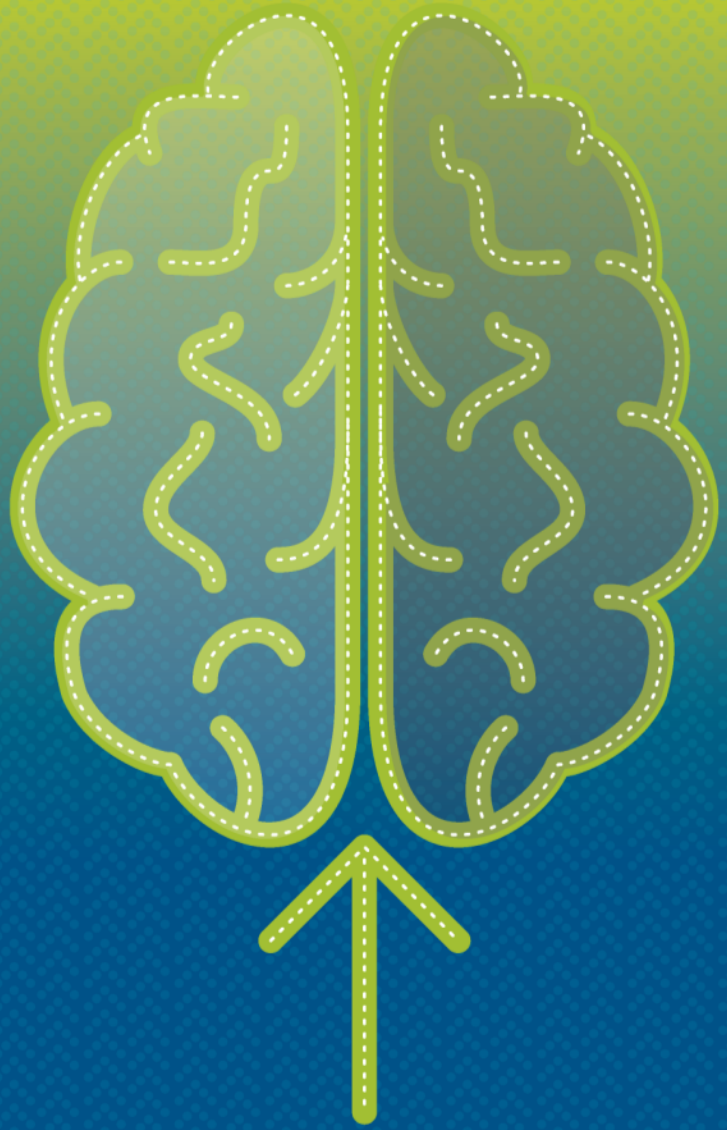

think fresh


INNOVATORS
inspiring + exploring + transforming

better roads ahead

Sustainable solutions to complex transportation needs

FEATURING

David McLean, Professor and Chair,
Civil and Environmental Engineering,
College of Engineering and Architecture

Curtis Hinman, Associate Professor,
WSU Pierce County Extension
Director, WSU Low Impact Development Research Program
Watershed Ecologist

April 6, 2010
Seattle

better roads ahead

Sustainable solutions to complex transportation needs

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Civil and Environmental Engineering,
College of Engineering and Architecture


WSDOT

SUSTAINABILITY

- Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

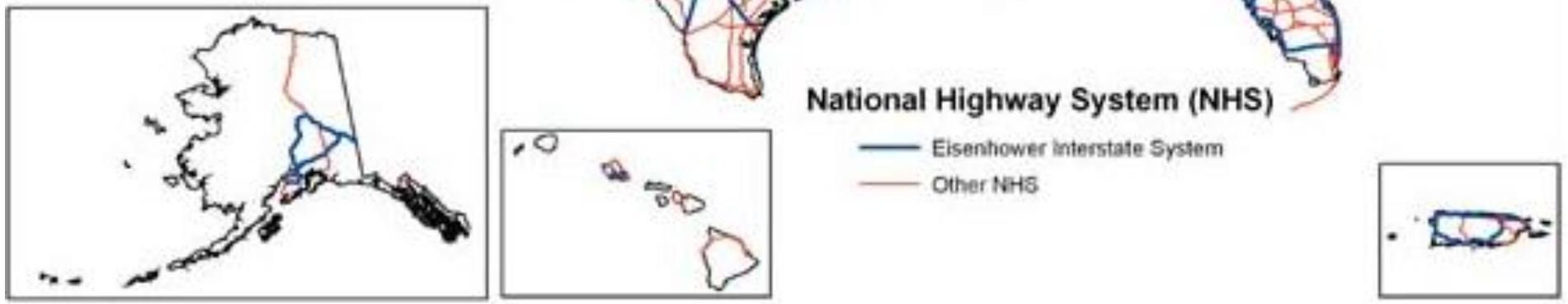
UN World Commission on Environment and Development
Brundtland Commission Report, 1987

"The interstate highway system is an engine that has driven 40 years of unprecedented prosperity and positioned the United States to remain the world's pre-eminent power into the 21st century."

- tribute to the Dwight D. Eisenhower System of Interstate and Defense Highways by Cox and Love, 1996

"Our generation inherited the world's best transportation system made possible by the commitment of the past two generations to invest in the country's future. We have spent that inheritance."

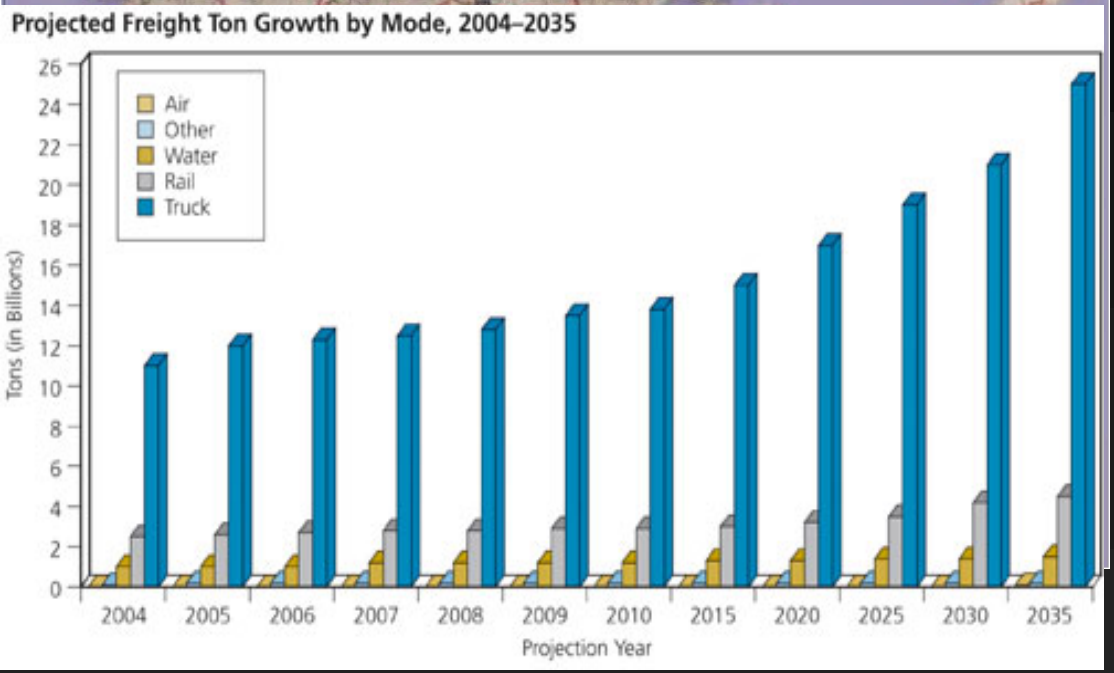
- AASHTO Board of Directors, 2006



$500 billion: cost to eliminate backlog of needed repairs and improvements to current highway and bridge network

