

A Historian's Perspective on the Interstate Highway System: Patterns and Consequences



Presentation to the Future
Interstate Study Committee,
Transportation Research Board
National Academies

Bruce E. Seely
Michigan Technological University

May 16, 2017



Outline

1. Historical Patterns associated with the U.S. highway system & integral to the Interstate program.

1. The role of the National Government
2. The Good Roads Movement and Reform
3. The Federal-aid Partnership
4. Paying for Roads
5. Planning in the Partnership

2. Winning Approval for the Interstate Highways

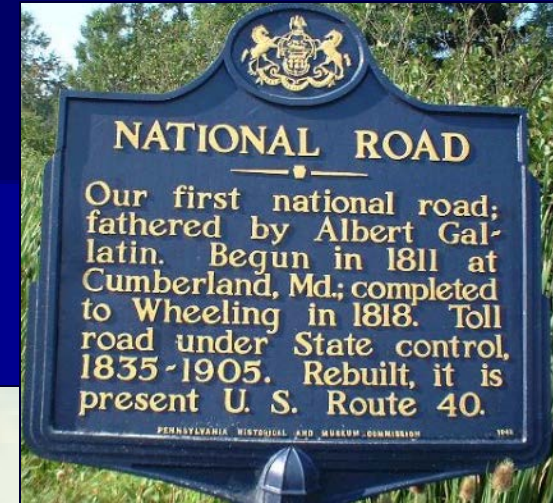
3. Lessons learned from the creation and implementation of the Interstate network

1. Accurate Projections
2. Less Accurate Outcomes
3. Consequences of the system



Government Role in Roadbuilding

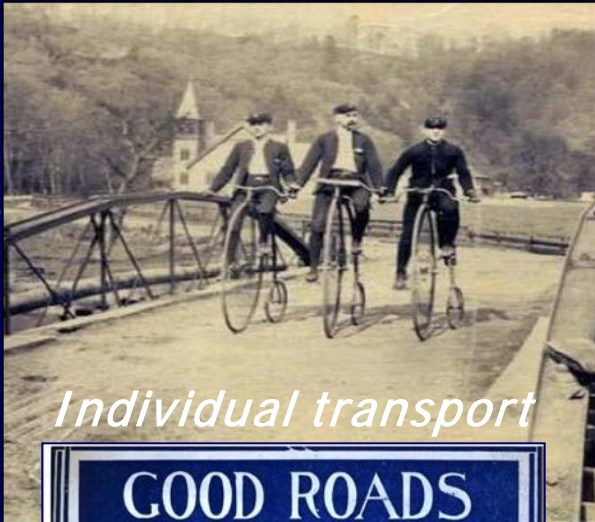
National funding sought after 1800, but constitutional limits were soon reached.



By mid 19th century, roads a local concern



The Good Roads Movement: 1880s



Individual transport



farm-to-market roads

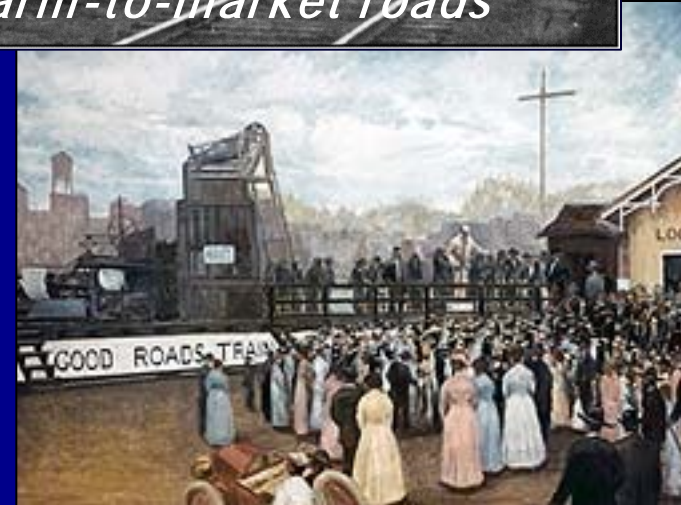
GOOD ROADS MAGAZINE

OFFICIAL ORGAN OF THE LEAGUE OF AMERICAN WHEELMEN
AND OTHER ORGANIZATIONS INTERESTED IN GOOD ROADS.

