

An aerial photograph of a small boat, possibly a fishing vessel or research boat, navigating through a dark, turbulent sea with large, white-capped waves. The sky is dark and stormy, with some light breaking through the clouds. The overall mood is dramatic and perilous.

THE PERFECT STORM

Frank Botelho
Office of Asset Management



U.S. Department of Transportation
Federal Highway Administration

The Big Picture

- PMS Fits into Asset Management
- Funds Shift to Asset Management
- Congestion & Freight
- Cost & Revenue
- Criticality:
 - Superpave
 - Materials
 - Quality
 - Pavement Management
 - Mechanistic Design

Synergy:

- 1. Asset Management**
- 2. Congestion & Freight**
- 3. Cost & Revenues**

Synergy => Premise

A. Asset Management

B. Congestion & Freight

C. Cost & Revenues

A + B + C = 

Premise \Rightarrow Analogy

Transportation

- **40 years**
- **Historic**
- **3 Energy Cells**

Weather

- **6 Days**
- **Epic**
- **3 Energy Cells**

THE PERFECT STORM

Transportation

1980

Middle

2000

2020



3 Energy Cells:

Transportation:

A. Asset Management

B. Congestion & Freight

C. Cost & Revenues

Perfect Storm:

A. Hurricane Grace

B. Cyclone

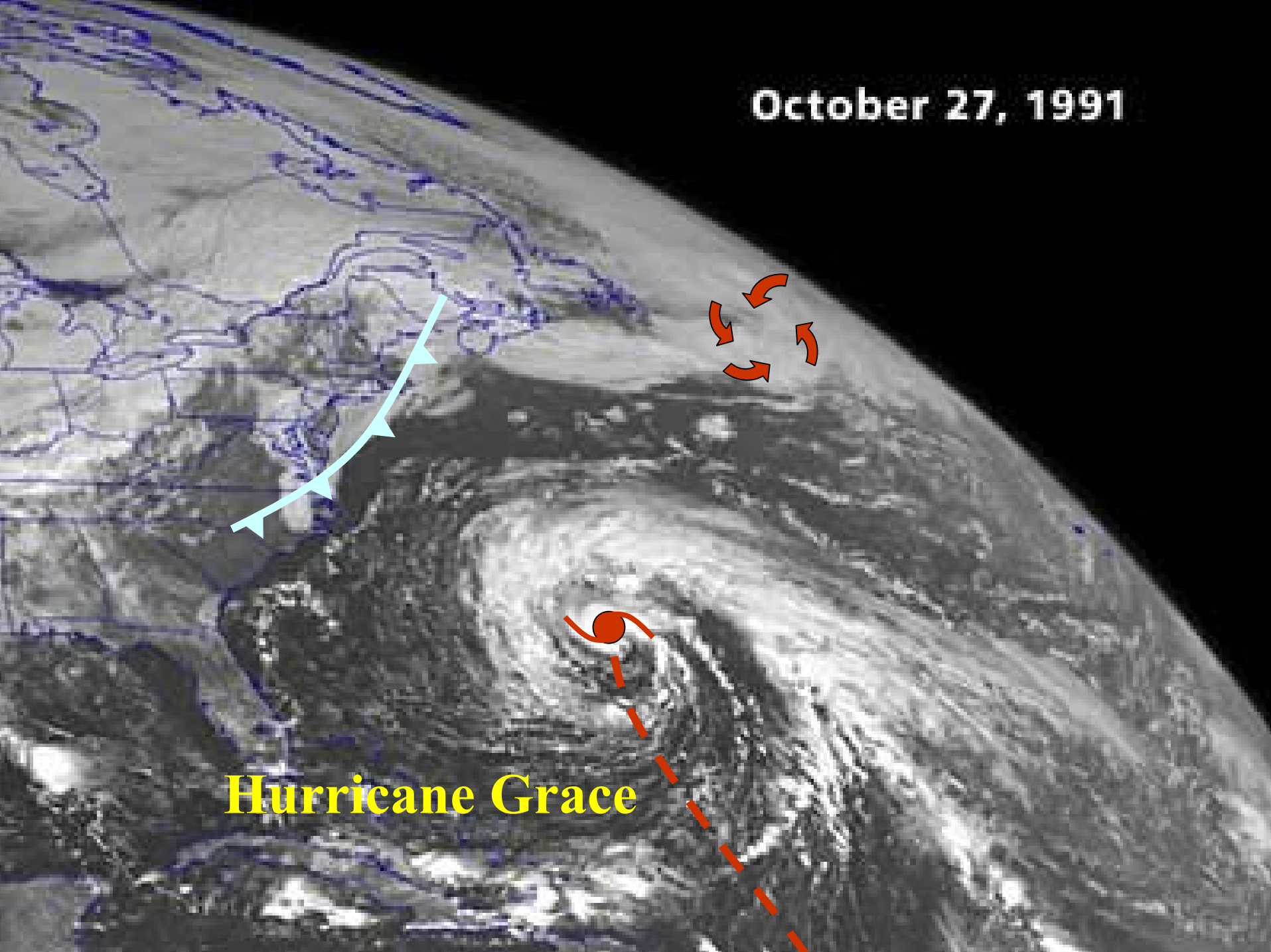
C. Cold Front

A + B + C =

**THE
PERFECT STORM**