– US DOT, 2009

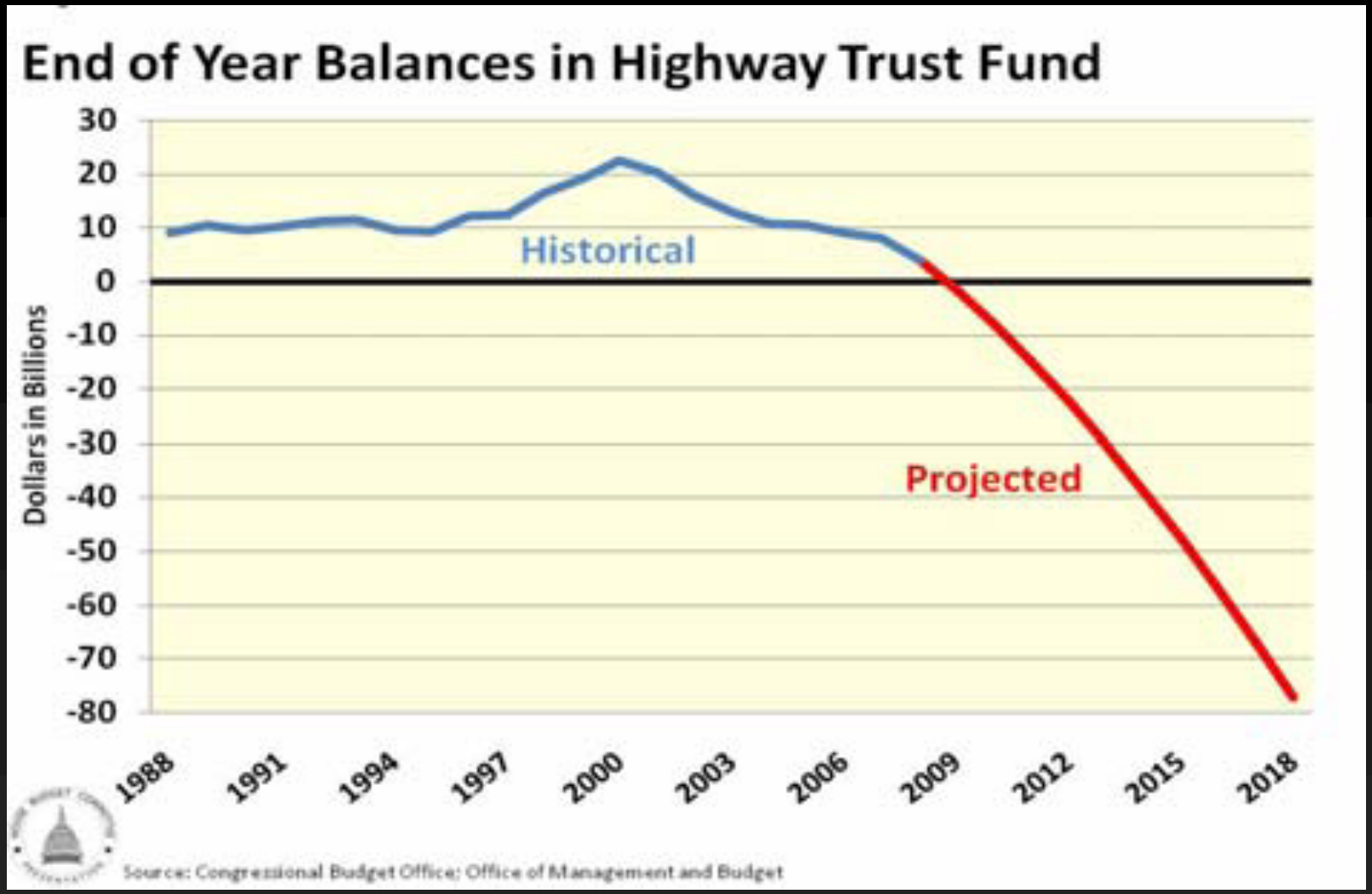
Growing Challenges



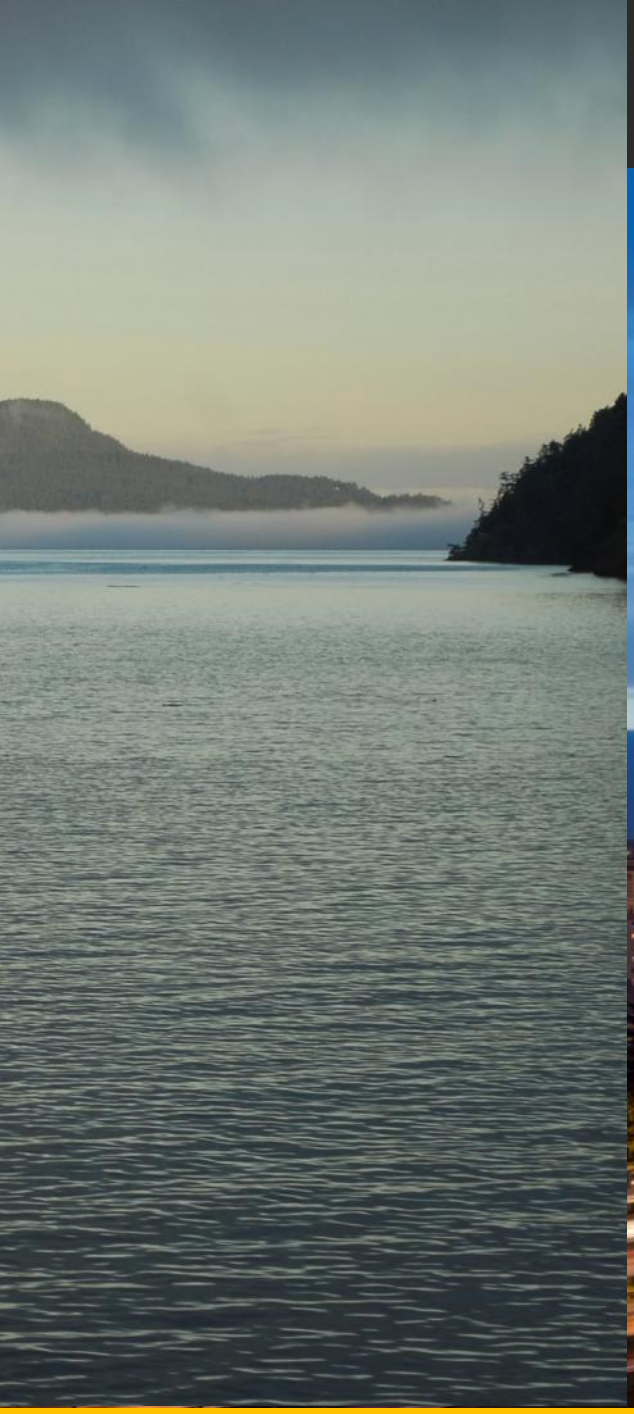
The U.S. will require twice as much arterial highway capacity over the next 50 years as was built over the last 50 years.

