Domestic Policy Subcommittee

Oversight and Government Reform

Professional Sports Stadiums:
Do they Divert Taxpayer Funds from Public Infrastructure?

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THE UNIVERSITY OF ALABAMA
AISCE

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Chairman Kucinich and members of the committee, thank you for the opportunity to testify concerning the impending crisis regarding prioritization of resource allocations among the nation's aging infrastructure systems. This statement is meant as a general overview of the issues that dominate the prioritization.

My name is David Hale and I am the Director of the Aging Infrastructure Systems Center of Excellence (AISCE) at the University of Alabama. The AISCE is a multi-disciplinary research and technology transfer center whose mission is to assist the public and private sector in ***managing*** and ***mitigating*** the effects of age on the nation's infrastructure systems through the conceptualization, development and dissemination of proven and innovative management and engineering techniques

AISCE takes an inclusive definition of infrastructure systems. The Center's infrastructure systems definition includes both man-made and natural infrastructure components. Collectively these systems provide the foundation for economic development, safety, security, and quality of life for the public.

From a societal perspective, our goal is to

- Preserve jobs and expand economic development in America by improving competitiveness of our aging infrastructure systems.
- Enhance the quality of life and security of Americans by improving the flexibility and reducing the fragility of our aging infrastructure.

The center is a collaborative effort among Governmental Agencies, Commercial Organizations and Universities, with a core faculty set from engineering, business, social and physical sciences.

Our center's work focuses on the creation of an *integrated body of knowledge* that crosses *fields of study* using tools and techniques in:

- Analytic Modeling of Risk based Decision Making, which includes tools from
    - Asset Management, Command and Control Systems, and Network Science to investigate:
        - Diagnostic analysis and 'Health monitoring' of aging systems

        - Financial analysis for aging asset life extension
        - Cultural change management & business process optimization
        - Maintenance optimization of aging systems
- Physical structure monitoring and improvement
    - Automated visual collection and interpretation of pavement condition data.
    - Supporting tools for bridge condition assessment and bridge inspector training.
    - Development of front end planning methods for renovation and retrofit of existing capital projects
    - Sensor monitoring and analysis of existing structural systems.
    - Development of new sensing methods and materials
- Knowledge Management focusing on technical and geospatial documents
    - Digital capture of data,
    - Data and text mining to cleanse and filter data
    - Structuring data for optimized storage and retrieval
- Process management and expert knowledge elicitation to capture aging workforce expertise and managing organizational forgetting
- Other areas of study include:
    - Instrumentation
    - IT legacy system integration & renovation
    - Protecting critical infrastructure
    - Configuration control & regulatory compliance
    - System design for reliability / maintainability

Our support comes from across multiple governmental agencies and foundations including:

- US Army Corps of Engineers
- National Oceanic and Atmospheric Administration.
- Federal Highway Administration
- Alabama Department of Transportation
- Construction Industry Institute
- Center for Transportation Research
- National Science Foundation
- NSF EPSCoR-Alabama
- National Aeronautics and Space Administration
- A.P. Sloan Foundation

The multitude of areas that are covered by the center provides a basis for culling leading practices from one domain and provide customizable patterns to be reused in other domains. This broad perspective leads us to the following.

Today's Challenge:

Today, the owners and operators of physical infrastructure in America face daunting challenges: the infrastructure assets and workforce that operates those assets are both aging. The implications of aging asset breakdowns are staggering. The 24-hour power outage affecting the Northeast in 2003 cost NYC's economy over a billion dollars. Though such incidents have tangible economic, social and personal safety consequences, financial resources needed for security, productivity and resilience have been slow to materialize.

Goals of expansion to meet anticipated demands often conflict with the complex problems associated with aging; that is, natural deterioration, structural obsolescence, unanticipated safety concerns, changing regulations and increased supply chain costs. Fierce competition and tight governmental budgets create pressure to optimize operations at the expense of managing the aging infrastructure. Consequently, the nation's infrastructure is less reliable, difficult to maintain, and more vulnerable to attack or incident.

These conditions are evidenced throughout our society. Recently we have been witness to catastrophic infrastructure failures such as the I35 bridge collapse in Minnesota, levee failures in New Orleans, contamination of our food supply, electric grid disruptions along each of our coasts.