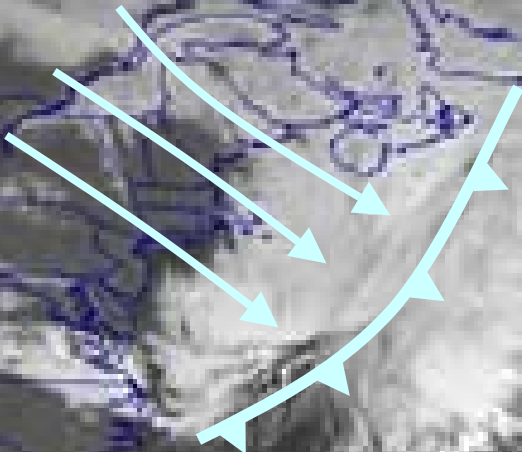
October 27, 1991

Hurricane Grace

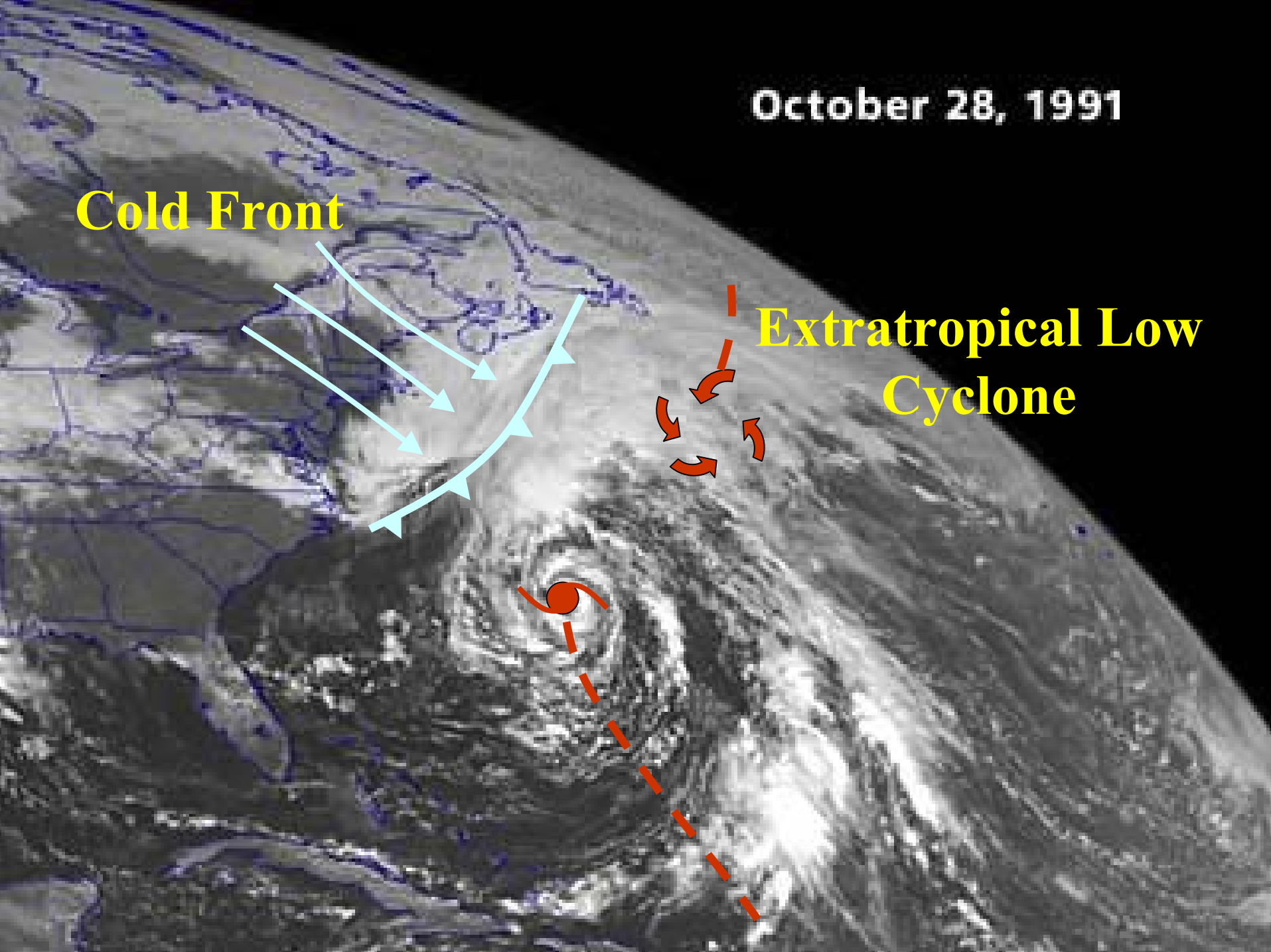


October 28, 1991

Cold Front

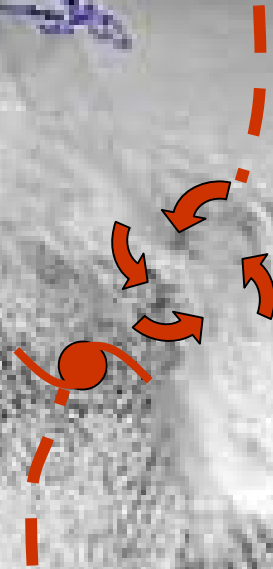


Extratropical Low Cyclone



October 29, 1991

Middle of the Storm



Hurricane, Cold Front & Cyclone Converge

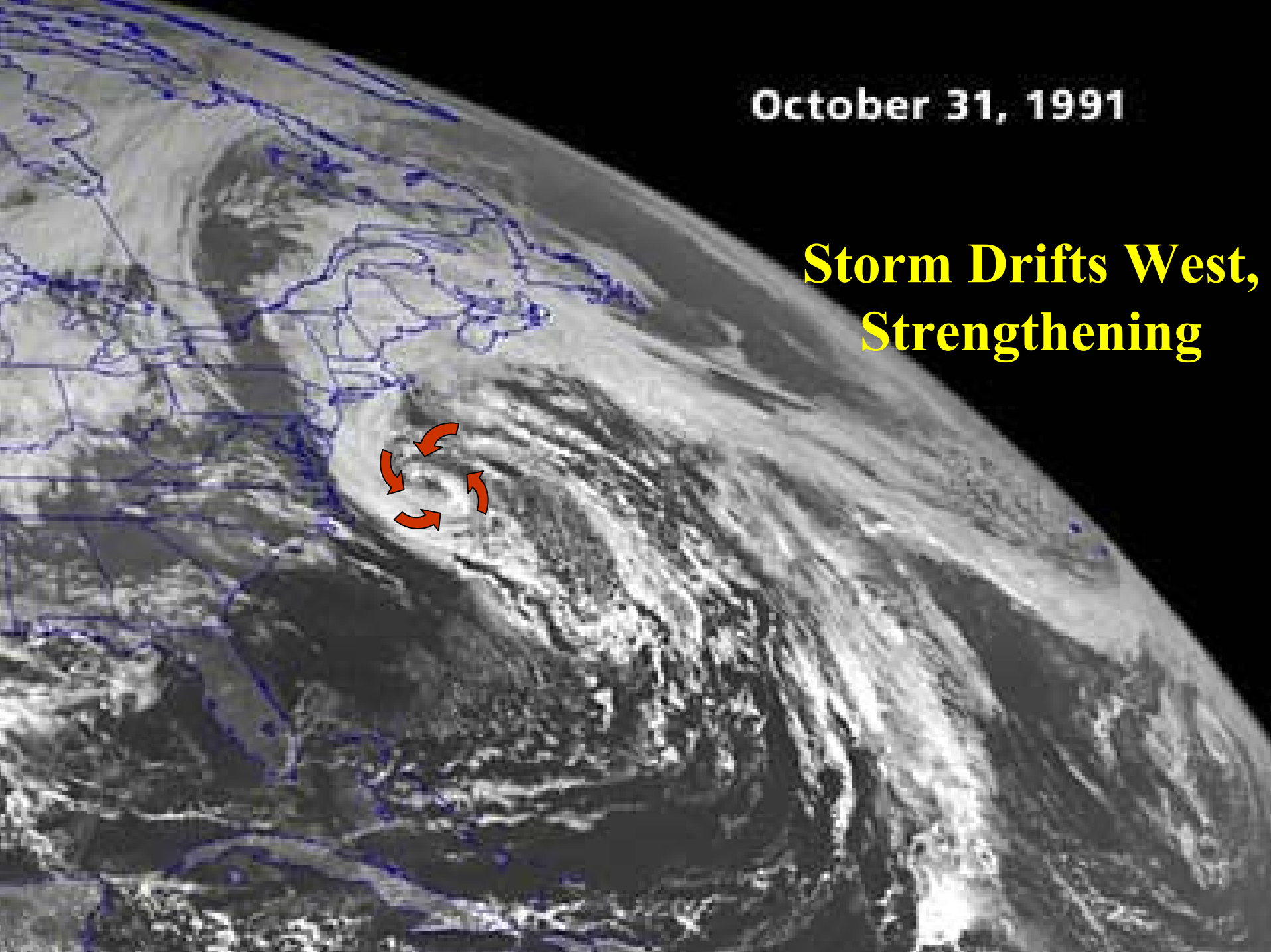
October 30, 1991



Storm Intensifies

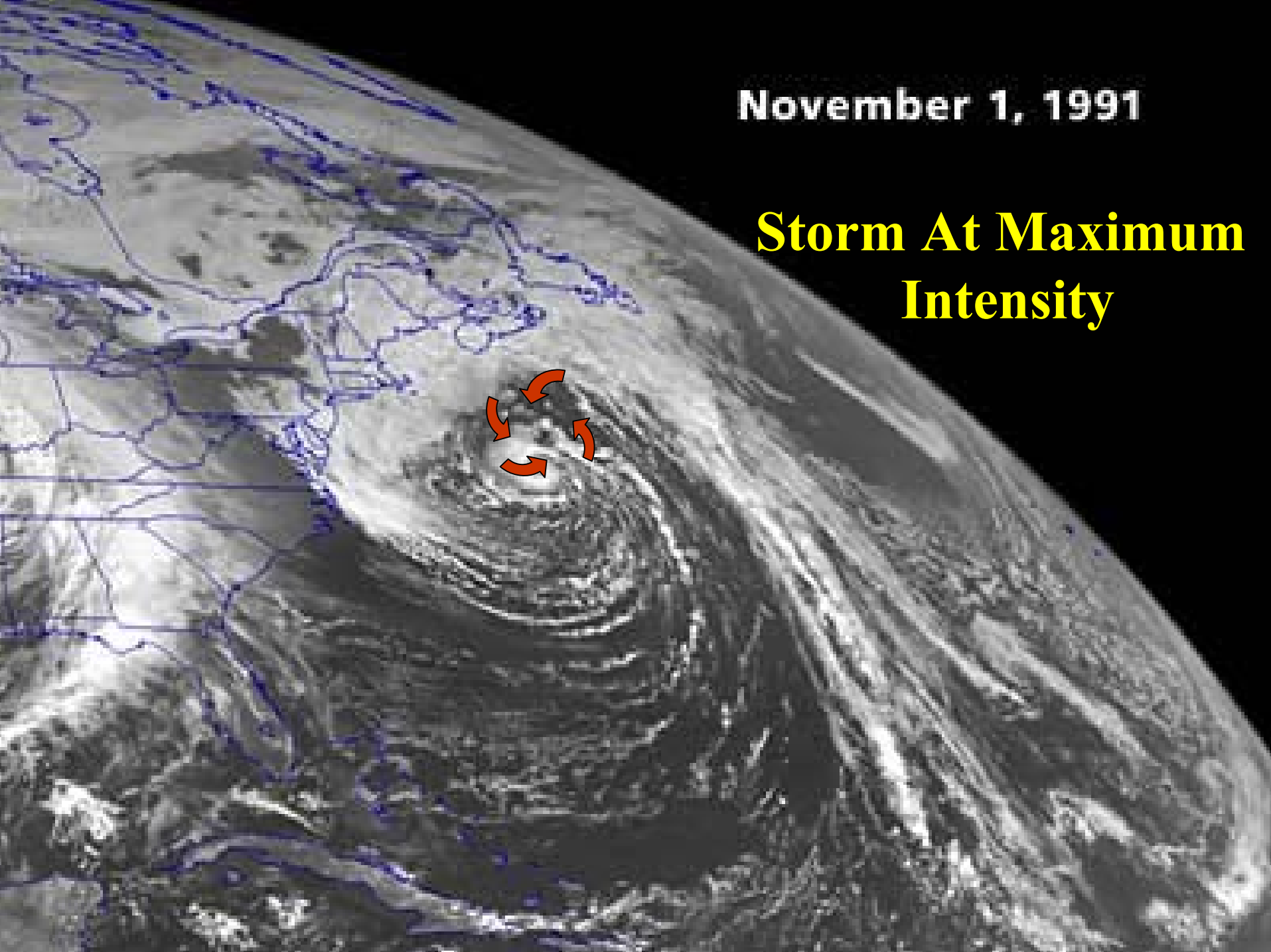
October 31, 1991

**Storm Drifts West,
Strengthening**

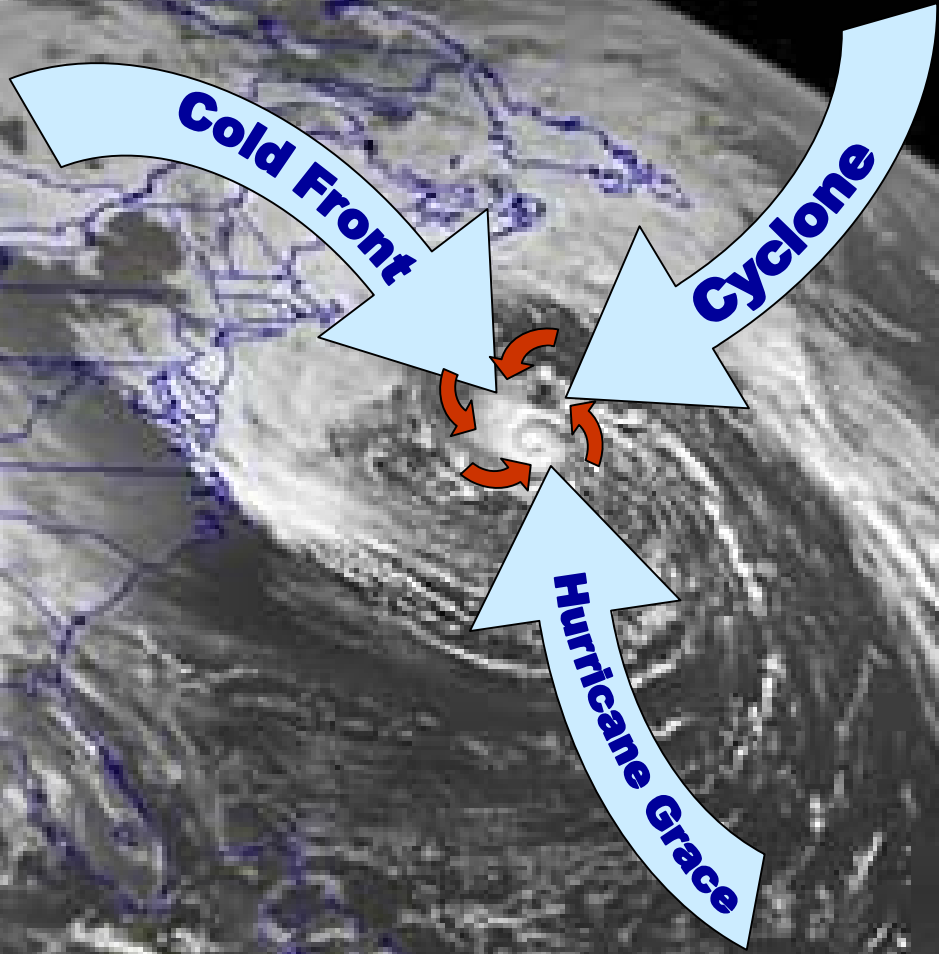


November 1, 1991

**Storm At Maximum
Intensity**



THE
PERFECT STORM

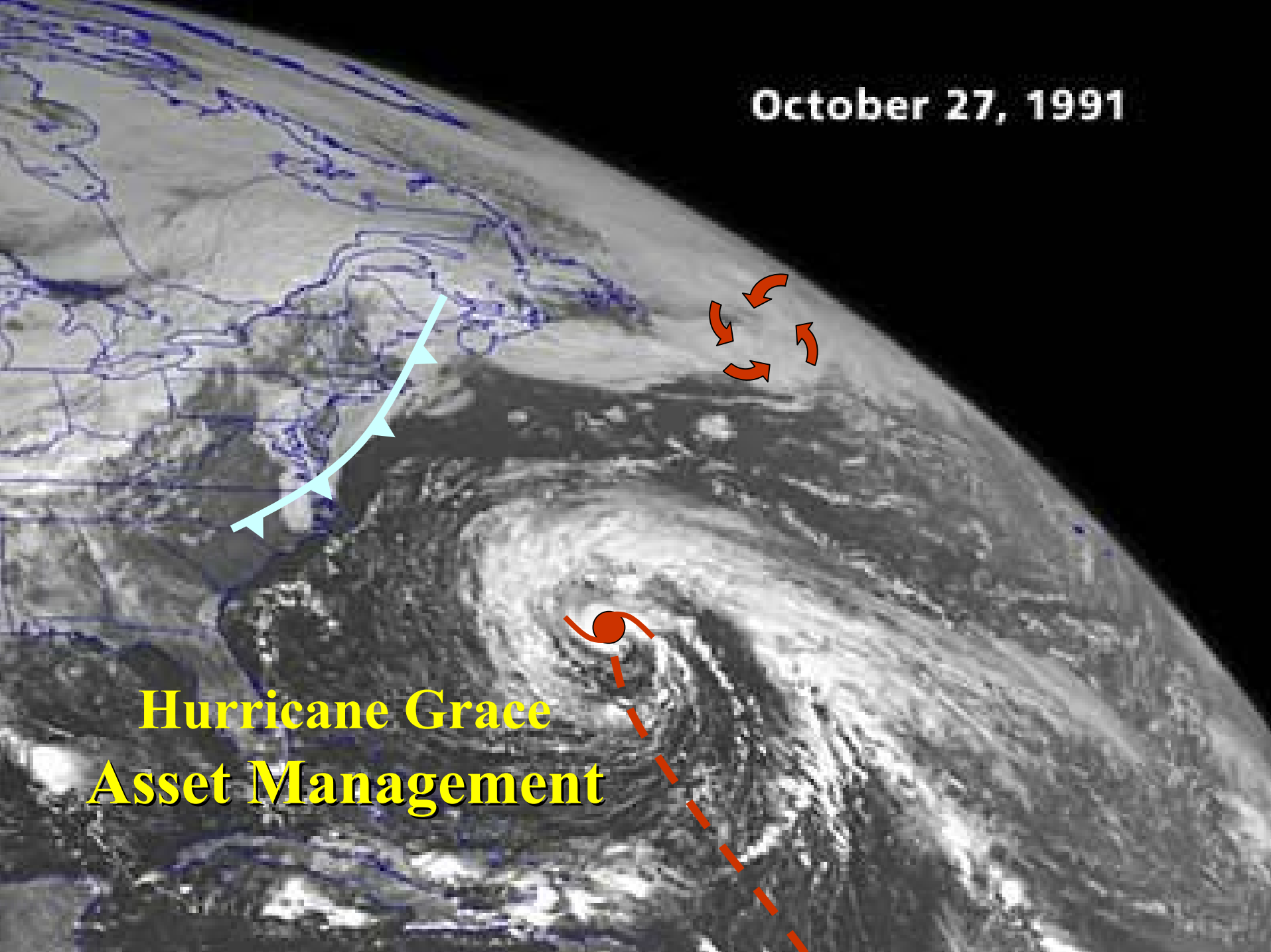


Superimpose Big Picture

- **PMS Fits into Asset Management**
- Funds Shift to Asset Management
- Congestion & Freight
- Cost & Revenue
- Criticality:
 - Superpave
 - Materials
 - Quality
 - Pavement Management
 - Mechanistic Design

October 27, 1991

**Hurricane Grace
Asset Management**



AASHTO Guidelines for Pavement Management Systems

July 1990



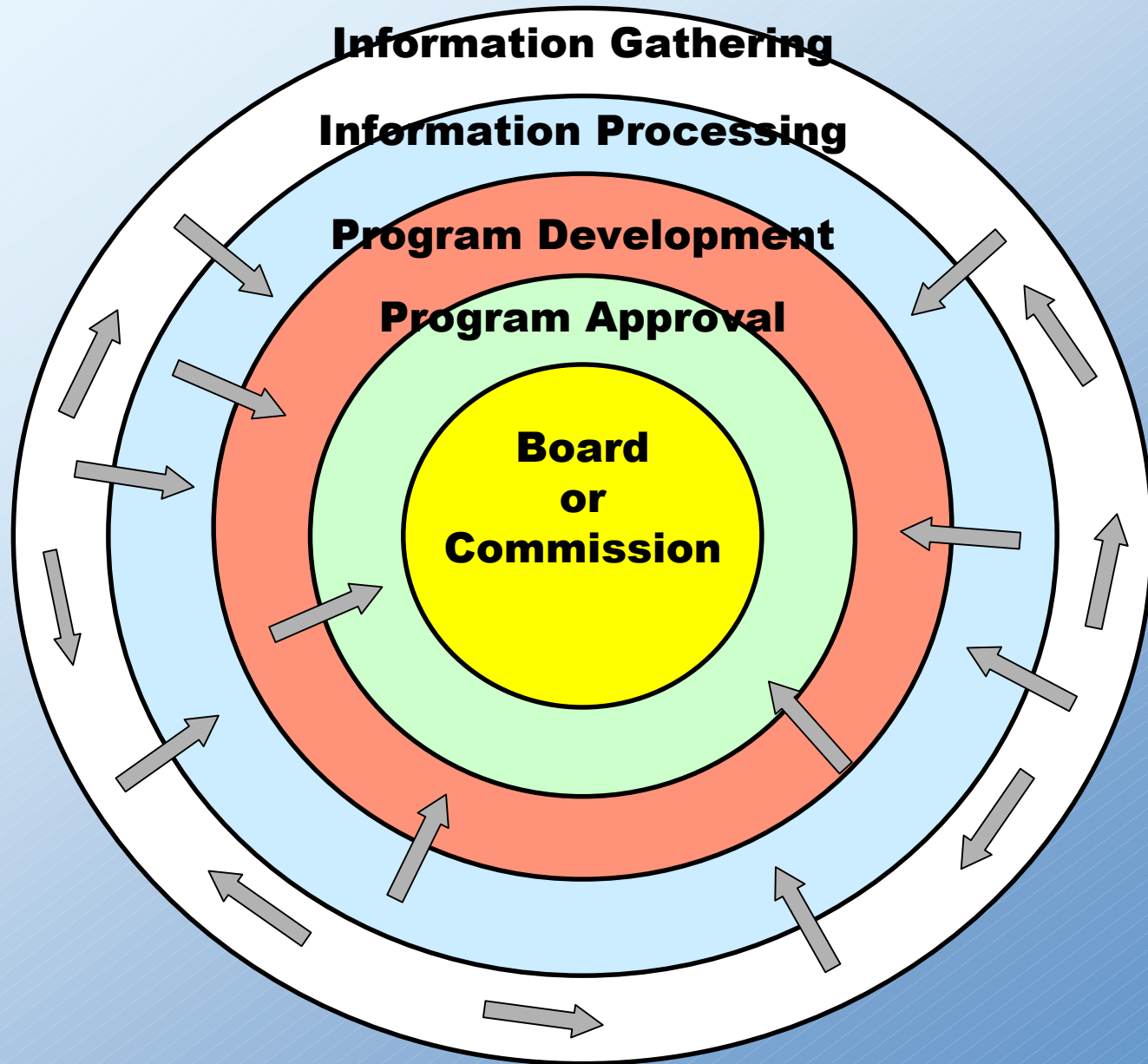
Published by the
American Association of
State Highway and
Transportation Officials
444 North Capitol Street, N.W.
Suite 225
Washington, D.C. 20001

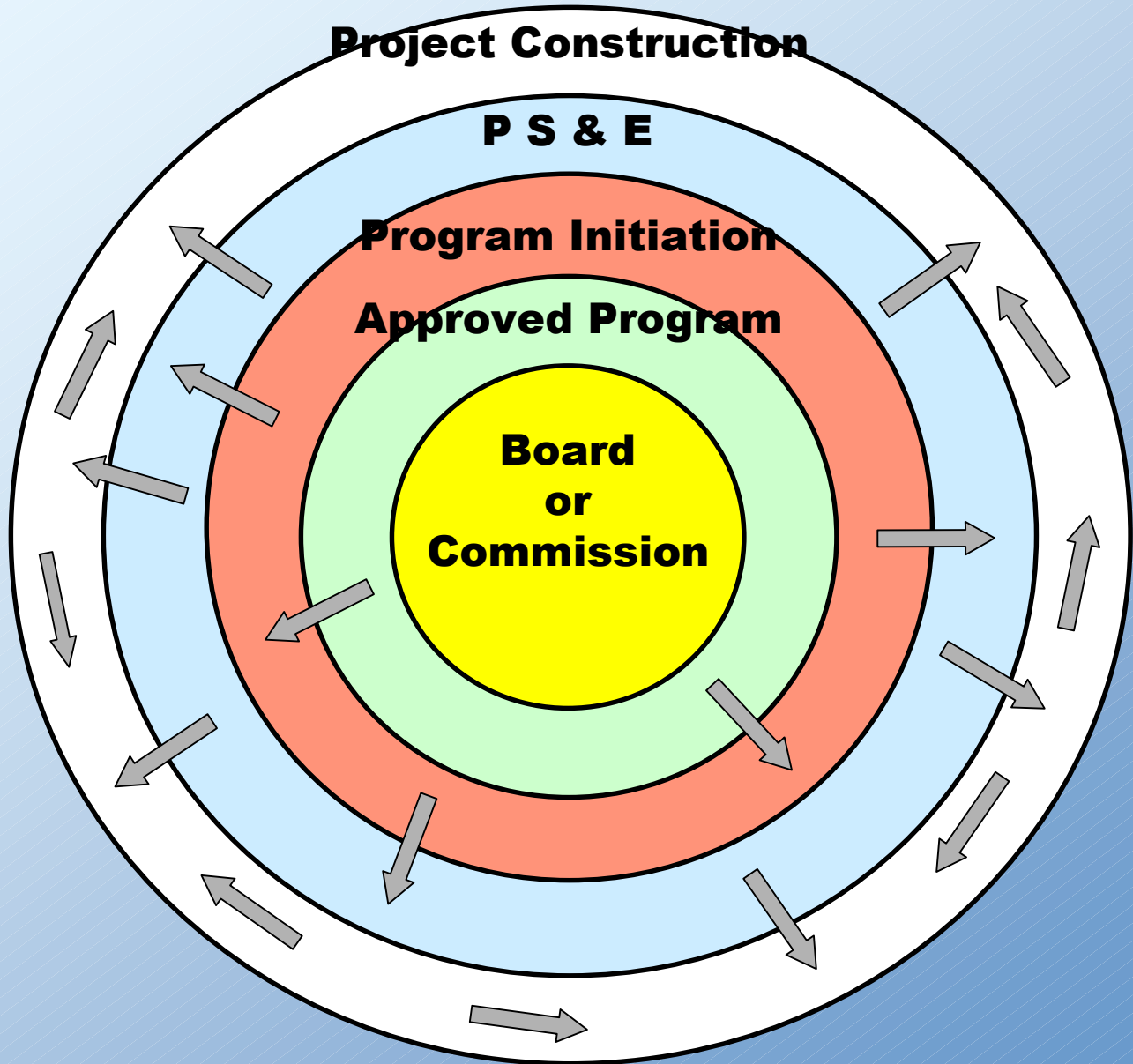


PMS Definition:

“A set of tools or methods that can assist decision-makers in finding cost-effective strategies for providing, evaluating and maintaining pavements in a serviceable condition”

Source: AASHTO Guidelines for Pavement Management Systems, 1990







Transportation Asset Management Guide

final
report

prepared for

**National Cooperative Highway Research
Program (NCHRP) Project 20-24(11)**

prepared by

Cambridge Systematics, Inc.

with

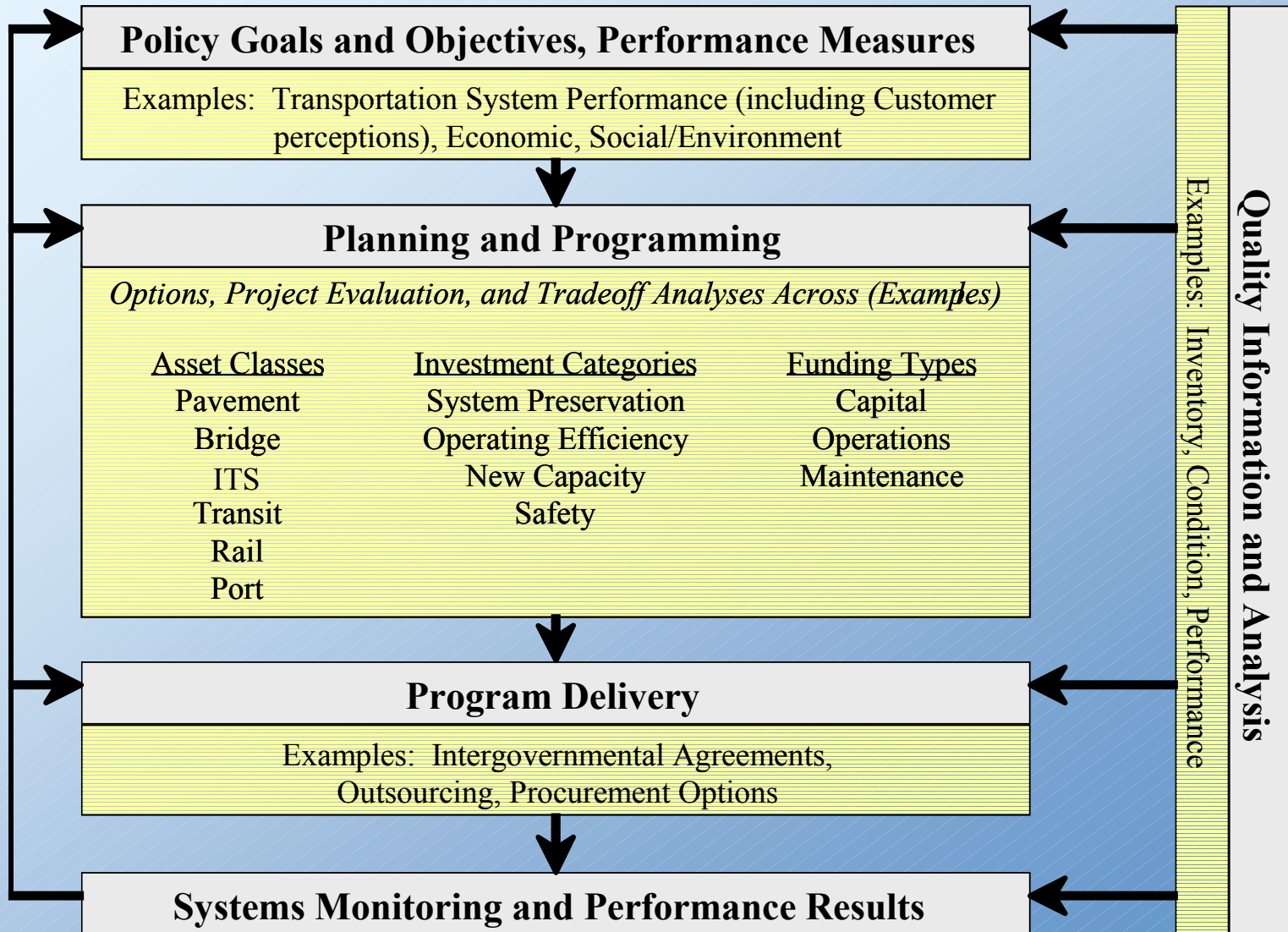
Parsons Brinckerhoff Quade & Douglas, Inc.
Roy Jorgensen Associates, Inc.
Paul D. Thompson, Consultant

November 2002

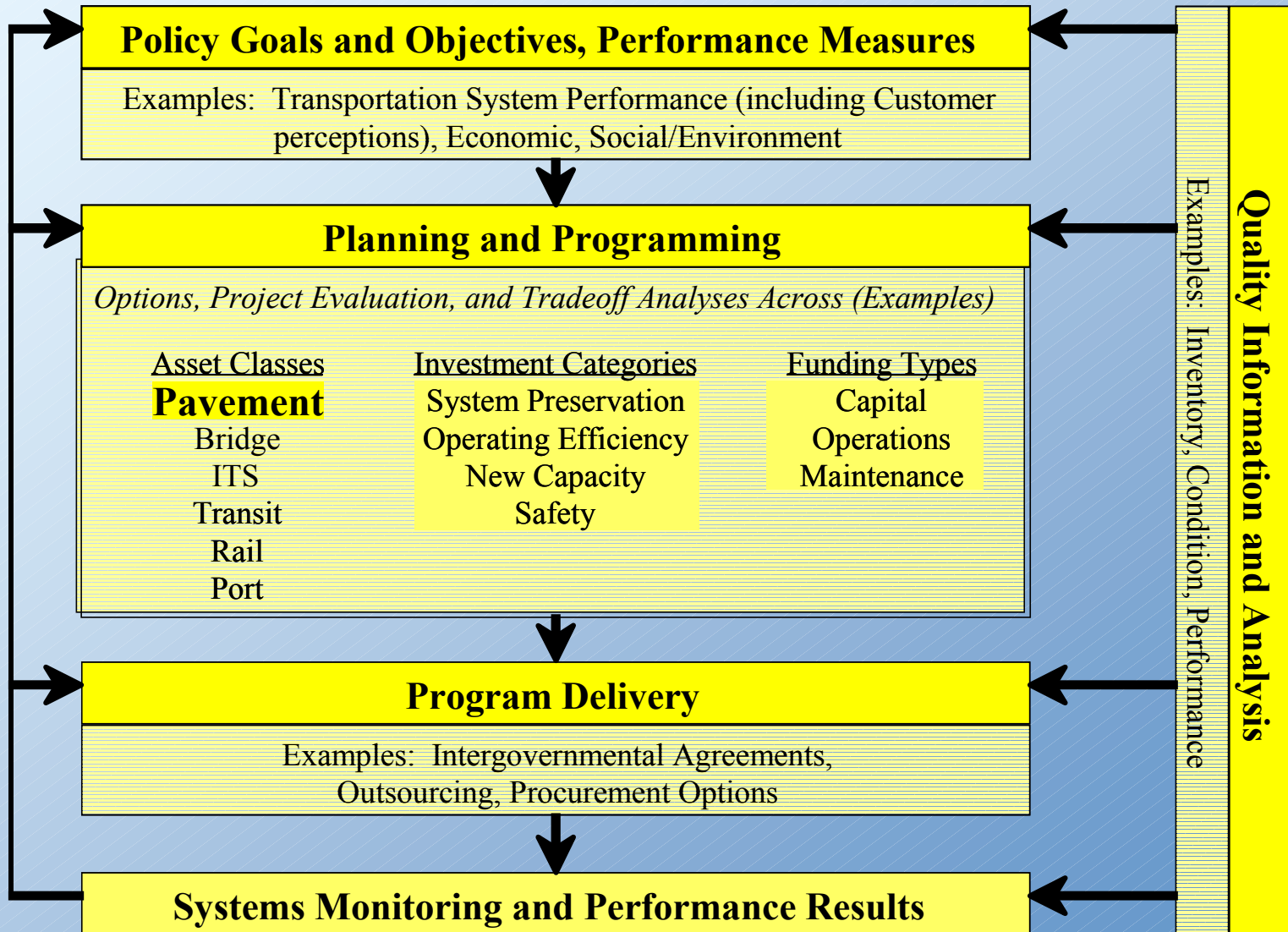
Asset Management:

“Transportation Asset Management is a strategic approach to the optimal allocation and utilization of resources for the management, operation, preservation, and expansion of transportation infrastructure.”

Asset Management Framework



PMS in Asset Management



THE PERFECT STORM

Historical Perspective

1980

2000

2020

React	Asset Management
Tactical	Strategic

Pavements ‘Я’ Us Generation

1980

2000



‘**R**’ \Rightarrow **R**eactive

Resurfacing

Restoration

Rehabilitation

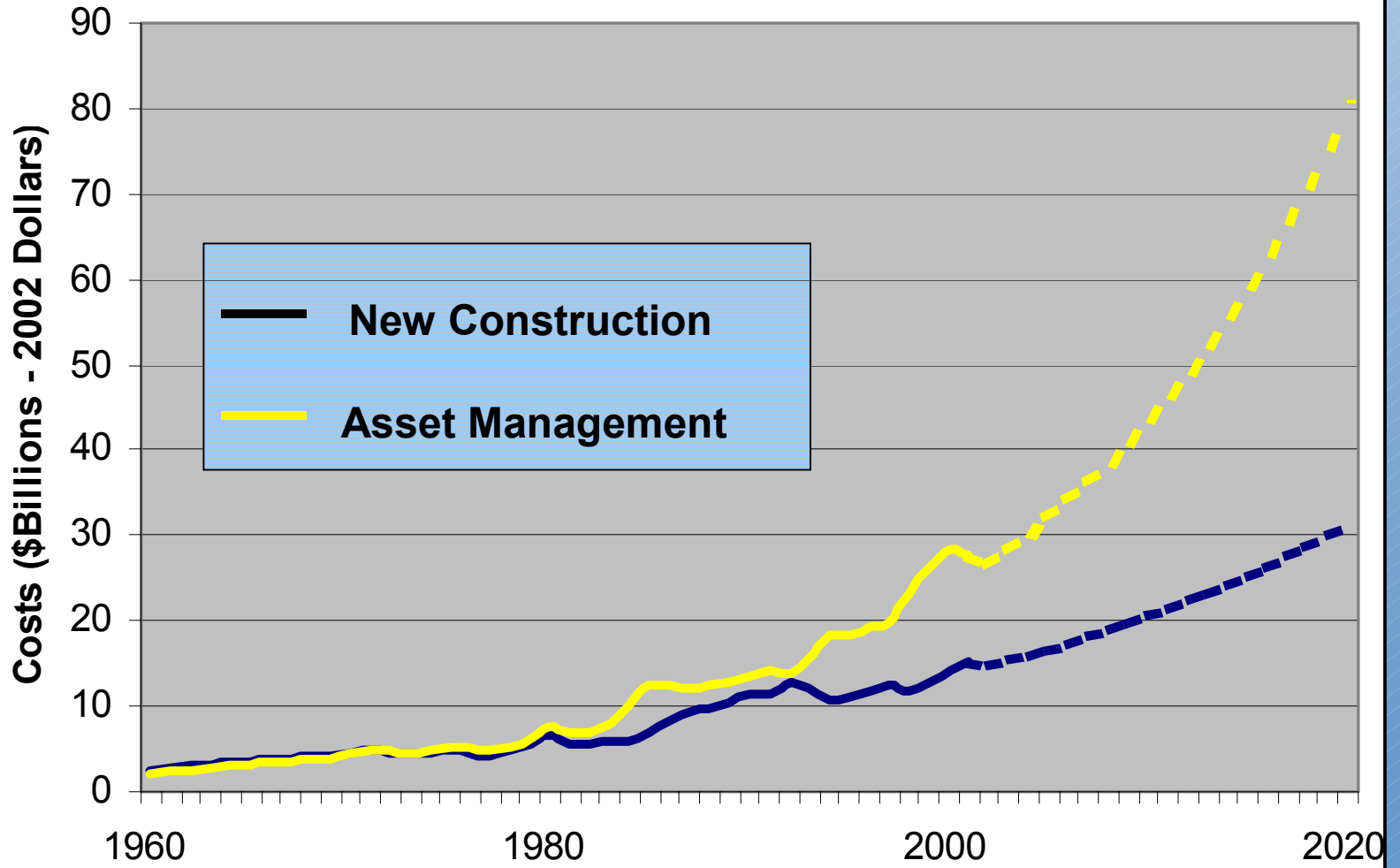
Reconstruction

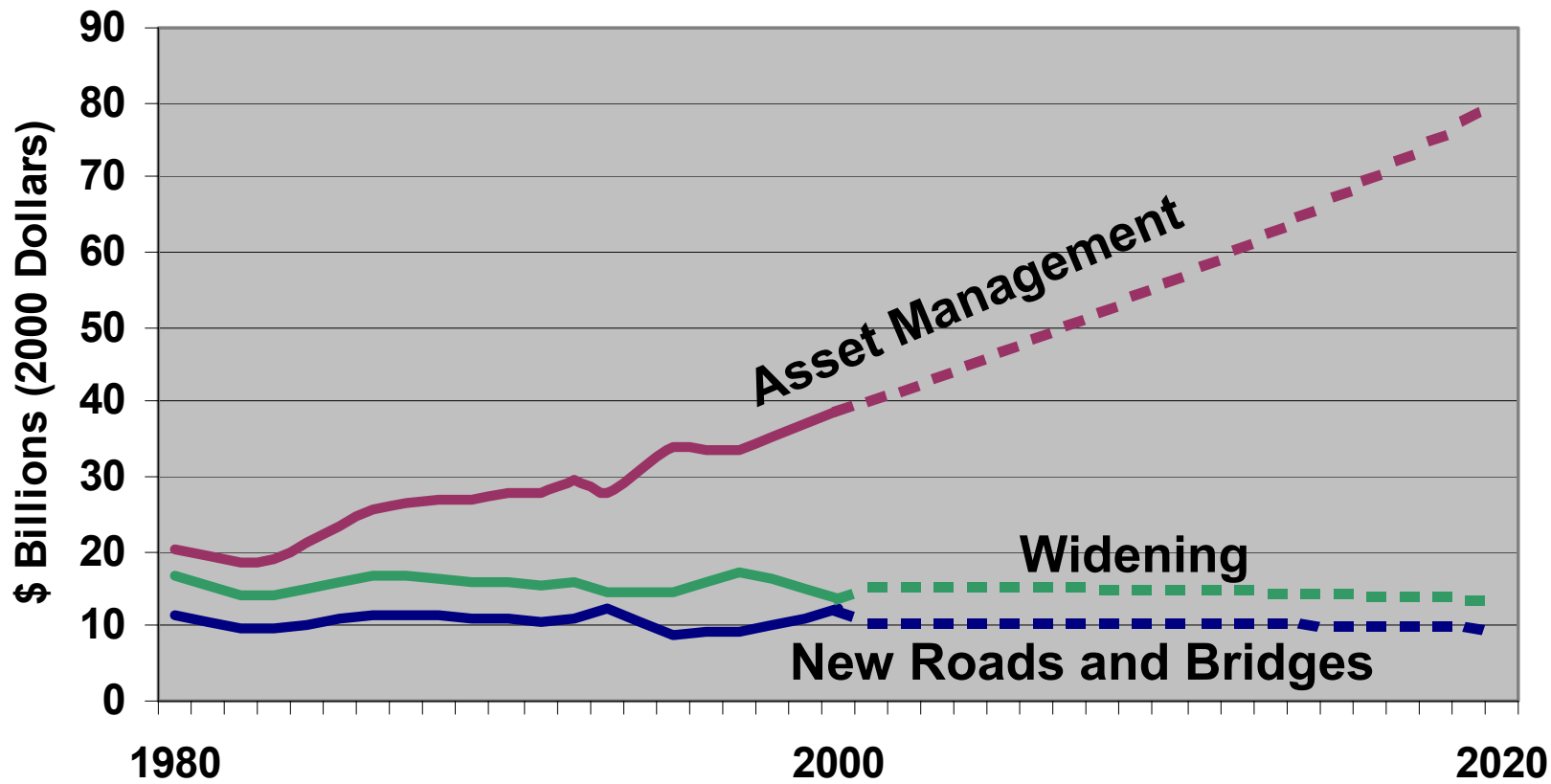
Pavements 'Я' Us

- End of Structural Life
- Underestimated ADT, Truck Loads, Cost
- Marginal Designs and Materials
- Worst First
- Lowest Initial Cost
- Era:
 - Get In...
 - Stay In...
 - Keep Going Back...