AASHTO *"Transportation: Invest in Our Future"* 2007

Highway Trust Fund Broke



Source: Congressional Budget Office



PugetSoundPartnership

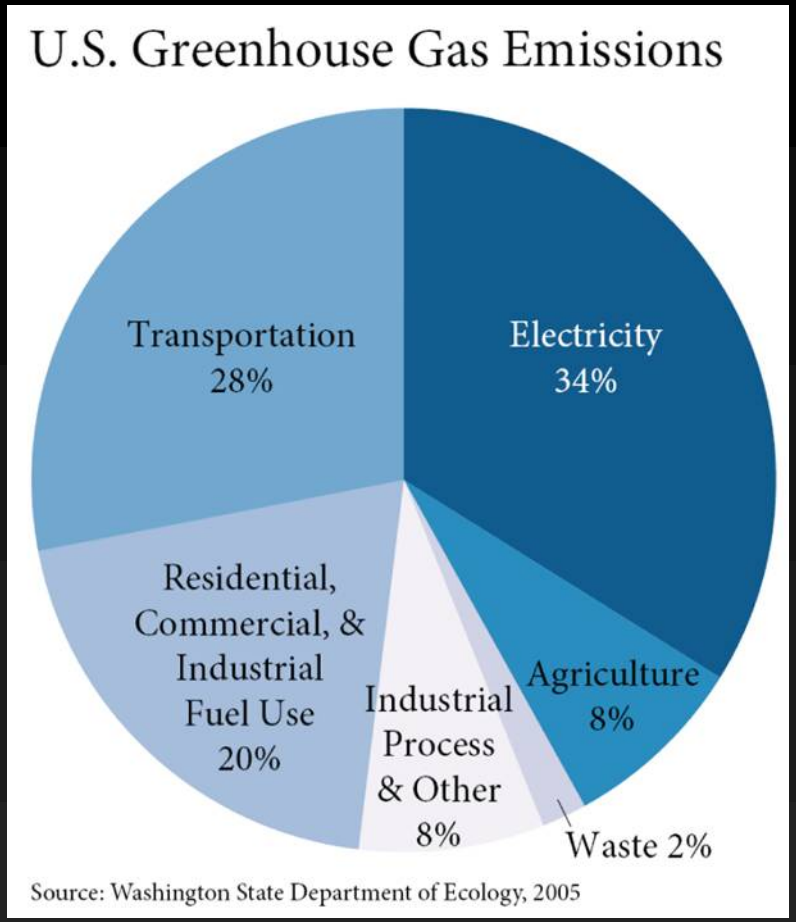
our sound, our community, our chance

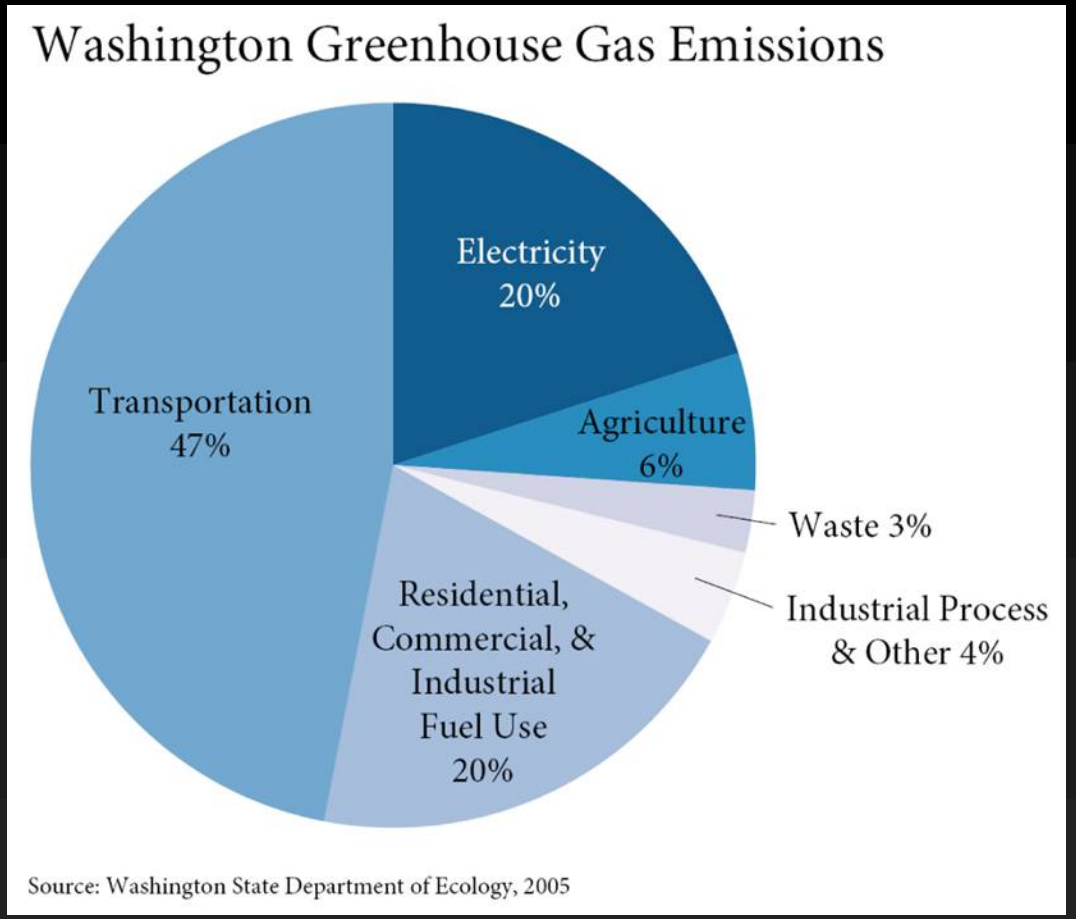
Seattle: 30 minutes average daily commute
45 hours average annual traffic delay

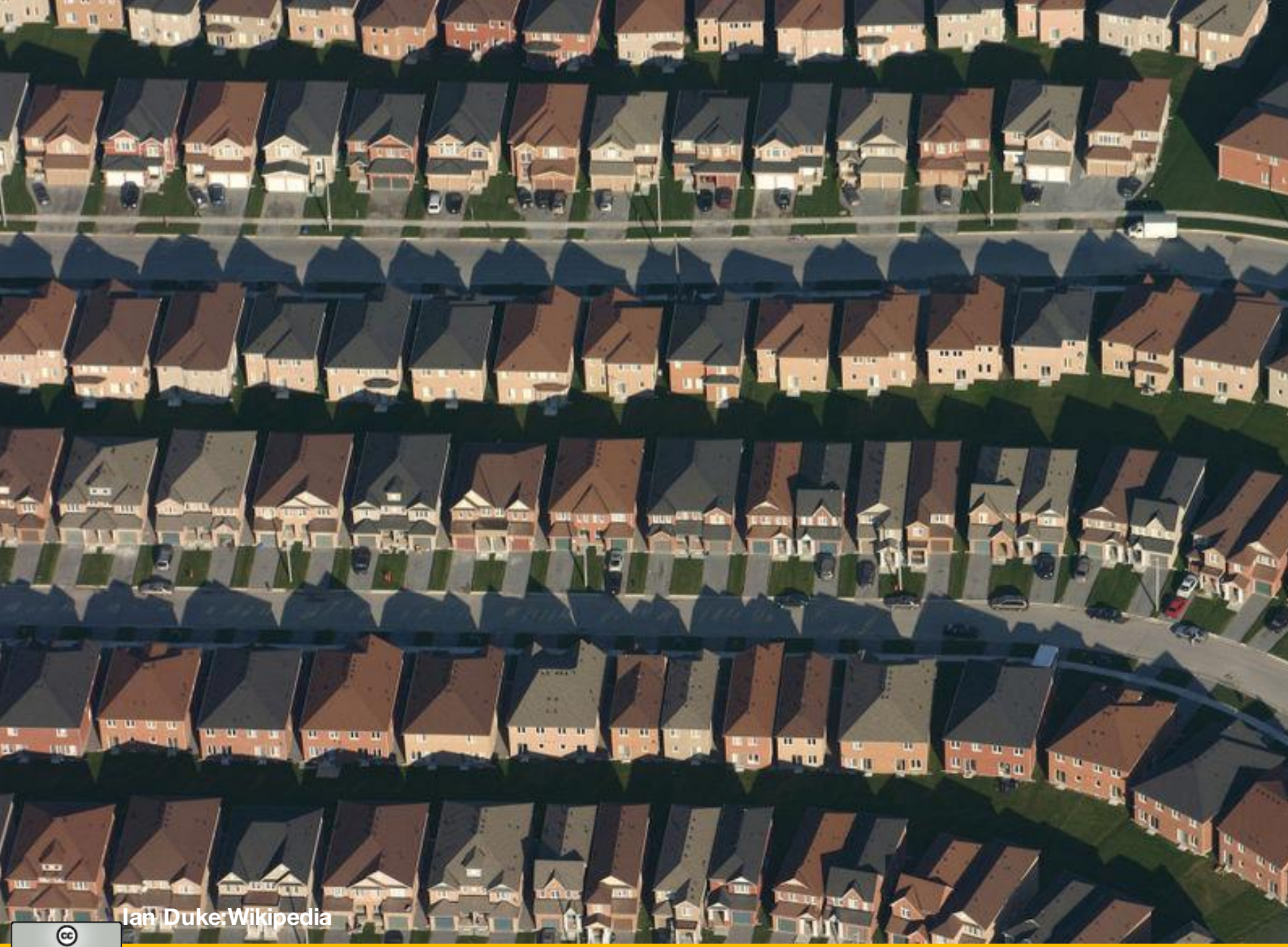
U.S.: 3 billion gallons of gas wasted and
$80 billion cost each year due to traffic congestion