In daily life our aging infrastructure is reducing the quality of our lives. For example[1]:

- in Ohio at least 36% of the urban roads are considered congested, which causes
    - the average Akron-Canton area commuter $203 per year in excess fuel and lost time.
    - Likewise the congestion in Cincinnati costs average commuters $687 per year in excess fuel and lost time.
- in California,

[1] ASCE 2005 Infrastructure Report Card http://www.asce.org/reportcard/2005/index.cfm

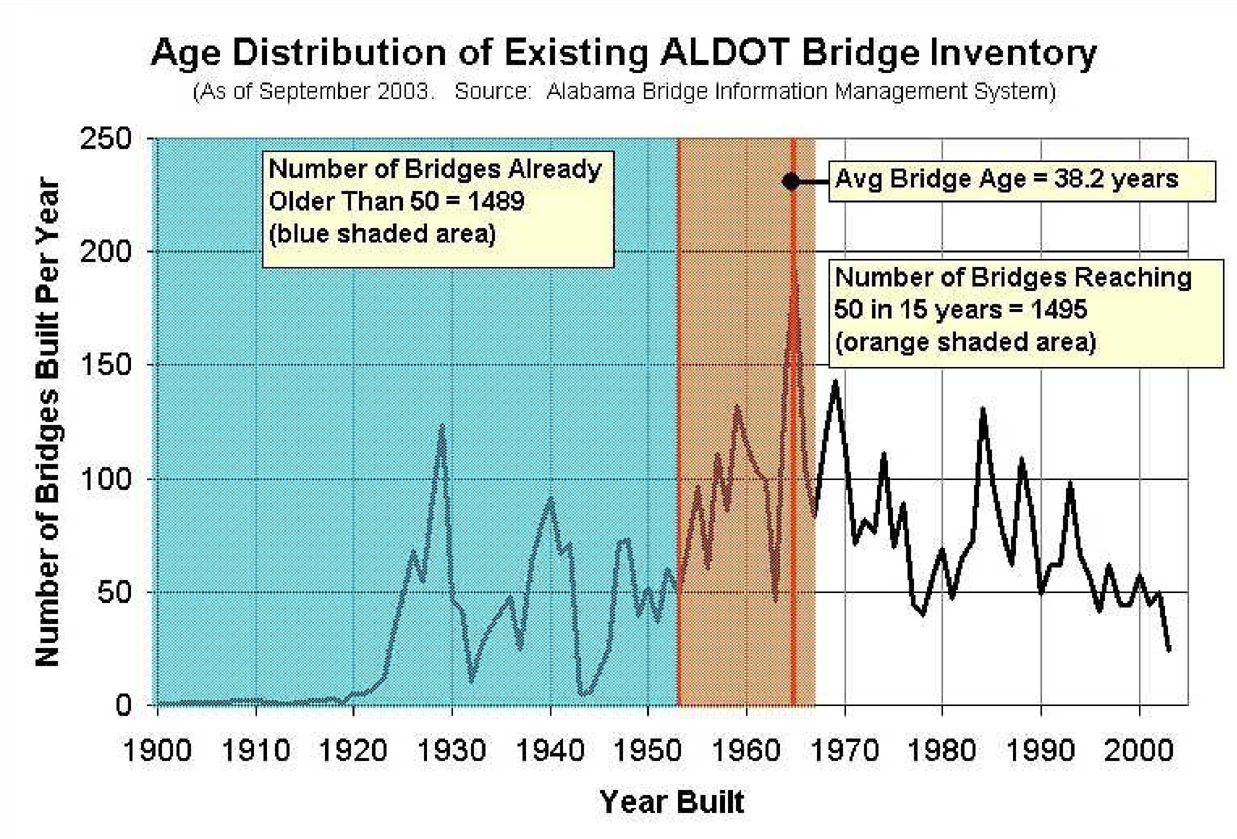
- 60% of urban roads are considered congested, and
- moreover,71% of the major roads are considered poor or mediocre in terms of condition.
- This level of upkeep costs California motorists $12.6 billion a year ($544 per motorist) in extra vehicle repairs and operating costs.