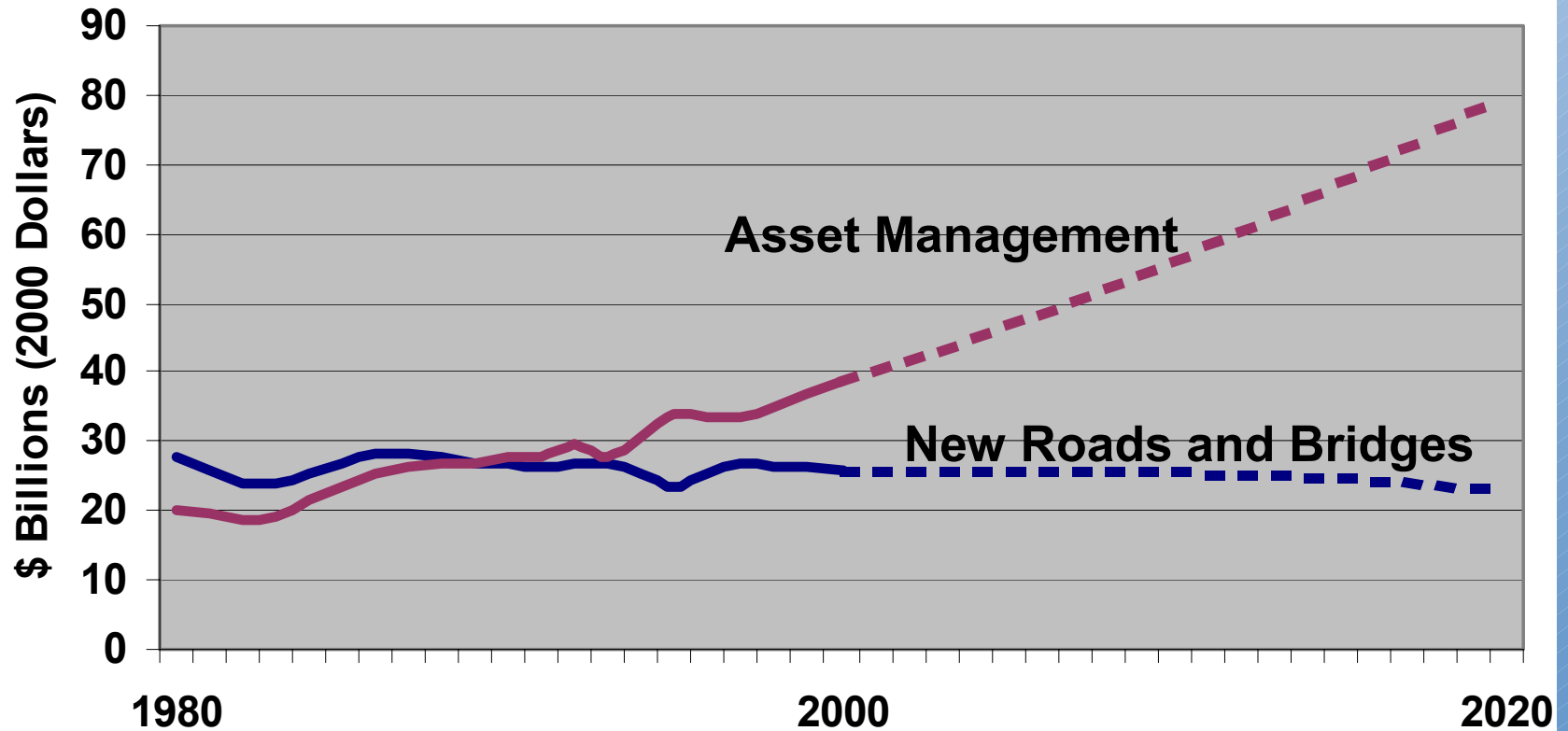
Big Picture

- PMS Fits into Asset Management
- **Funds Shift to Asset Management**
- Congestion & Freight
- Cost & Revenue
- Criticality:
 - Superpave
 - Materials
 - Quality
 - Pavement Management
 - Mechanistic Design

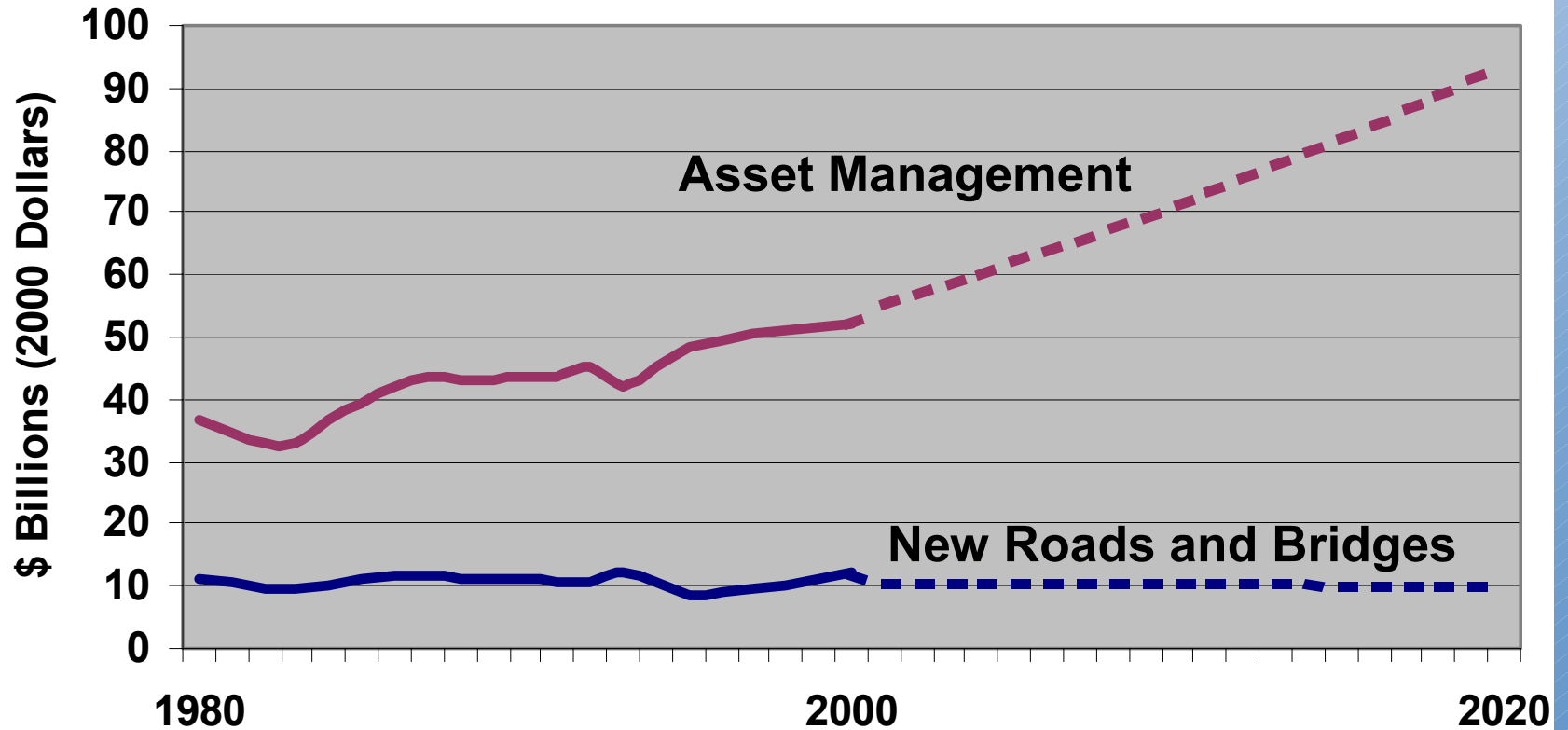




Combining Widening into New Roads & Bridges



Combining Widening into Asset Management



Big Picture

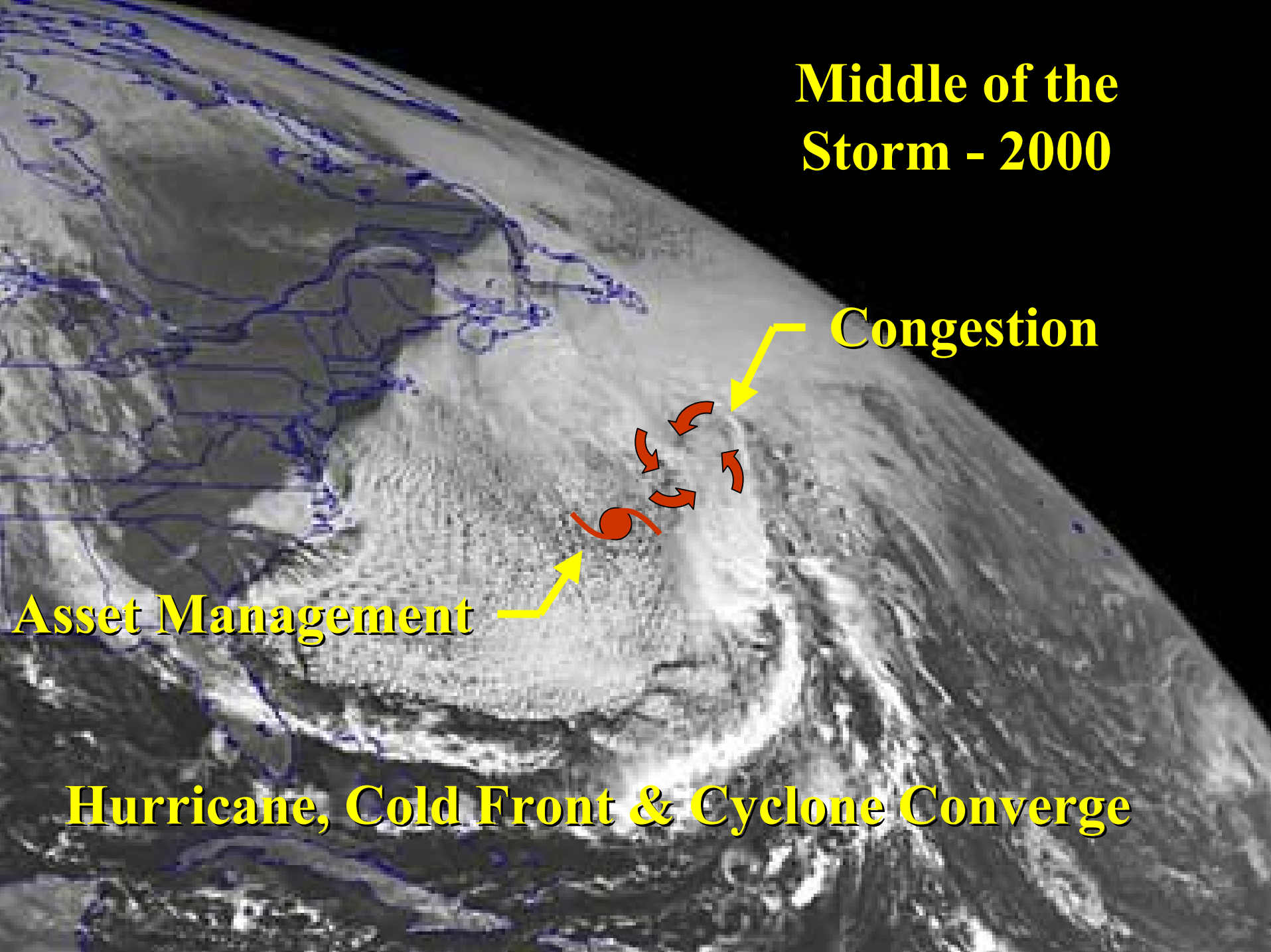
- PMS Fits into Asset Management
- Funds Shift to Asset Management
- **Congestion & Freight**
- Cost & Revenue
- Criticality:
 - Superpave
 - Materials
 - Quality
 - Pavement Management
 - Mechanistic Design