Source: U.S. Census, ASCE

Transportation's Contribution to GHG







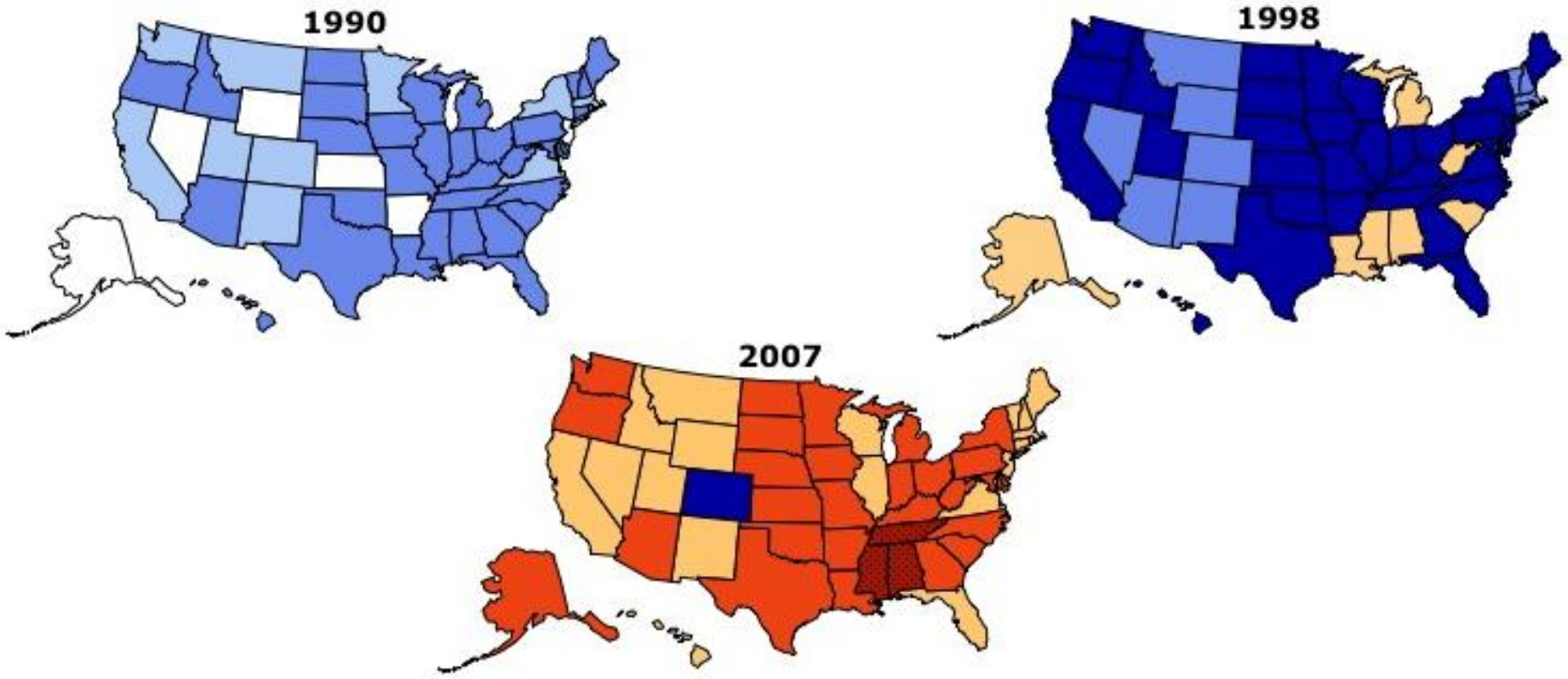
Ian Duke:Wikipedia


STOP

Obesity Trends* Among U.S. Adults

BRFSS, 1990, 1998, 2007

(*BMI ≥30, or about 30 lbs. overweight for 5'4" person)



Source: CDC Behavioral Risk Factor Surveillance System.

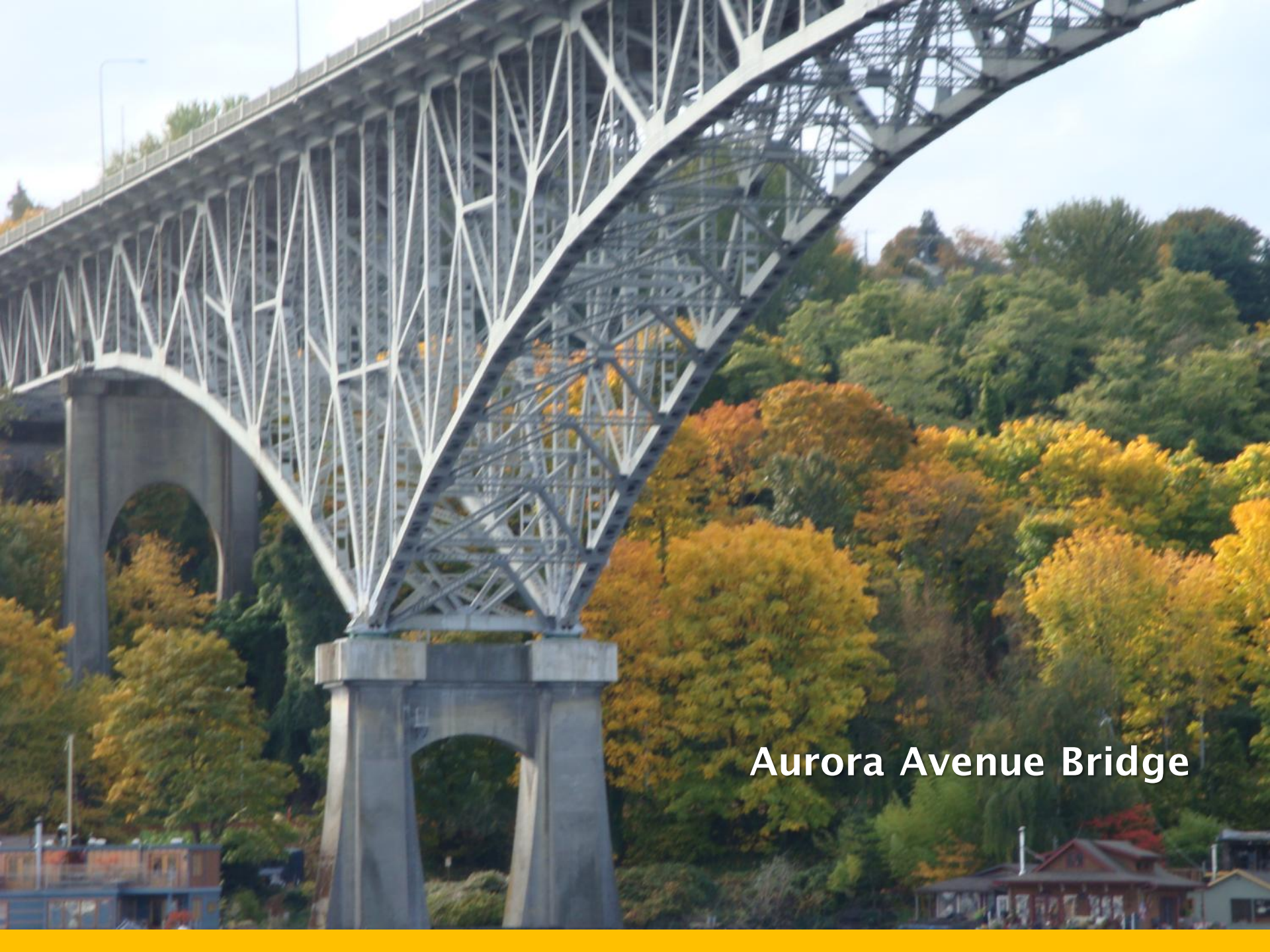
SUSTAINABILITY

Moving people and freight in an environmentally and economically sustainable manner will be one of the biggest challenges of the 21st century.