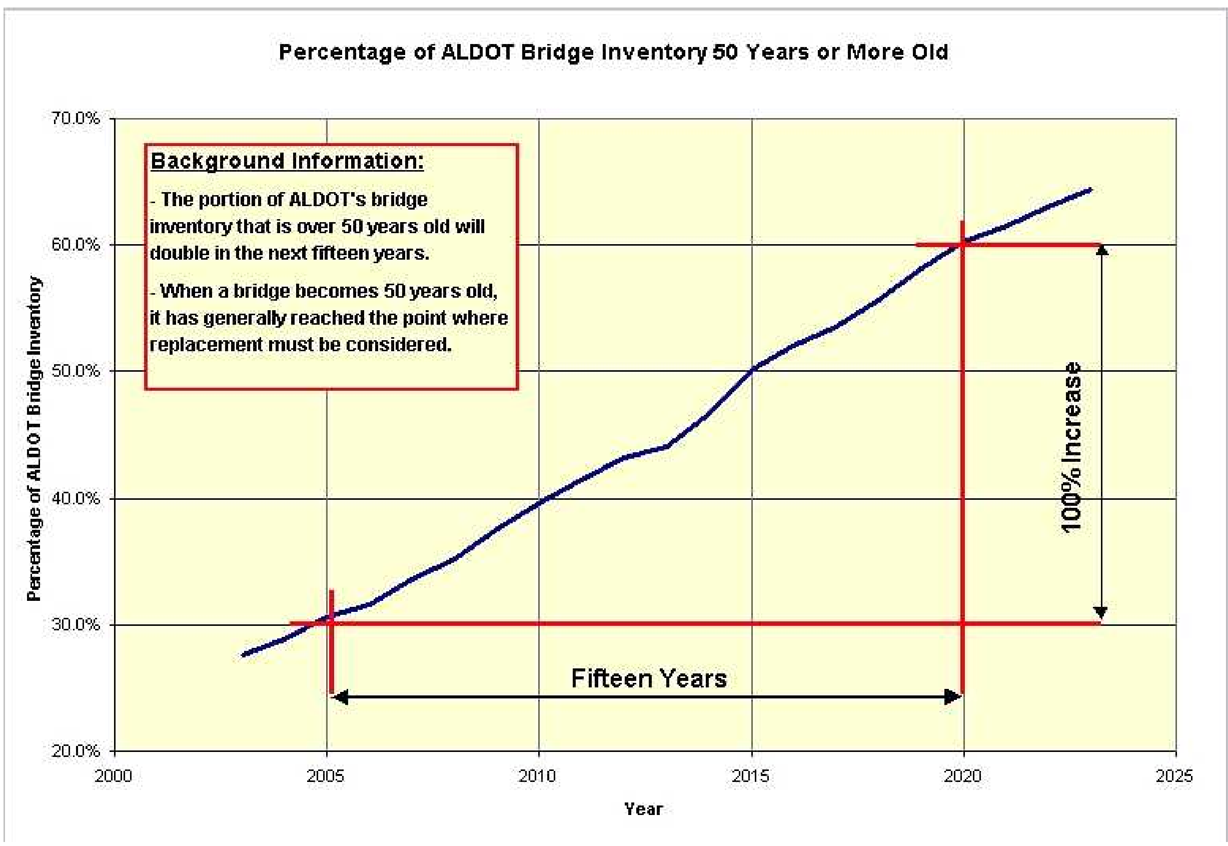
Infrastructure systems permeate society. Society uses multiple infrastructure systems on a daily basis from the time a light is turned on in the morning through the drive to work, obtaining cash from an ATM machine to responding to a tornado warning in the afternoon to checking the stock market prices through the internet at the end of the day. We take these infrastructure systems for granted, in most cases not even thinking about them as they progress through their daily lives. But, when a power blackout occurs; that is, when the power distribution infrastructure system fails as it did in the northeast, the importance of these infrastructure systems to our safety, wellness and happiness becomes apparent.

Many of the infrastructure systems found in the United States have been in place, not only for decades but for centuries. For example, the sewer system found in NYC has portions that were first implemented prior to the civil war and are still in use today. Another example is the Eisenhower Interstate System, which was built between 1950 and 1980, that in many cases is now in a state of decay, with bridges having to carry loads much greater than they were originally designed for.