CONTENTS

- Our Observations of the Month, Page 1
- An Undertaking Unique in History—The Good Roads Train, Page 5
- Massachusetts Highway Commission Report, Page 7
- Pennsylvania Road System Indecisive, Page 9
- Awards in the \$500 Prize Story Contest, Page 11
- Editorial Expressions, Page 18
- Wheel Paths of the Twin Cities, Page 19
- An American Rider in Europe, Page 21
- The Public Press on Good Roads, Page 24
- L. A. W. Official Department, Page 26
- Brisk Shop Talk, Page 35

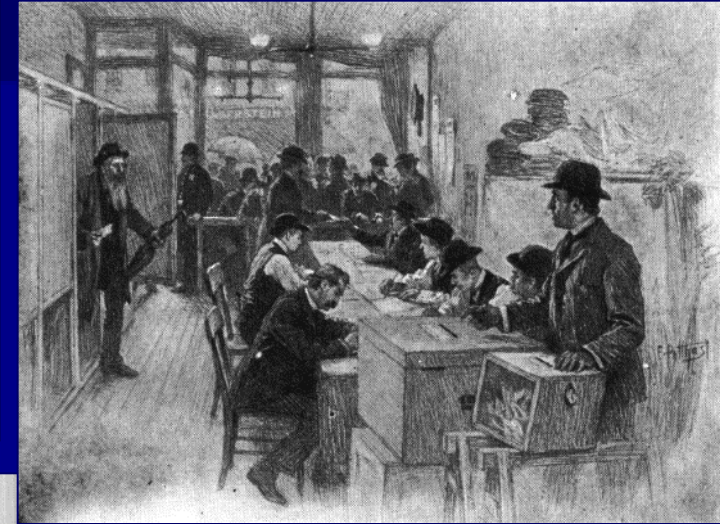
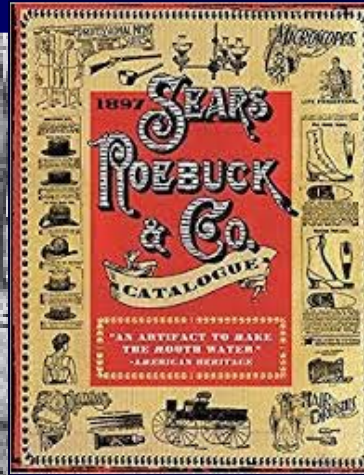
Bicycles & railroads, not autos, started this movement.



Get Rural America out of the mud! Roads served moral purposes.



WHAT FARMERS HAD TO CONTEND WITH IN SOME SECTIONS OF ILLINOIS.



Serve *transport and social* needs in *rural America*: education, civic life, and access to the modern economy for rural Americans .



Roads as Progressive Reform: Office of Public Roads, Efficiency & Expertise

1893 – Office of Road Inquiry: disseminate technical information on road construction. Became BPR.