Source: International Organization for Economic Cooperation and Development
Transportation Futures, Strategies and Best Practices 2000

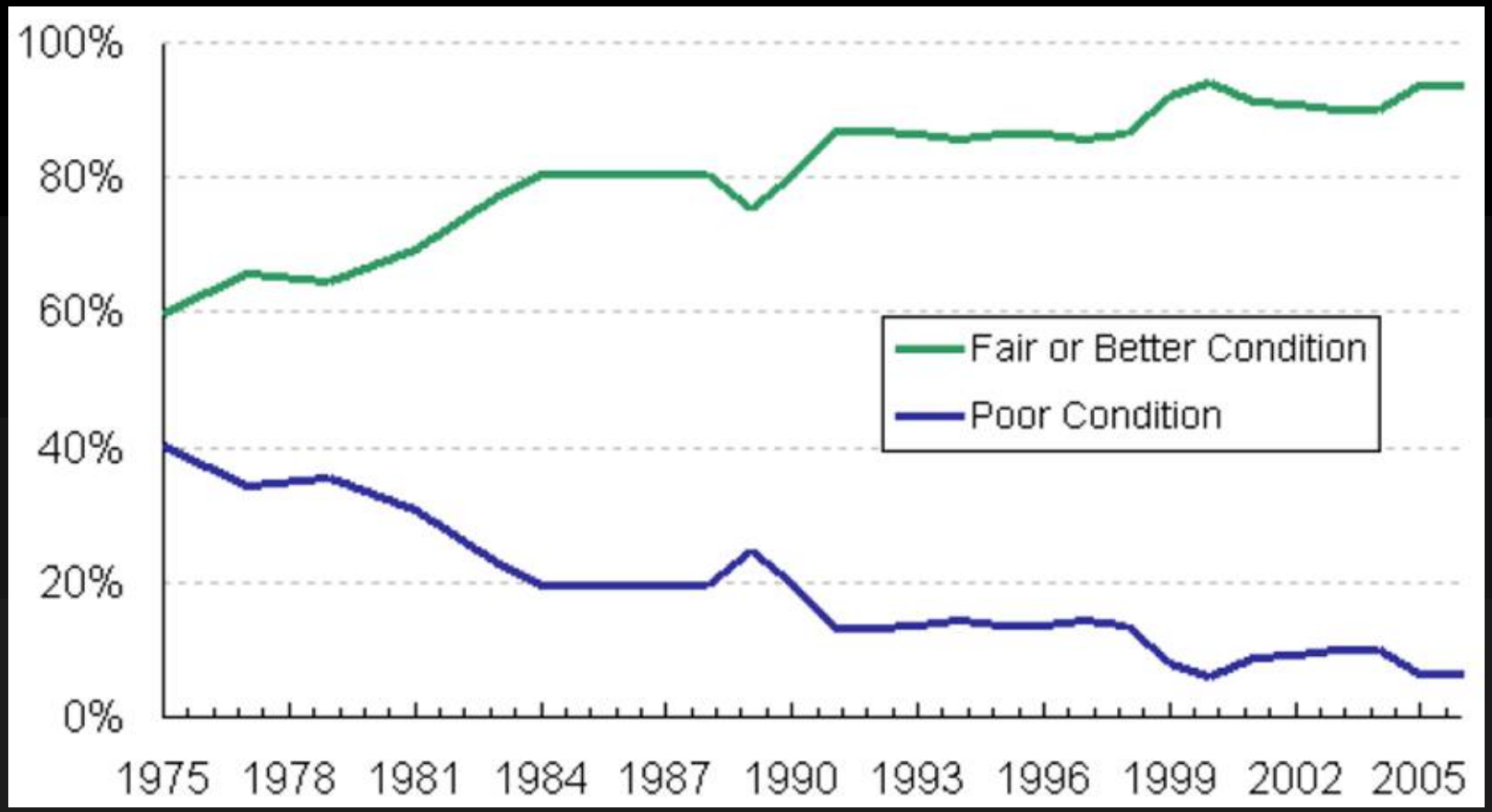
Solutions for a Sustainable Future

1. Preserve what has been built
2. Improve current system performance and efficiency
3. Better integrate transportation planning and land use
4. Increase multimodal transportation options
5. Create funding mechanisms to make improvements and add capacity
6. Reduce impact of transportation on the natural environment


Aurora Avenue Bridge


AURORA BRIDGE- ROJECT
N .5
JANUARY 29, 2010

State Highway Pavement Trends
(1975-2007)



Research supporting WSDOT's pavement management program has resulted in better roads and more than $100 million in savings over the last 10 years for the state




Strategic Freight Transportation Analysis




Website: www.sfta.wsu.edu

Wireless Connectivity Enabling Smart Transportation Systems

Drivers

Vehicles

Infrastructure

Wireless Devices

King County Executive Ron Sims, a leader in healthy community design, commutes to work on his bike.

King County

HealthScape

Community design for health and the environment

Learn more/ participate

HealthScape is a dynamic project that draws on the participation of residents, planners, public health officials, advocates, elected officials, and many others. It will continue to rely on wide participation to help refine the tools now being developed, and you can be a part of this process.

For more information, please visit our Web site (see address below) or contact Christina O'Claire (christina.oclaire@metrokc.gov, 206-263-4753).

Case study: SW 98th Street corridor

HealthScape principles can be applied to planning processes in urban, suburban, and rural communities. For example, King County has incorporated findings from the LUTAQH study into planned improvements to the SW 98th Street corridor in White Center. Enhancements to sidewalks and the streetscape along the main commercial corridor will complement a new trail connection to the nearby Greenbridge development. In addition, the new Development Impact Assessment Tool will be used to evaluate proposed zoning changes in the neighborhood.

To learn more about this and other projects in King County, visit the HealthScape Web site (see address below).

Sustainability through healthy community design

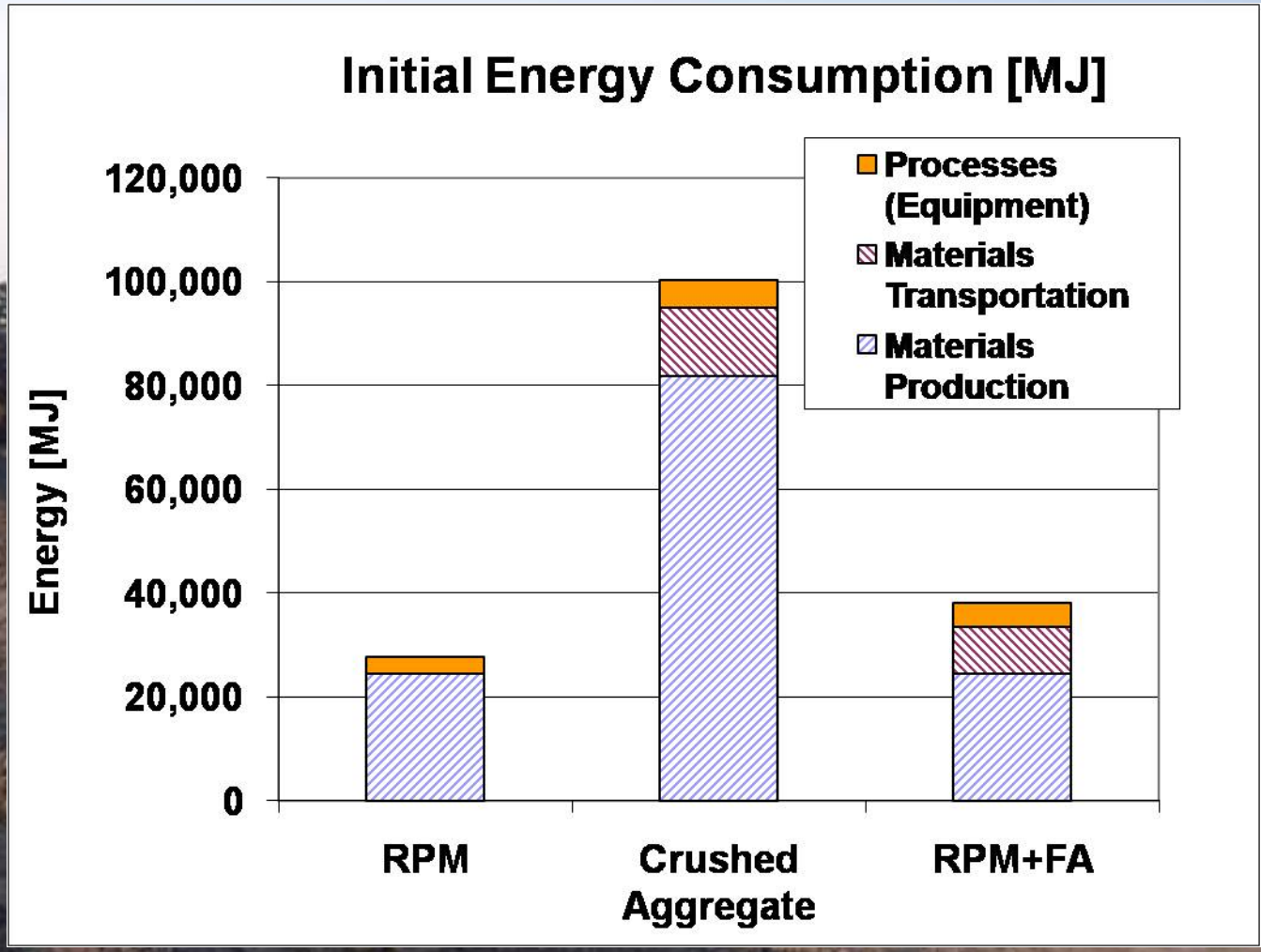
Multimodal Systems as Alternatives to Driving