Middle of the Storm - 2000

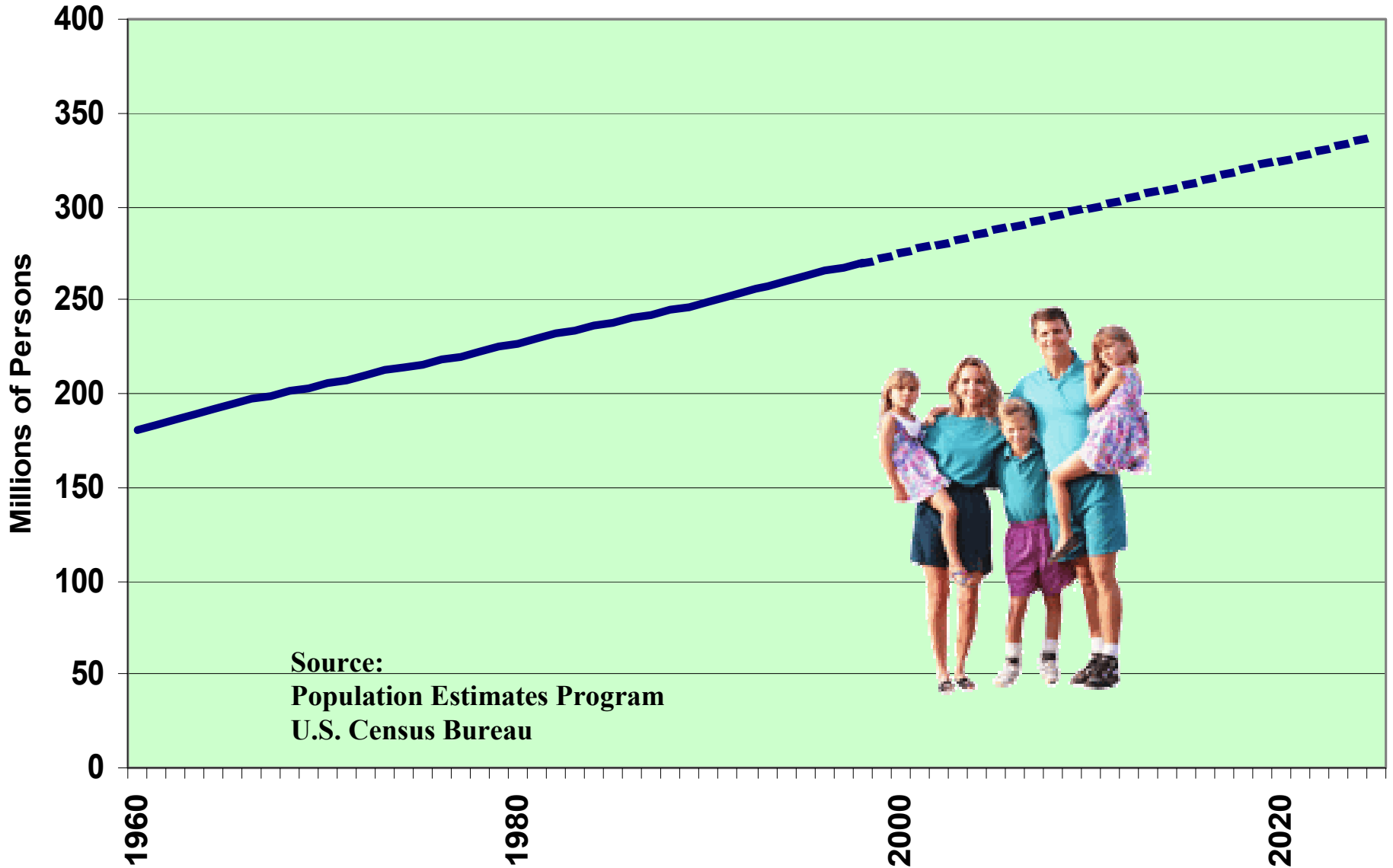
Congestion

Asset Management

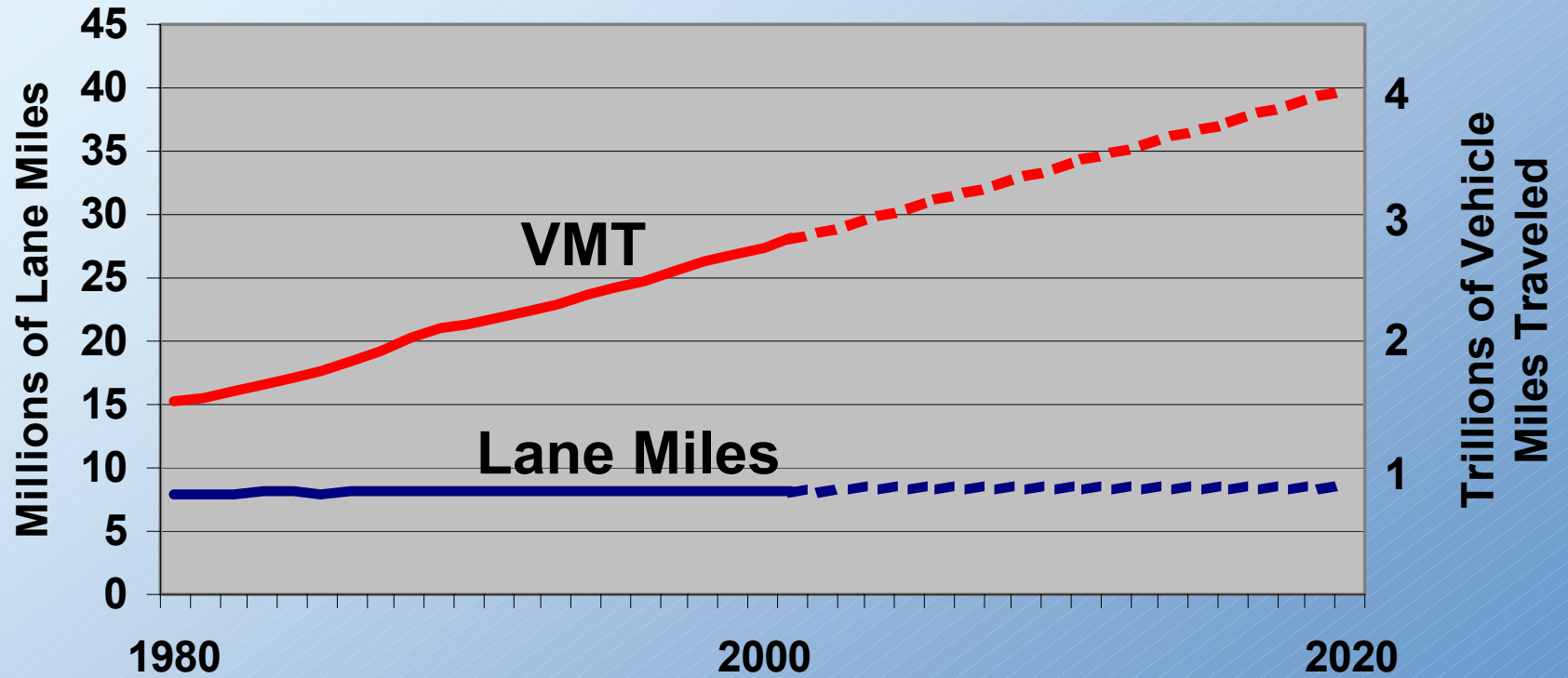
Hurricane, Cold Front & Cyclone Converge