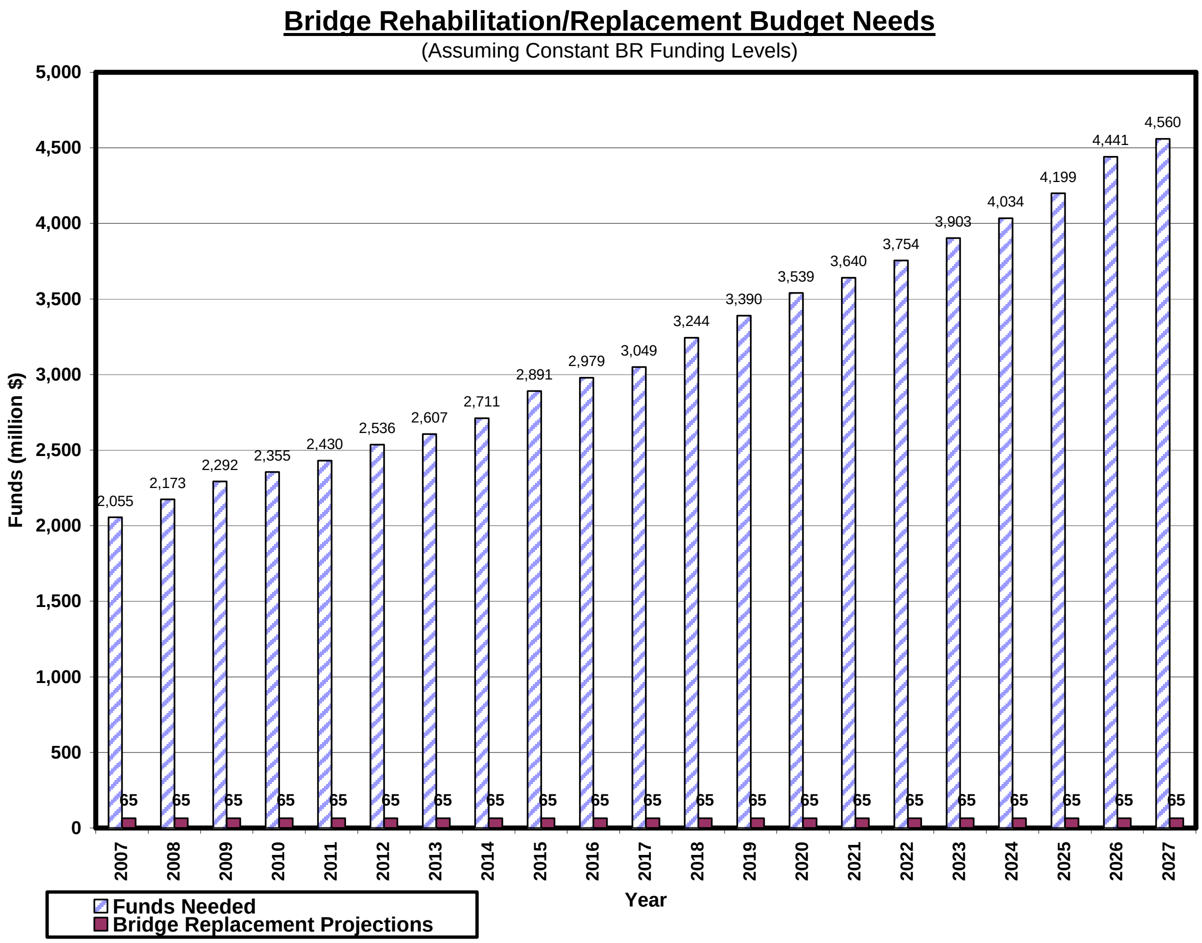
I serve on the State of Alabama's Infrastructure Commission. In that position, I am confronted with the trade-offs between public safety, economic development, ecology, and quality of life. I'd like to be specific in terms of need.

The engineering design life of a bridge built in Alabama is considered to be 50 years. Currently Alabama has 1489 bridges that were built 50 or more years ago. In the next 15 years the number of additional bridges reaching 50 years of age will be an additional 1495 bridges (a 100% increase). The total number of bridges that will be greater than 50 years old will be 60% of the total inventory.