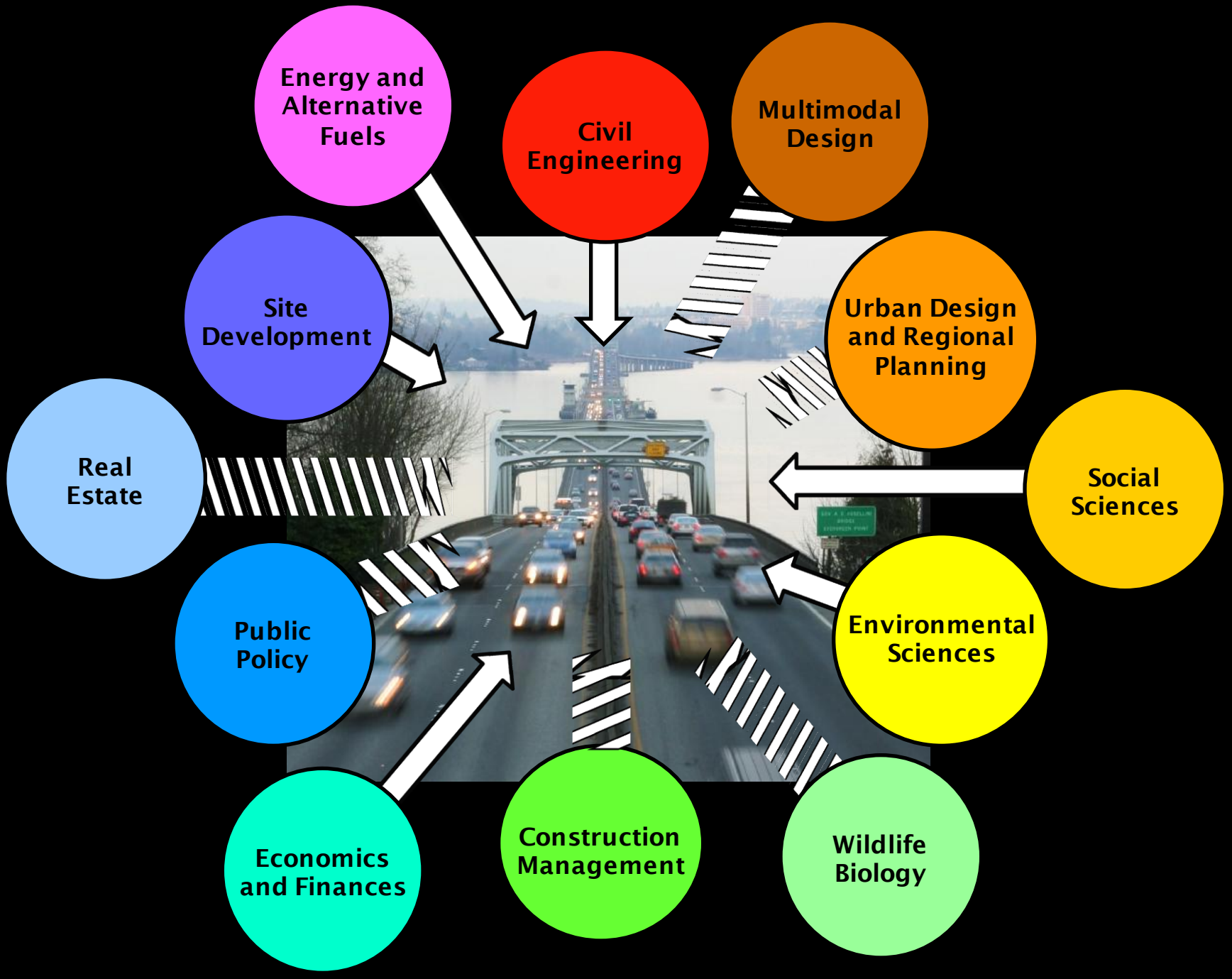
New Funding Basis Needed

- Fuel taxes not enough
- Taxes based on vehicle miles traveled (VMT)
- Increased use of toll roads and toll lanes along with congestion-based pricing
- Public–private partnerships as well as fully private
- Expanded funding for transit

Improved Standards for Design and Construction

Use of Recycled Materials




Energy and Alternative Fuels
Civil Engineering
Multimodal Design
Site Development
Urban Design and Regional Planning
Real Estate
Social Sciences
Public Policy
Environmental Sciences
Economics and Finances
Construction Management
Wildlife Biology