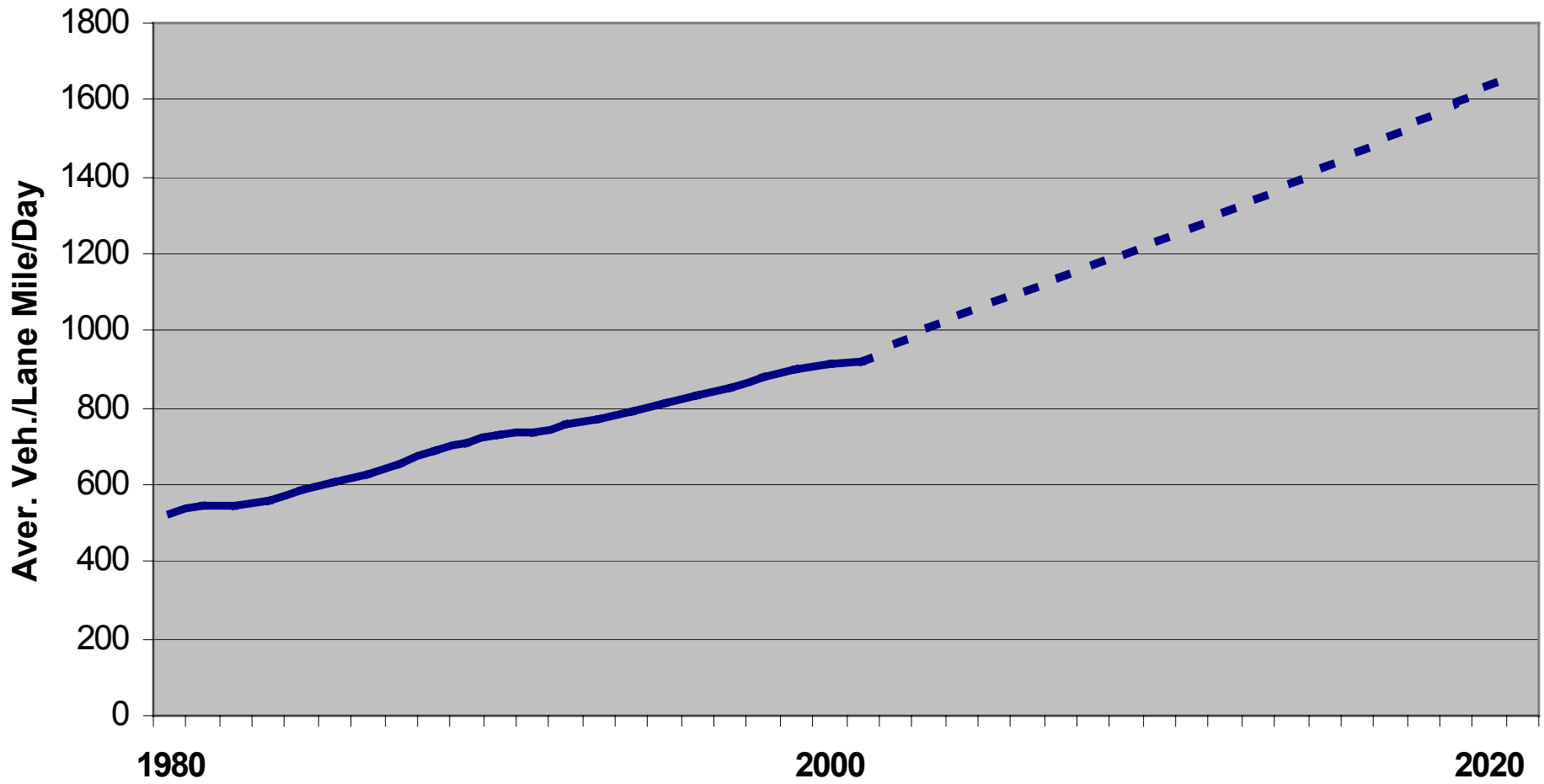
U.S. Population



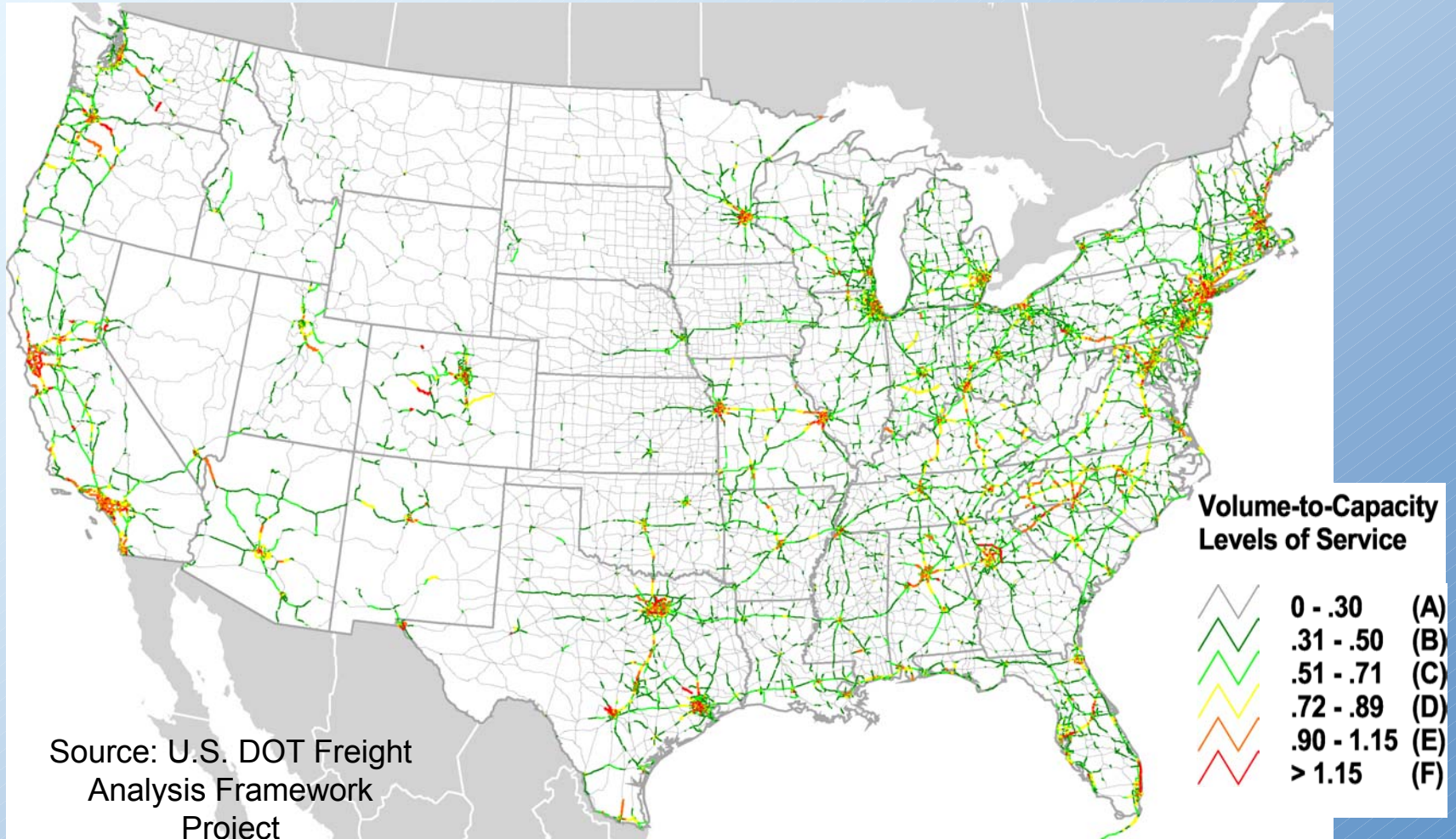
VMT => Double 2020



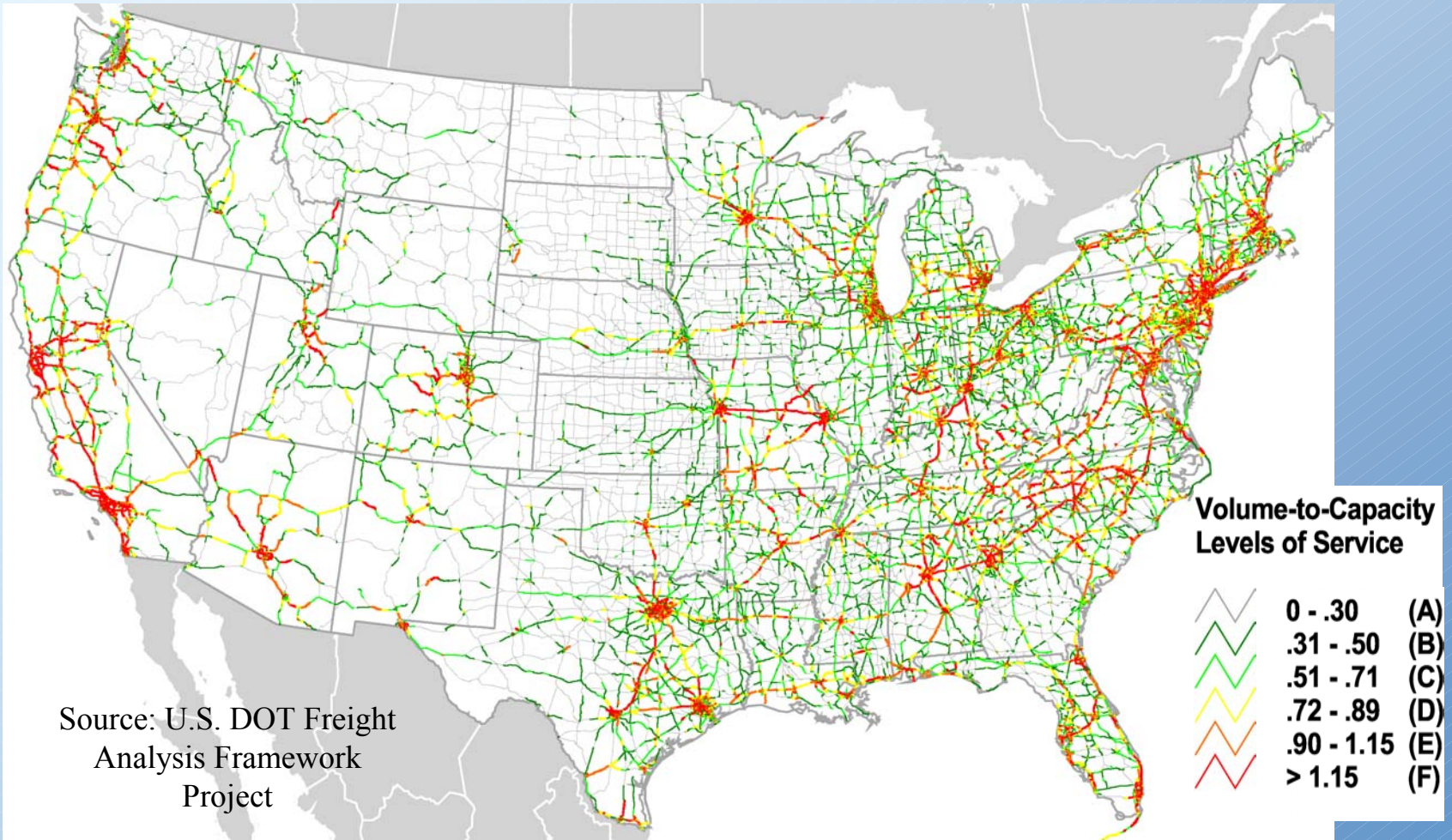
Congestion



Congested Highways 2000



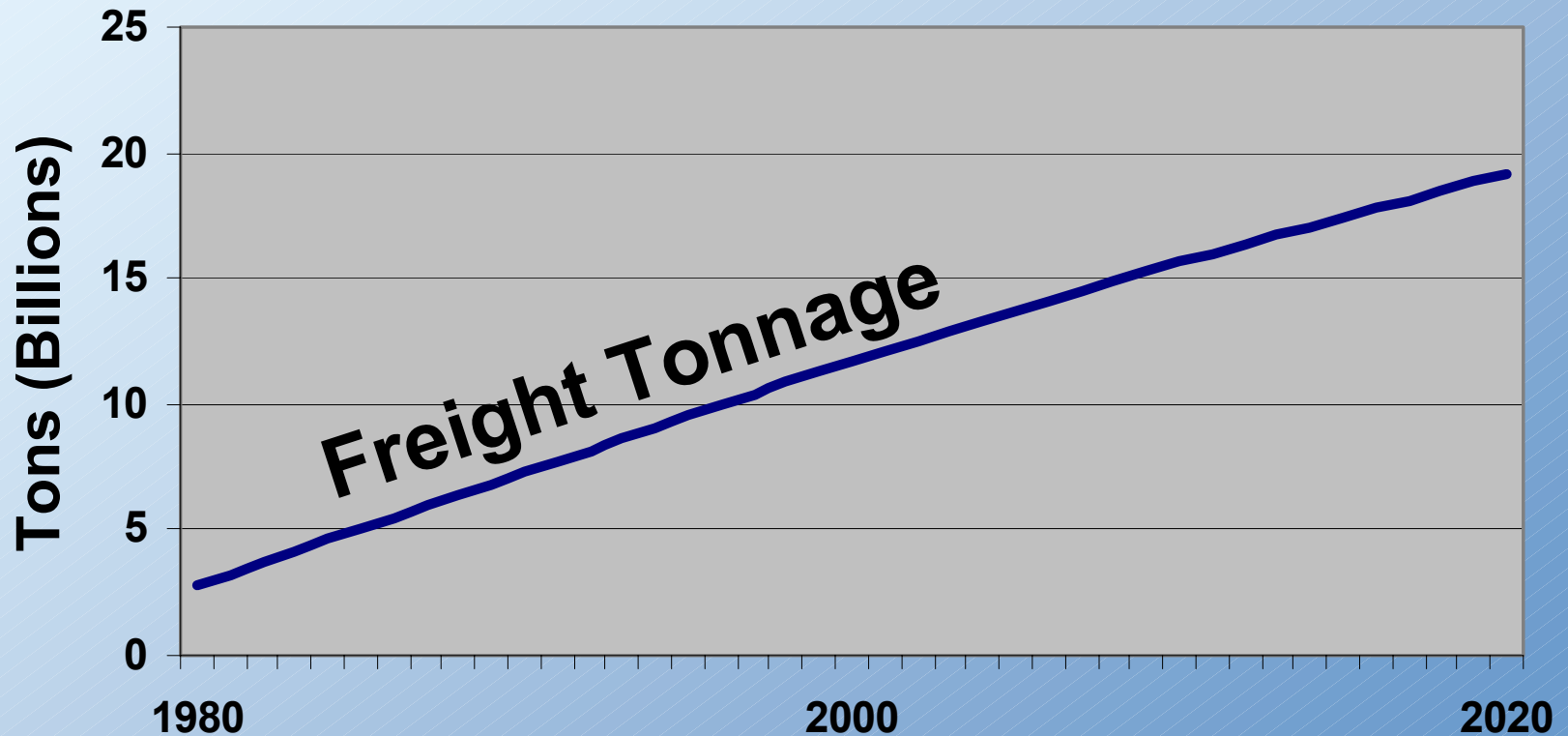
Congested Highways 2020



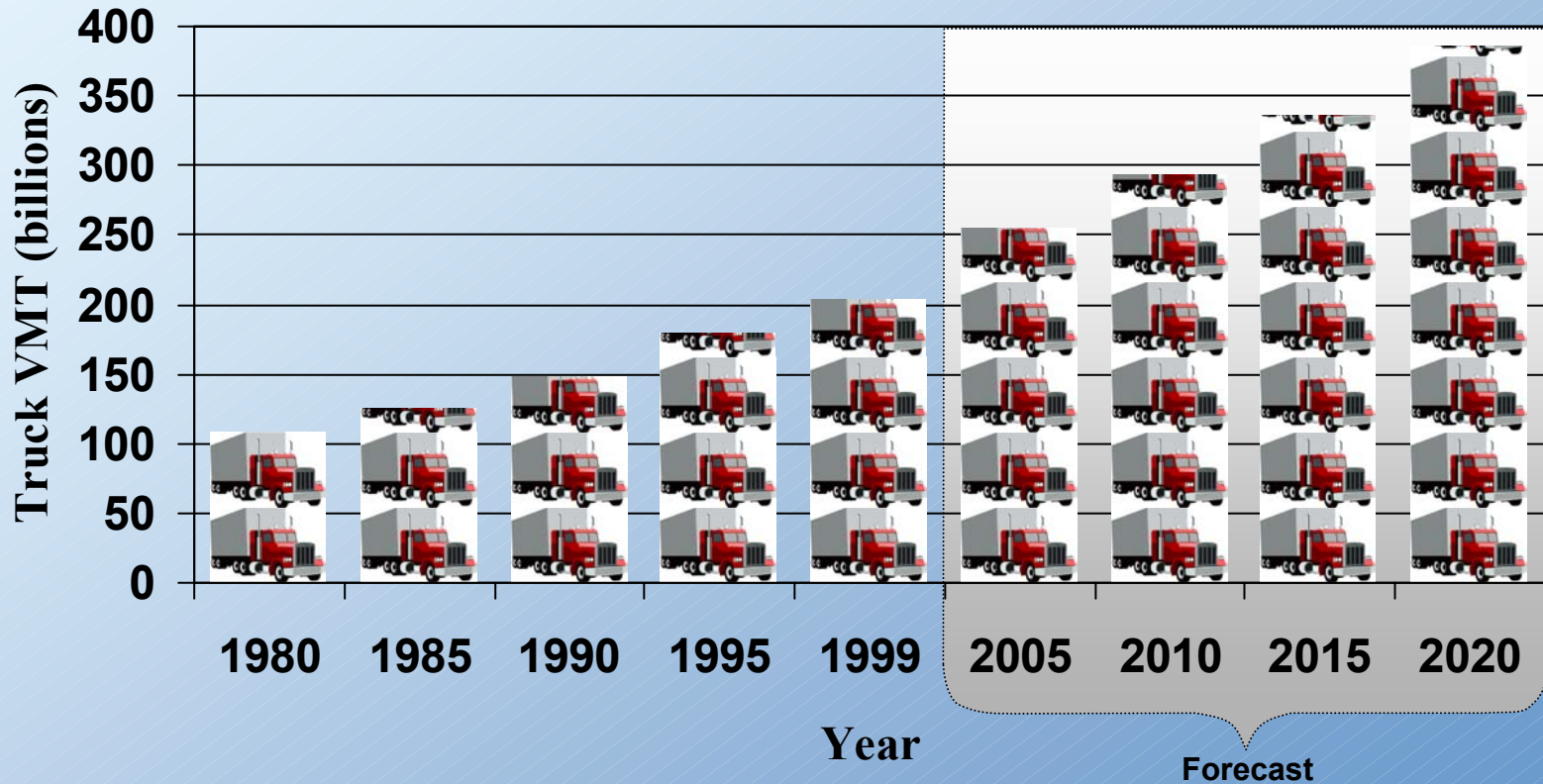
Virus

SARS \Rightarrow CARS

Tonnage => Double 2020

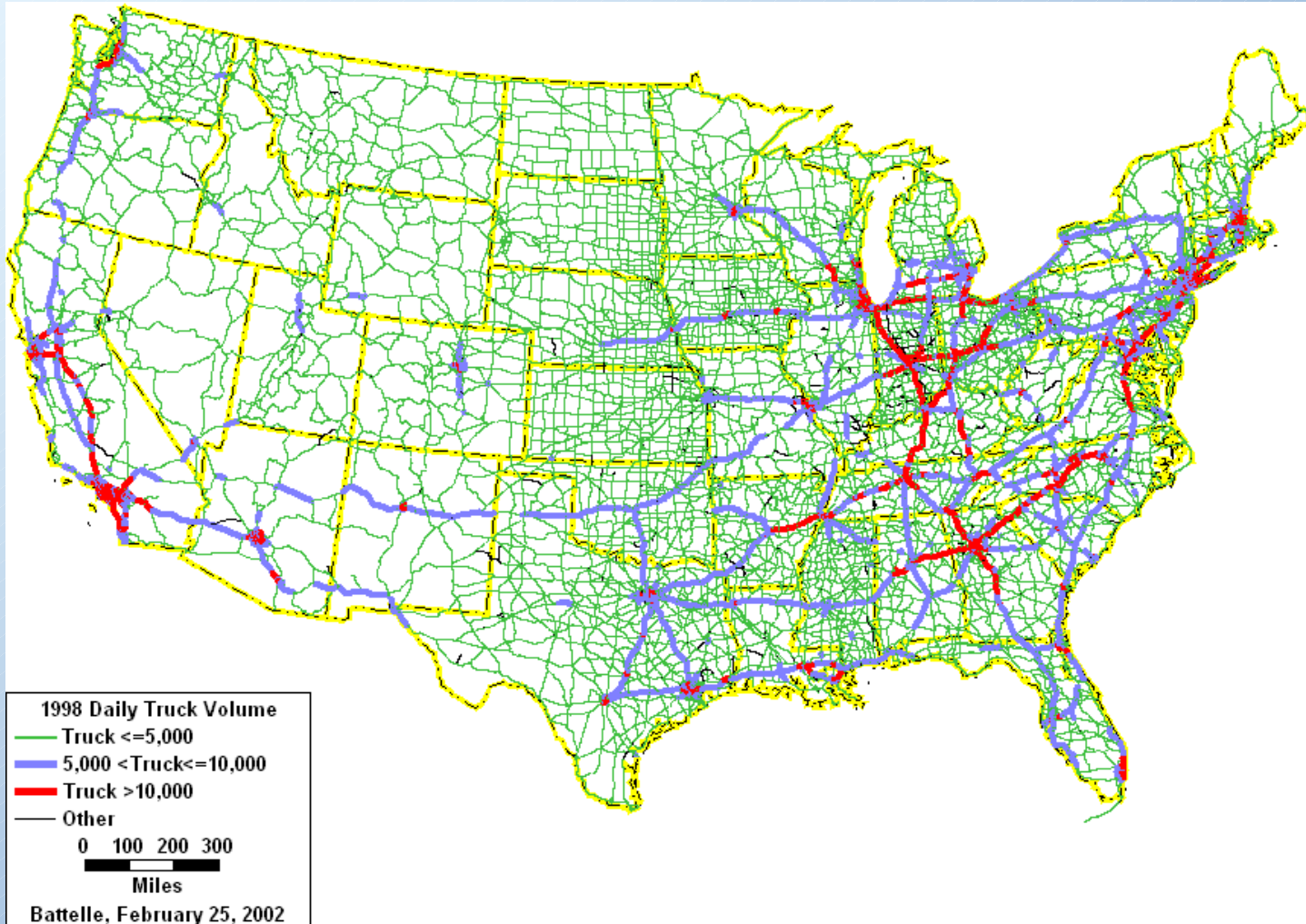


Truck Vehicle Miles Traveled



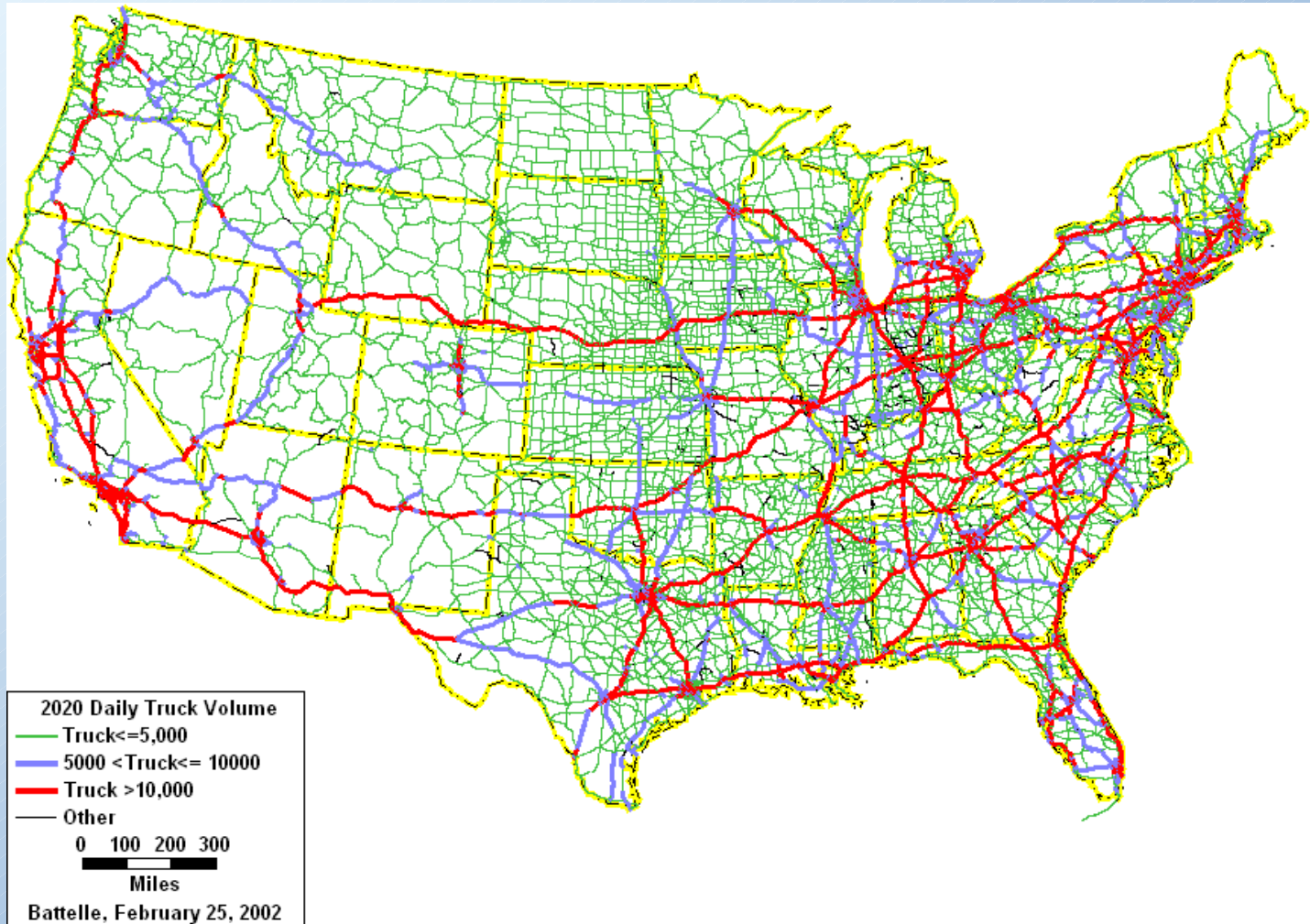
Truck Volumes, 2000

Interstate and NHS



Truck Volumes, 2020

Interstate and NHS



THE PERFECT STORM

Historical Perspective

1980

2000

2020

React	Asset Management
Tactical	Strategic

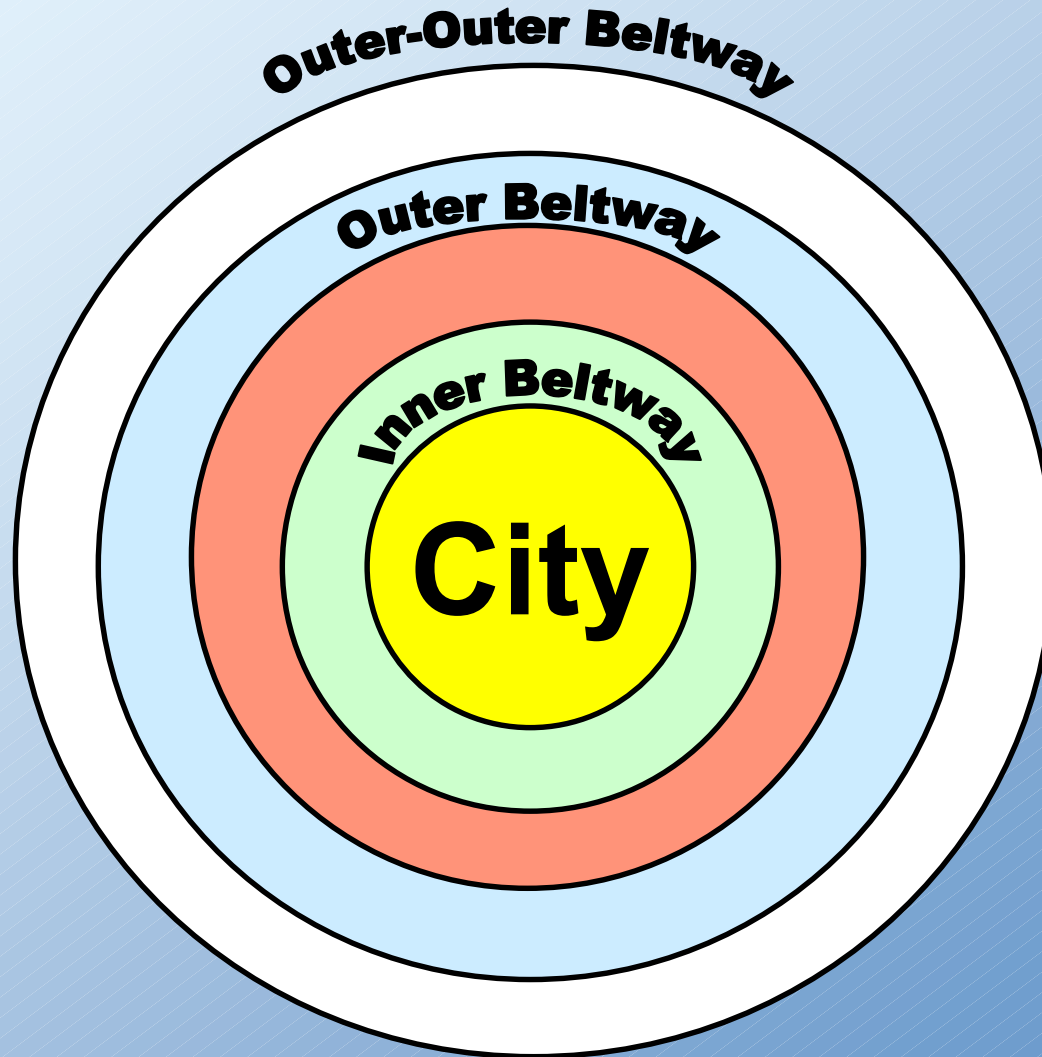
2000

Maxed Out !

2020

- 
- 1. Vehicles /Lane Mile**
 - 2. Right-of-way**
 - 3. Rush Hours**
 - 4. HOV**
 - 5. ITS**
 - 6. Transit**