Age Distribution of Existing ALDOT Bridge Inventory
(As of September 2003. Source: Alabama Bridge Information Management System)
Number of Bridges Already Older Than 50 = 1489 (blue shaded area)
Avg Bridge Age = 38.2 years
Number of Bridges Reaching 50 in 15 years = 1495 (orange shaded area)
Number of Bridges Built Per Year
Year Built
0
50
100
150
200
250
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000


Percentage of ALDOT Bridge Inventory 50 Years or More Old
Background Information:
- The portion of ALDOT's bridge inventory that is over 50 years old will double in the next fifteen years.
- When a bridge becomes 50 years old, it has generally reached the point where replacement must be considered.
100% Increase
Fifteen Years
Percentage of ALDOT Bridge Inventory
Year
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
2000
2005
2010
2015
2020
2025

Current funding levels for bridge repair and replacement are $65 million annually and the current back log of deferred repair and replacement amounts to $2 billion today and will total $4.5 billion in 20 years.



Resource Allocation

Quality of life and economic prosperity are dependent on a collection of critical and interdependent social, man-made and ecological infrastructure systems. Within this context, the decisions on funding and resource allocation priorities are vital to the economic, social and environmental health and well being of each community, region and the nation as a whole. The vitality of our social fabric extends broadly across our education, transportation, manufacturing, energy, and water infrastructures.

Within this context it is then useful to ask two questions that go to the core of genuine progress and a practical translation of sustainable development:

- What do we want to maintain/sustain/preserve?
- What do we want to change/develop for the better?

This is where it is useful to introduce the concepts of *capital*.

The concepts of financial, engineered, natural, social, and cultural capital are familiar to most of us, and it's generally recognized that it is unwise to deplete these forms of capital without provisioning for their replacement. A balanced management of the combined portfolio of five forms of capital is required.

In balancing the management of our infrastructure the application of systems thinking to the five forms of capital in a systemically integrated way provides the objectives for sustainable development from which planning can proceed.

Infrastructure Systems Management provides mechanisms to manage appropriate levels of service of infrastructure system service across its life cycle using risk and uncertainty techniques. Infrastructure Systems Management facilitates risk-based decision making concerning:

- New Investment
- Maintenance
- Recapitalization
- Resource Disposal

The objective is to ensure effective resource allocation using transparent, standard, and repeatable processes. Going beyond the traditional practice of examining individual assets, infrastructure systems management supports the effective utilization of limited resources through managing systems of assets and all of their components. Comprehensive infrastructure systems management practices link user expectations for system condition, performance, and availability with system management and investment strategies. Increased information accessibility and use will enhance and sharpen decision-making, resulting in more effective investments decisions.

Key questions that can be analytically addressed within the context of infrastructure system resource allocation include:

- What development, preservation, maintenance, recapitalization and decommissioning strategies are best aligned with government's mission?
- Are stakeholder value metrics associated with goals?
- Are target levels identified for each goal?
- Are stakeholder and customer value-producing assets included in the asset inventory?
- What is the value of the service that is provided to the public?
- Beyond the primary authorized function for an asset (or project), what are the secondary functions? How are they valued? How is value allocated across multiple business lines for a multi-purpose asset? What is the risk of not performing a detailed analysis of secondary purpose?
- What are the historic, current, and forecasted condition, risk, performance, and value of services provided by the infrastructure system?
- What resources are available? What is the schedule for resource availability? What performance level would result given increased or decreased funding?
- What investment options may be identified within and among assets at the various levels of the asset hierarchy?
- What are the consequences of not developing or maintaining the infrastructure system? What impact concerning condition and performance can be communicated and to whom will this be important?

Infrastructure Systems Management not only aids in the decision-making process, but also provides for a fact-based dialogue among stakeholders, government leaders and agency managers concerned with daily operations.

High Demand for Resources

As the 2005 American Society of Civil Engineers (ASCE) Infrastructure Report Card indicates all of the nation's infrastructure is has deferred maintenance, which corresponds to low marks across the board.

Aviation:D+	**Bridges:C**	**Dams: D**	**Drinking Water:D-**
Hazardous Waste:D	**Roads:D**	**Schools:D**	**Solid Waste:C+**
Wastewater:D-	**Transit:D+**	**Navigable Waterways:D-**	

Collectively the ASCE estimates that $1.6 trillion dollars is needed over the next 5 years to bring the nation's infrastructure into good condition. With such high demand for pubic sector resources, the pertinent question continues to be whether public funding for ball park expansions squeezes out needed funding for public works projects that are critical to the nation's safety and competitiveness.