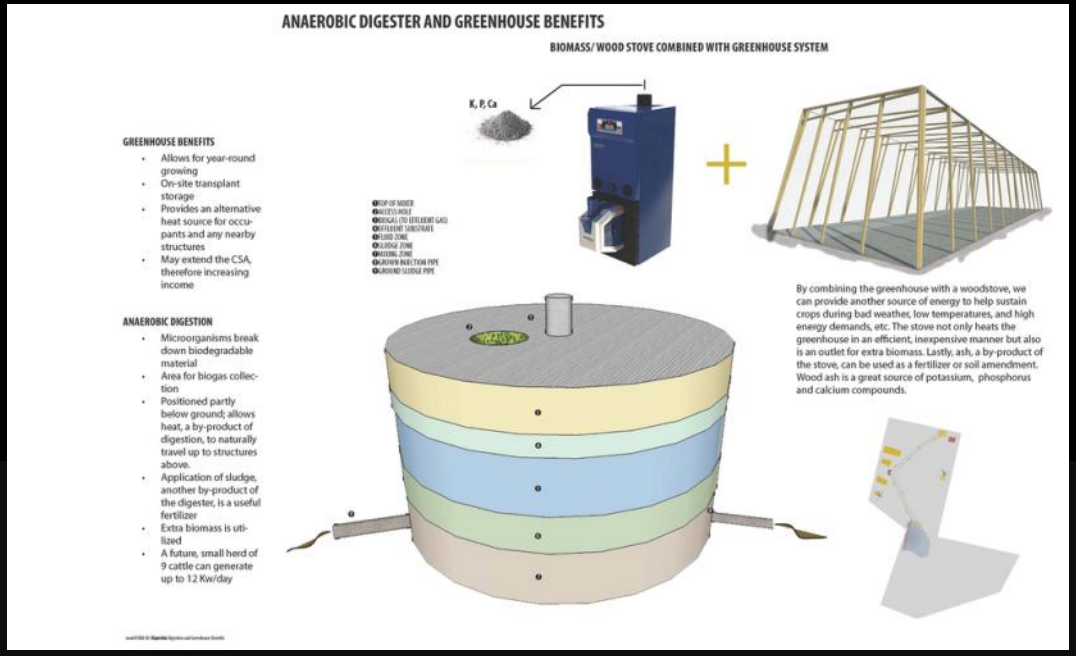
IDeX

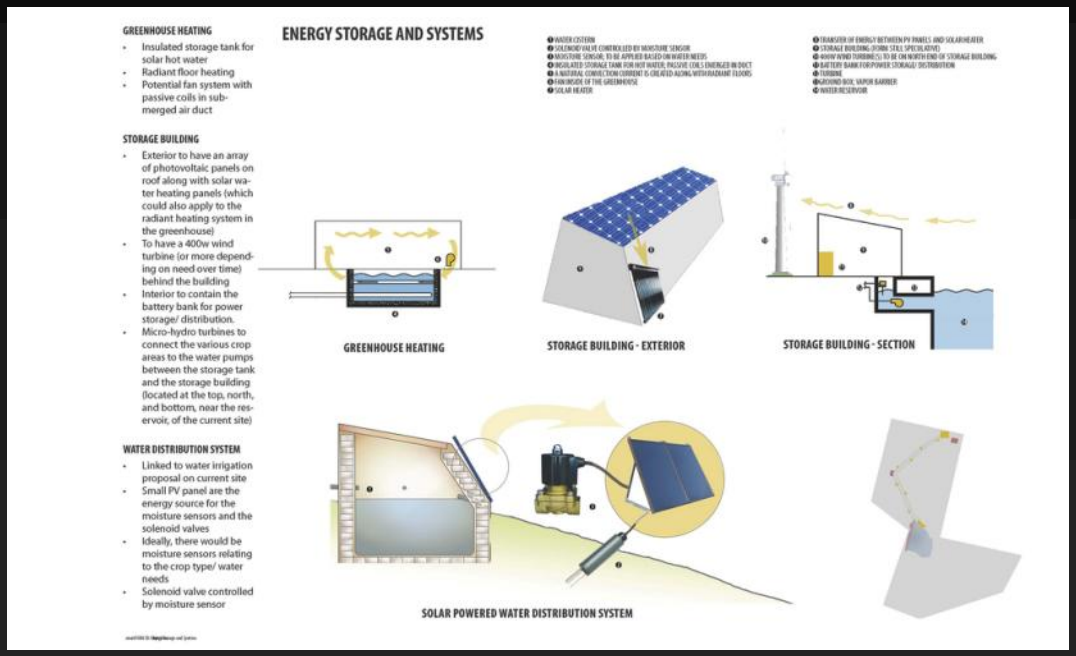
Integrated Design Experience

Mission: To pioneer and catalyze changes to the design and construction of the built environment that facilitate a sustainable future.

The Integrated Design Experience incorporates real project and joins students from engineering and the allied design disciplines with practitioners and faculty working together to develop sustainable solutions for the built environment.

The **smart**FARM project is designing an organic farm that is both water and energy neutral. It will influence policy and outline a new blueprint for the production and consumption of food, energy, and water.





better roads ahead

Sustainable solutions to complex transportation needs

FEATURING | **Curtis Hinman**, Associate Professor,
WSU Pierce County Extension
Director, WSU Low Impact Development Research Program
Watershed Ecologist

Innovation and Evolution of Transportation Systems

- Transportation systems and water quality
- New transportation designs for water quality protection
- WSU Low Impact Development Research Program



Puget Sound Conditions

- Stormwater a primary driver for decline
- Annual loading of oil ~22,580 metric tons
  (Exxon Valdez spilled ~33,500 metric tons)
- ~344 metric tons/yr of zinc
- Many pollutants associated with fines (particularly metals), many <0.45 microns (dissolved).

Low Impact Development Principles and Practices

- A land use development strategy that emphasizes protection and use of on-site natural features to manage stormwater.
- Integrated engineered, small scale stormwater controls. WQ treatment integral in all controls.

The Goal of LID

is to make this…

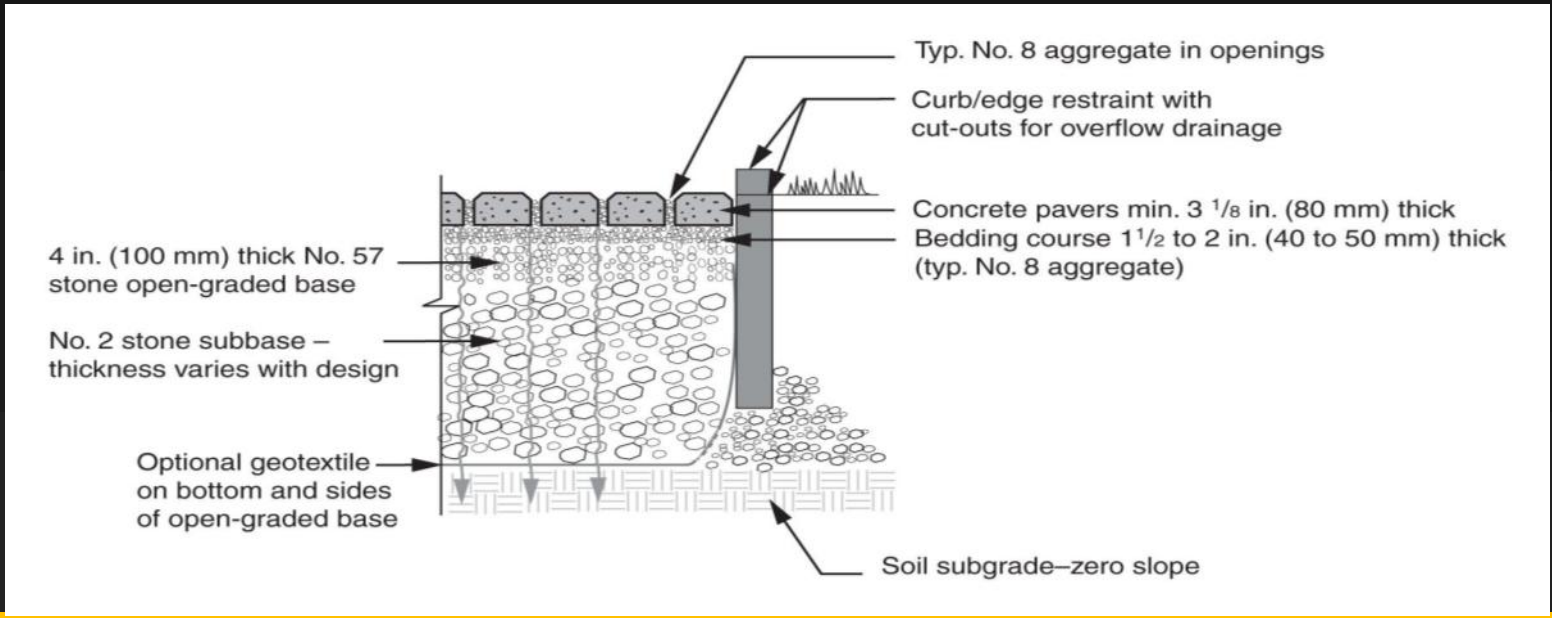
function more like this


2nd Ave NW, from NW 117th St. to NW 120th St.

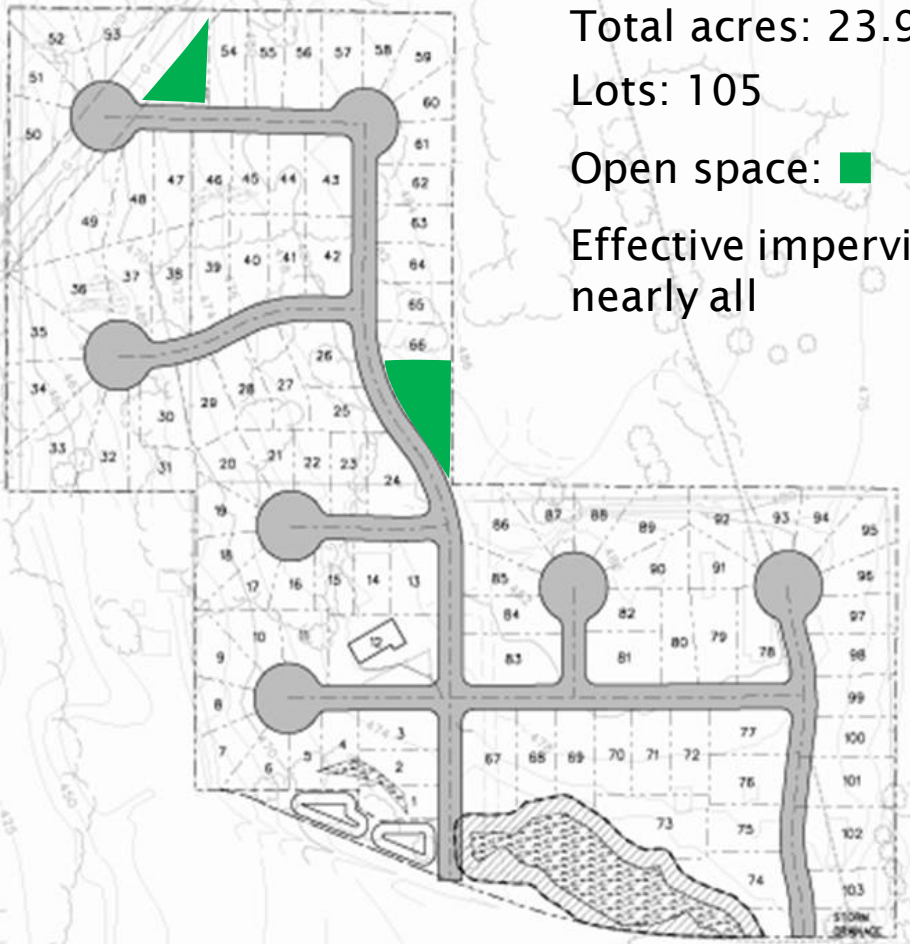

FIRSTENBURG BAZAAR
November 11, 9am-4pm
487-7001
REGISTER NOW FOR ADULT
BASKETBALL LEAGUES
487-7025

Permeable Pavers

- Flexible
- Capable of high vehicle loads, used for lower speeds
- High-density concrete that interlock and transfer vertical loads to surrounding pavers



Road Layout



Kensington Estates

Total acres: 23.92

Lots: 105

Open space:

Effective impervious area: nearly all

N

0 100 200 300
Scale in Feet

LEGEND
- PROPERTY BOUNDARY
- 105 LOT NUMBER DESIGNATION
- ROAD RIGHT -OF WAY
- EXISTING FOREST
- EXISTING WETLAND
- WETLAND BUFFER

Kensington Estates

Total acres: 23.92

Lots: 103 (4,143 sq ft Ave.)