 - 7. Rail**

Beltway Syndrome



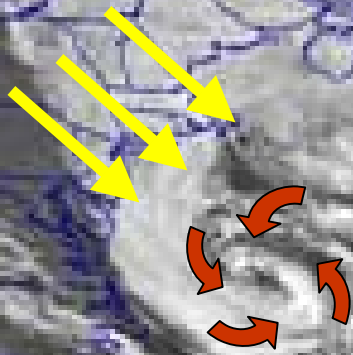
Big Picture

- PMS Fits into Asset Management
- Funds Shift to Asset Management
- Congestion & Freight
- **Cost & Revenue**
- Criticality:
 - Superpave
 - Materials
 - Quality
 - Pavement Management
 - Mechanistic Design

October 31, 1991

**Cold Front
Cost & Revenue**

**Storm Drifts West,
Strengthening**

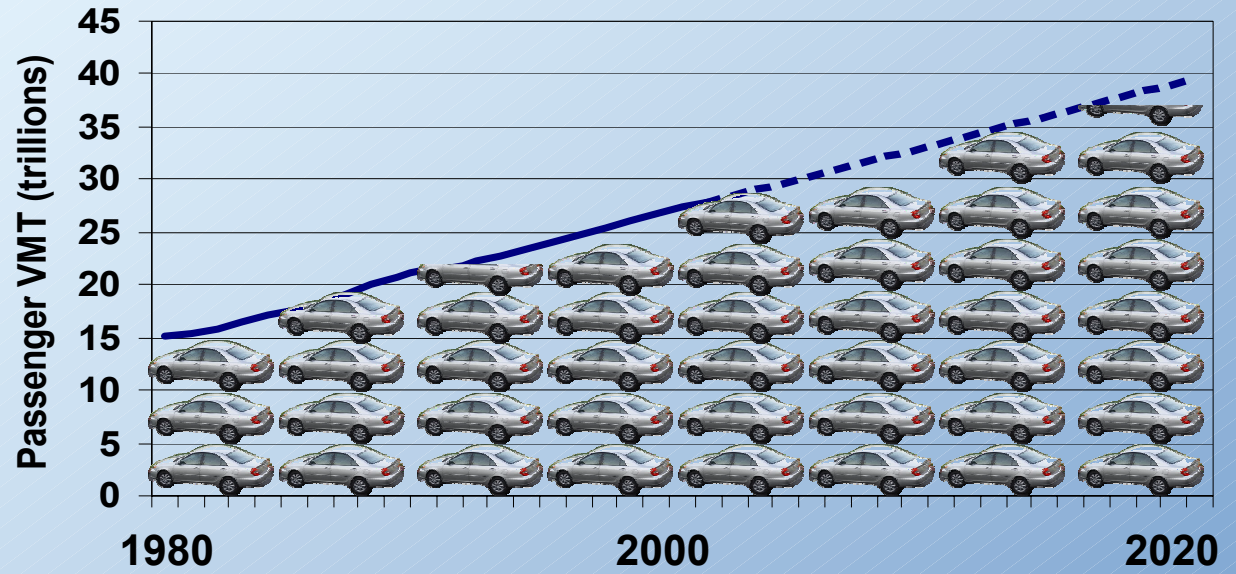


Driving Cost:

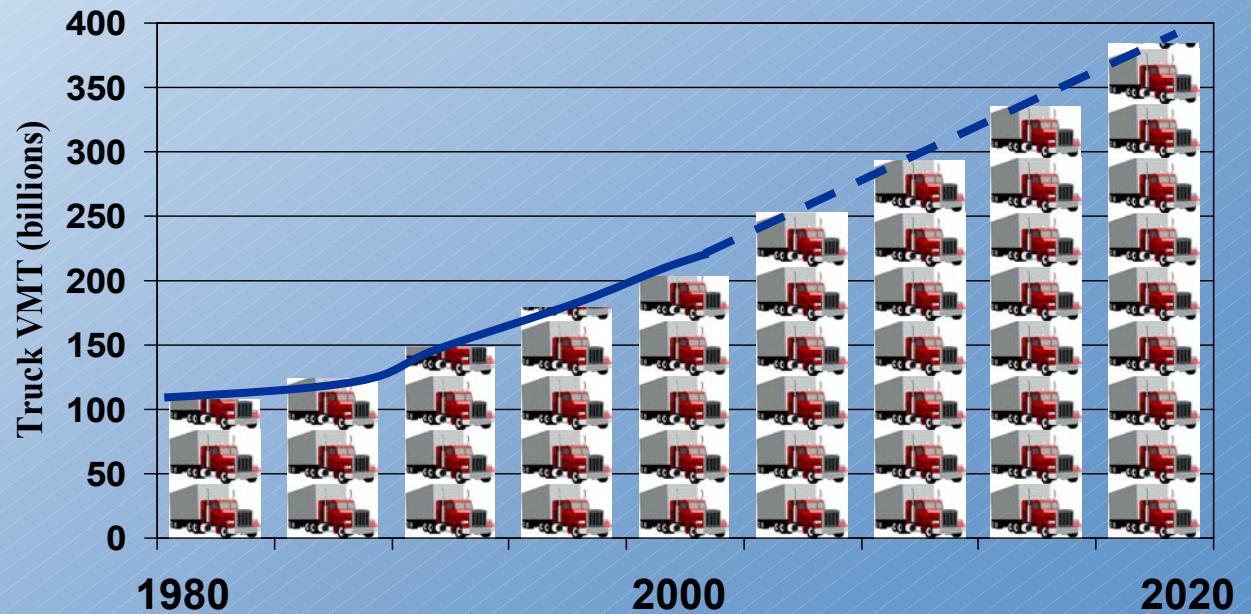
1. Congestion (People) Volume
2. Freight (Goods) Loads



Passenger VMT



Truck VMT



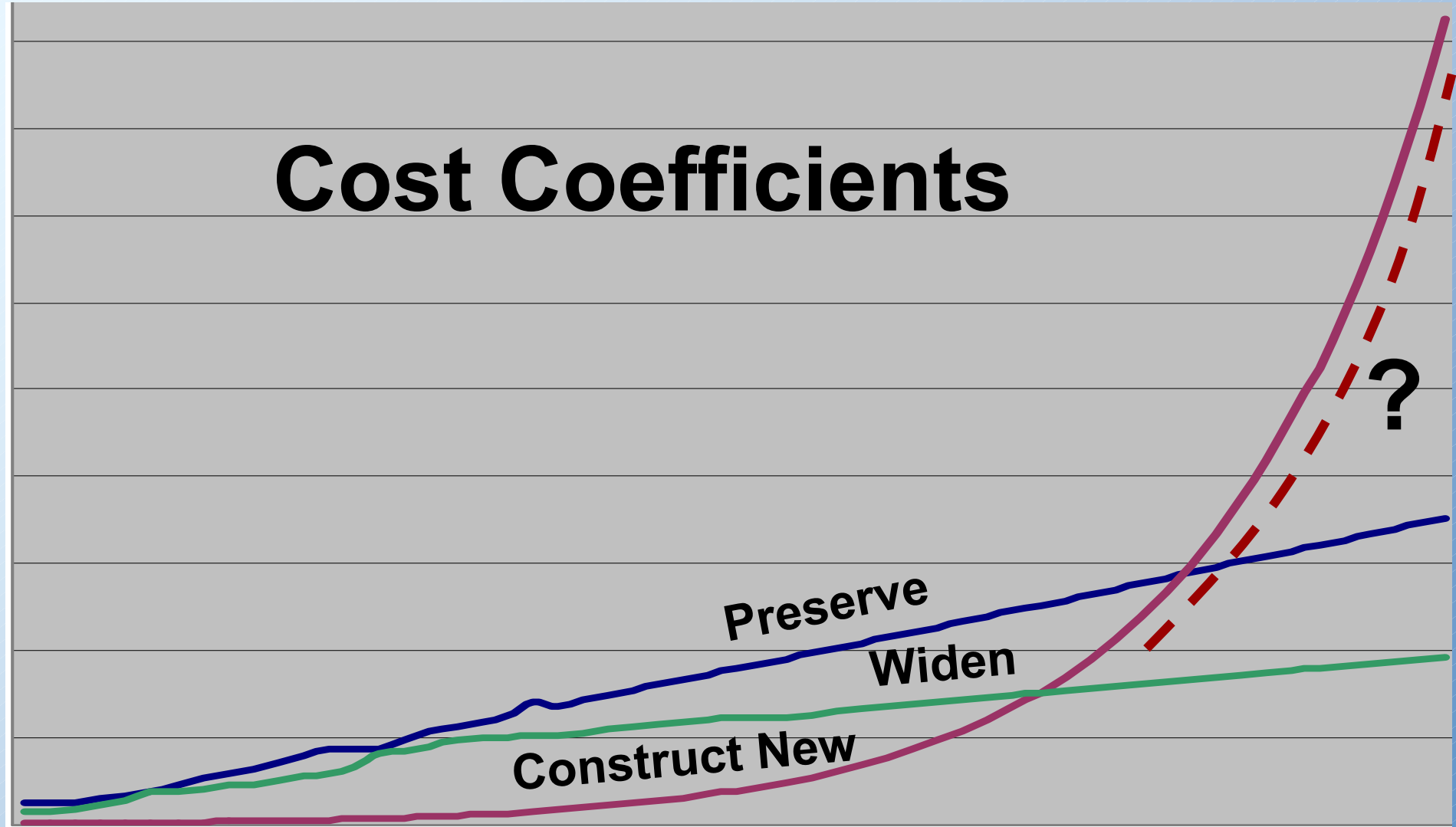
Highway – Transit - Rail

- 1. Build New Capacity**
- 2. Widen & Beef Up**
- 3. Preserve & Optimize**

Cost Distribution

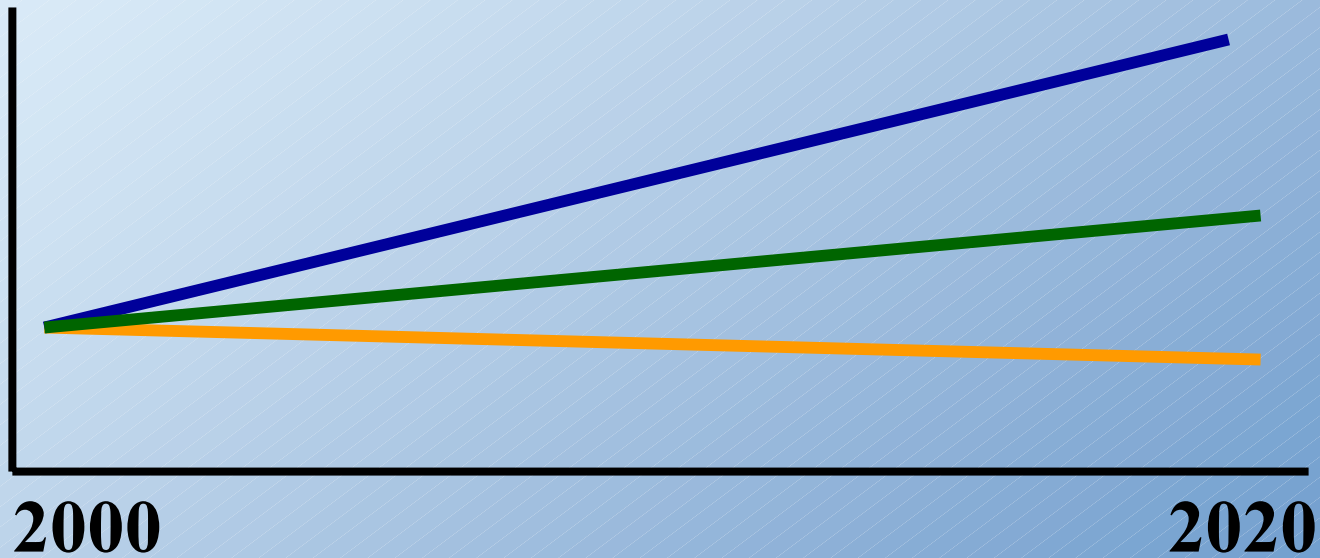
	Highway	Transit	Rail
New			
Widen			
Optimize & Preserve			