Open space: 15 acres (63%)

Effective impervious area: approaching 0%

AHBL

Pierce County

Washington State University
Pierce County Extension

Research indicates that permeable pavements are highly effective for hydrocarbon biodegradation and metal capture.

- Hydrocarbons:
  97-99% removal capability (Pratt et al 1999)
- Metals:
  most captured in upper few centimeters of pavement (Dierkes et al)

Stratford Place, Sultan

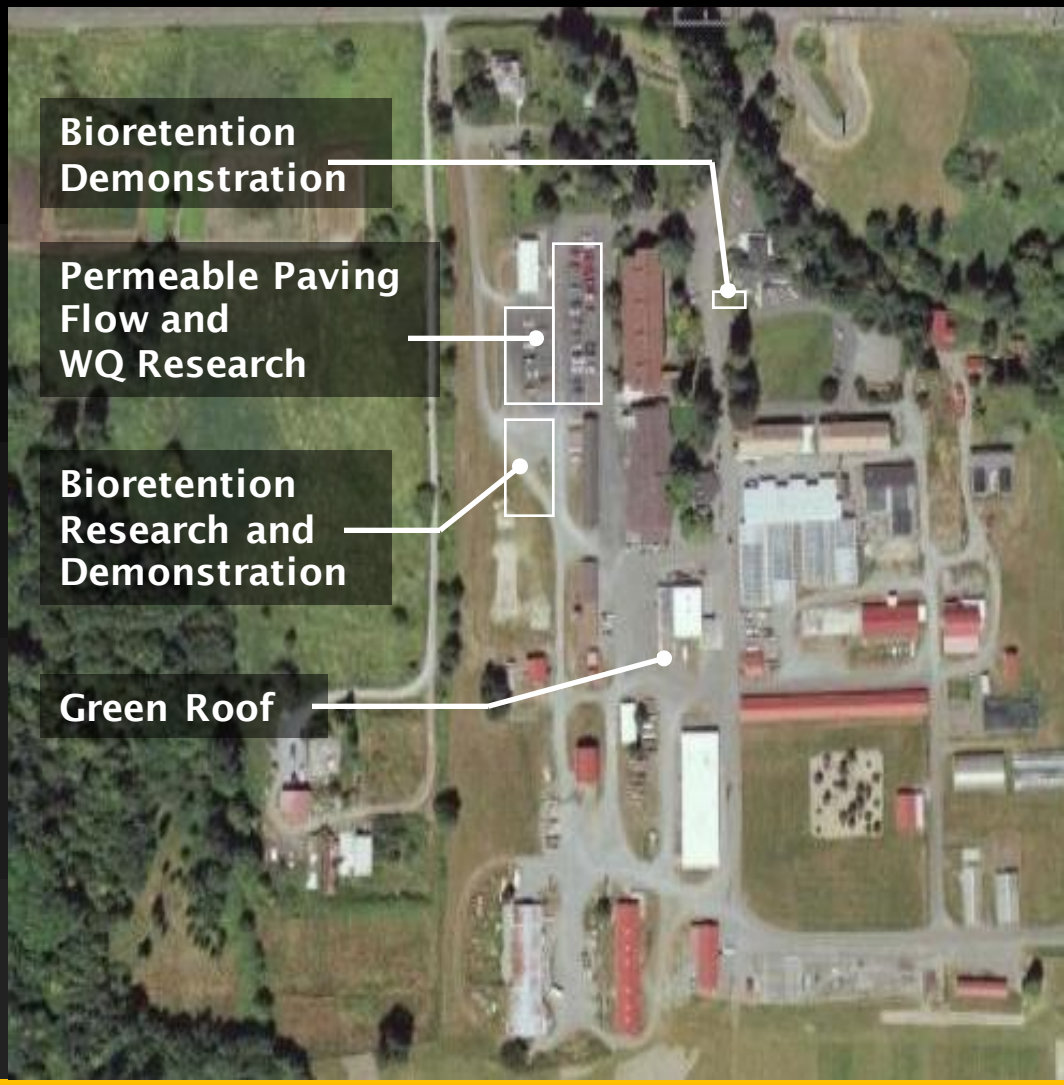
- 20 home residential subdivision
- 32,000ft^2 of pervious concrete
- Eliminated essentially all conventional stormwater practices
- Gained 2 building lots
- Gained $260,000 in stormwater infrastructure savings and extra lots

Marysville Park and Ride

- Ecostone pavers
- 18” sandy peat mix for treatment
- Eliminated essentially all conventional stormwater practices
- Saved ~$300,000
  (total project budget ~$2 million)

WSU Puyallup
LID Research Program

- A center for LID research and education in Puget Sound and the west
- Pilot scale and replicated research
- Research will integrate civil engineering, soil science, plant science, aquatic toxicology, etc.
- Excellent graduate research and publishing opportunities



WSU Puyallup
LID Research Program

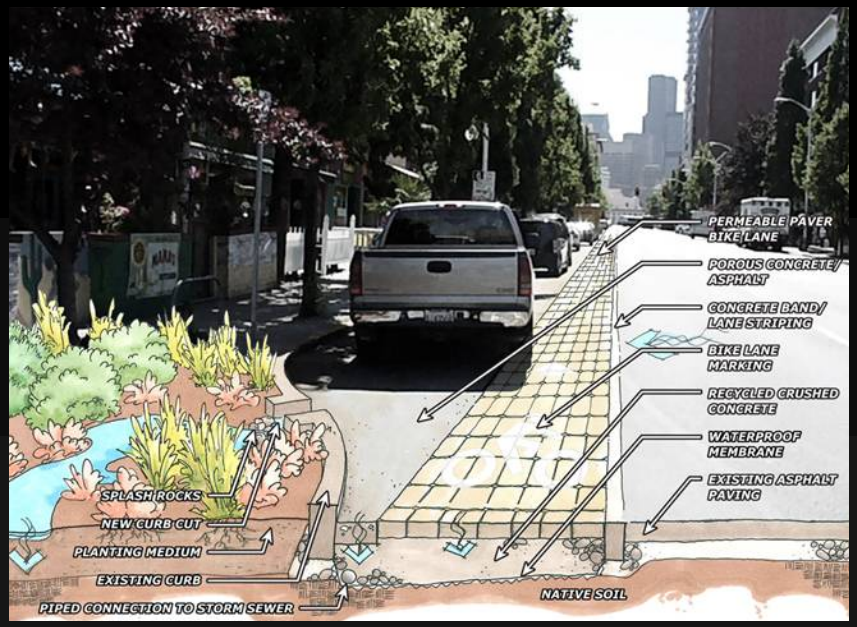
Pervious concrete

Porous asphalt

Bioretention

Developing and testing LID systems for enhanced flow control and water quality treatment performance.

Hydrology Redefining the Urban Landscape



GSI to protect receiving water will significantly change the built environment aesthetic and influence other social and environmental issues.

Re-tooling Our Education Programs

Innovation will require engineering programs that deliver interdisciplinary civil hydrology/ecology degrees

…and us.

Integrating Nature Back into the Built Environment

Europe leading in GSI, but…


INNOVATORS
inspiring + exploring + transforming

World Class. Face to Face.