Cost Coefficients



Revenue

3 Classic Scenarios



Revenue

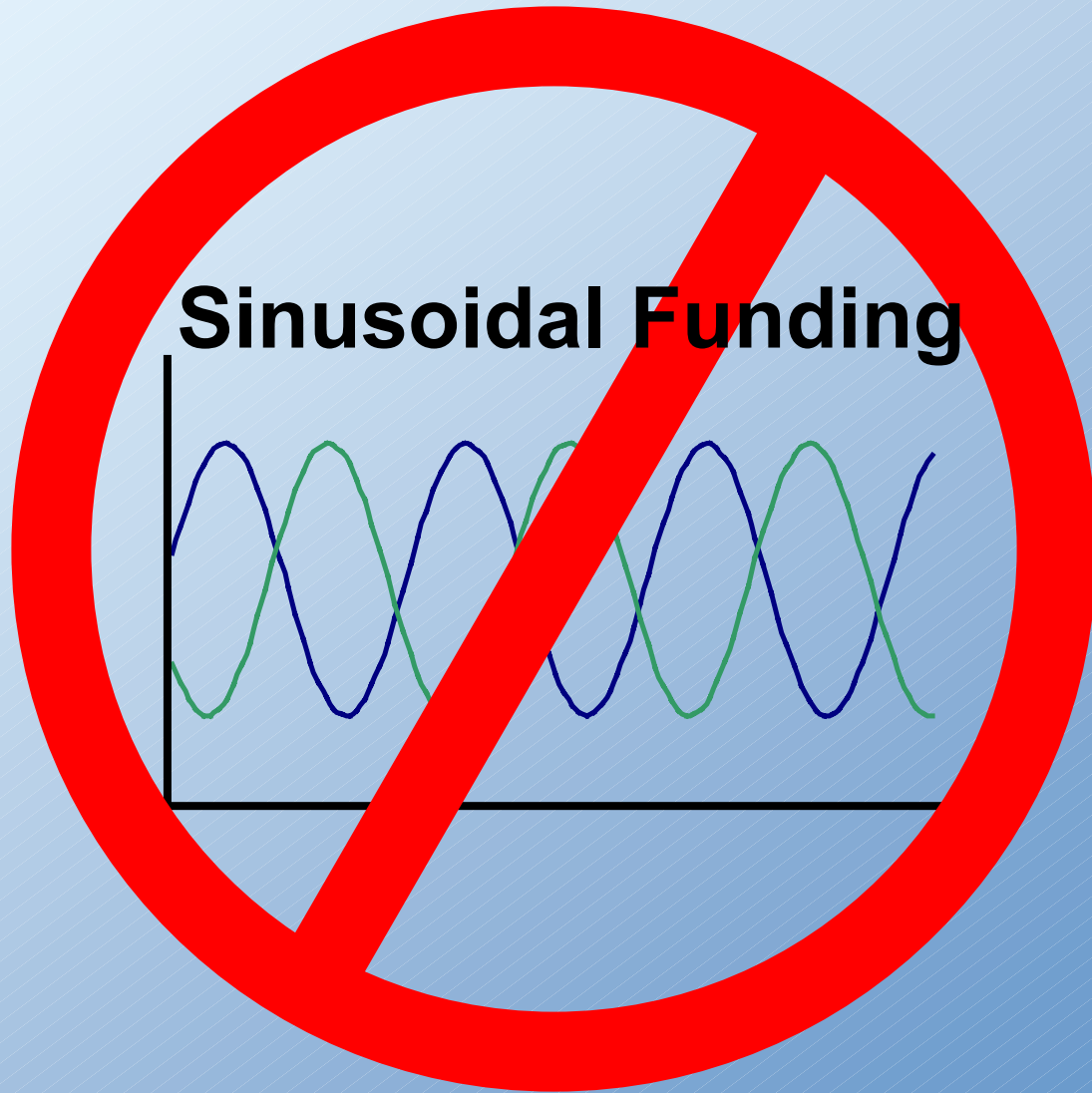
Will: People
Politicians
Administrators

Economy: Bull vs. Bear

Sources: Taxes, etc.

Distribution: Apportionment (Formula)
Earmarks
Allocations

Steady State Cost Distribution

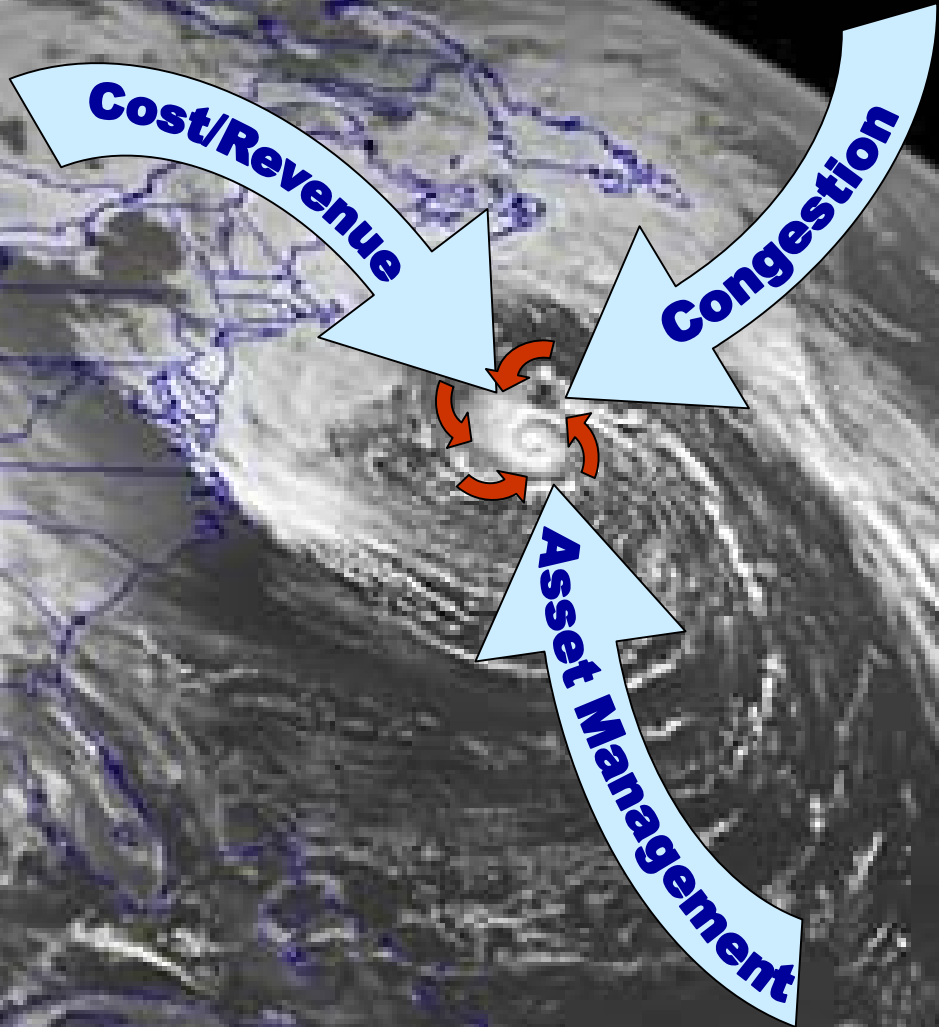


Big Picture

- PMS Fits into Asset Management
- Funds Shift to Asset Management
- Congestion & Freight
- Cost & Revenue
- **Criticality:**
 - **Superpave**
 - **Materials**
 - **Quality**
 - **Pavement Management**
 - **Mechanistic Design**

THE
PERFECT STORM

2020







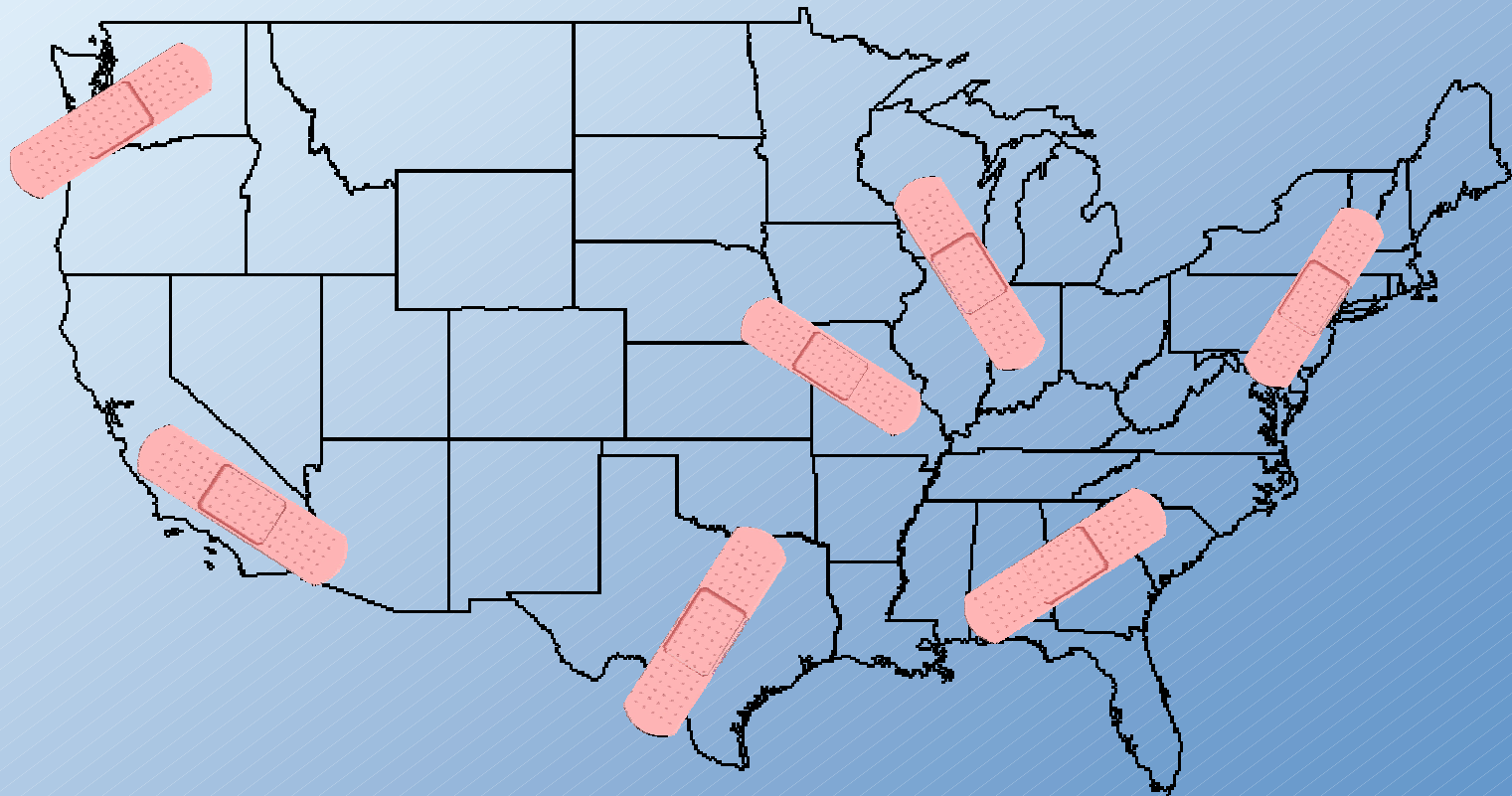
ANDREA GAIL
GLOUCESTER

2 Choices { Sail into Storm Avert Storm



Choice #1

Repeat History: Sail into Storm



Choice #2

Avert the Storm:

- 1. Premium Pavements**
- 2. Significantly Outperform
Past Pavements**
- 3. Strategically Plan => 20 Years**

Avert Perfect Storm:



Asset Management => Strategic Principles



3 Primary Functions:

- 1. Where**
- 2. When**
- 3. How Much**

1. Where ?

Congestion } **Links**
Loading }

Aggregate by Link:

- **Corridor**
- **Region**
- **State**
- **National**

2. When ?

Remaining Service Life (RSL)



3. How Much Cost ?

Cost Distribution { **Highways**
Transit
Rail

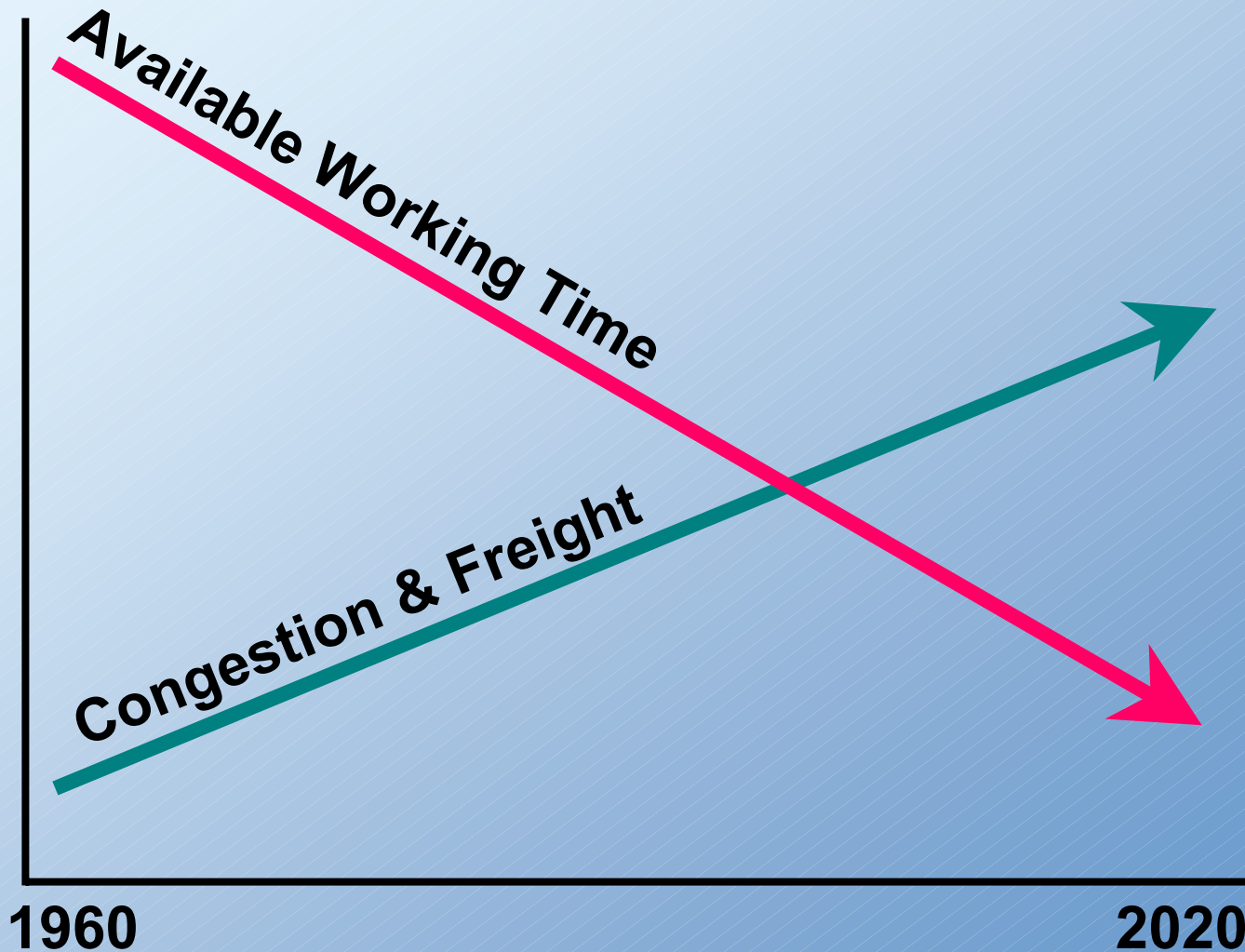
Cost Coefficients¹ { New
Widen
Preserve

3. How Much Cost ?

Cost Coefficients² { **Superpave
Mechanistic Design
Materials**

Cost Coefficients³ { **Night Construction
Accelerated
Quality**

Doing Business in 2020...





Get In...

Stay In...

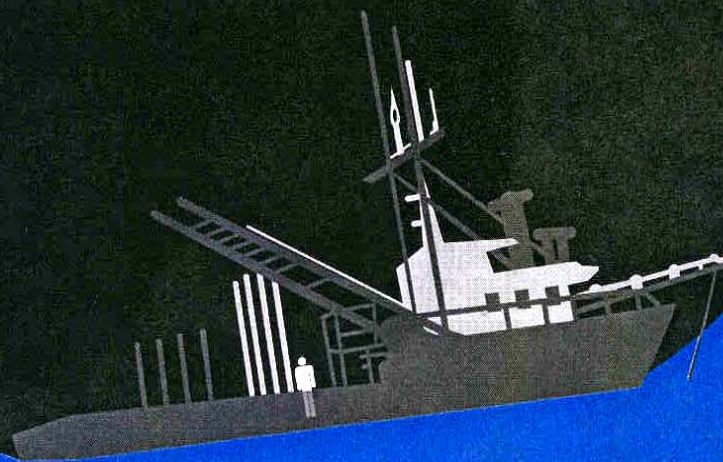
Keep Going Back...

Worst Case Scenario

- **Engineering**
- **Asset Management**
- **Accountable**
- **Make Case**
- **Revenue**



THE PERFECT STORM



**100'
Wave**