Object-lesson road: before & after



MichiganTech

Roads as Progressive Reform: Office of Public Roads and Expanding Expertise



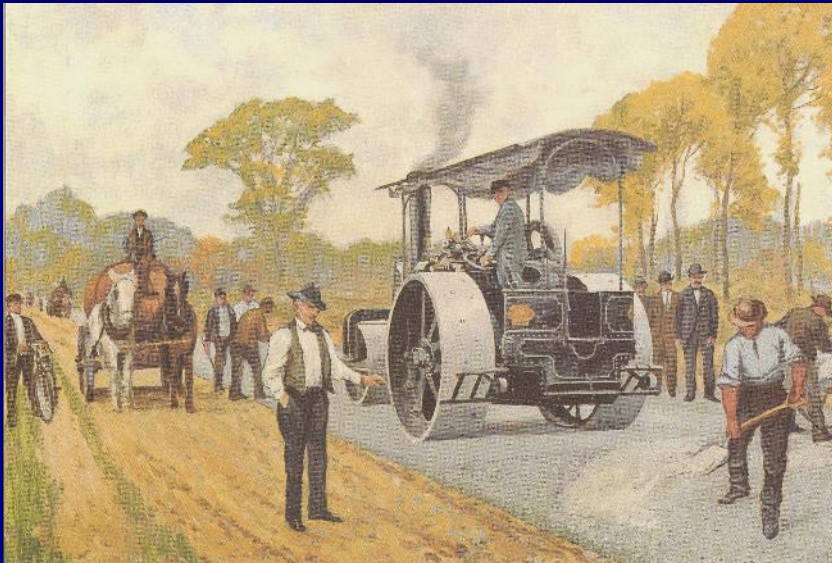
Logan Waller Page

1912 – Post-road demonstration efforts.
1916: 1st federal-aid bill. Extended efforts to spread expertise, focused on RFD & post roads.

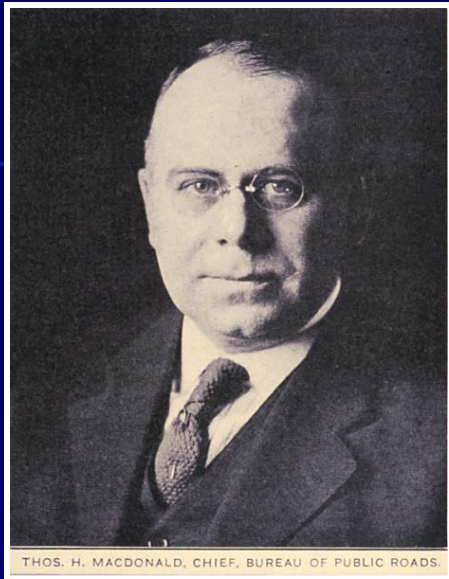


Ed Jackson

RFD – postal routes



Roads as Progressive Reform: Thomas MacDonald and Federal-aid System



THM retained authority based upon superior expertise but shifted to transportation efficiency emphasis.

1921 – Federal-Aid Road Act: 7% of state roads linked to create a ROAD SYSTEM that was NATIONAL IN SCOPE.



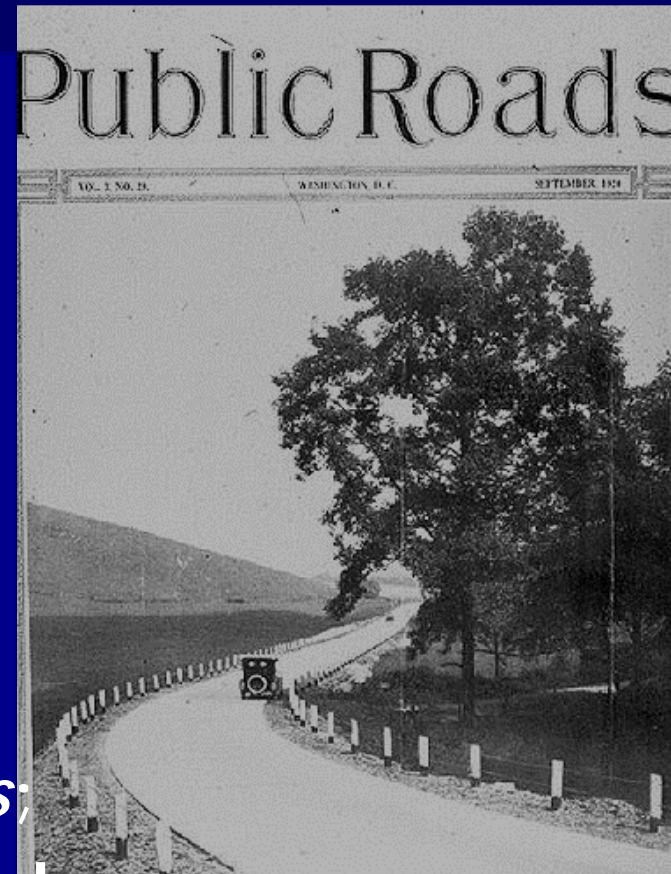
Thomas H. MacDonald,
Chief, BPR: 1919-53

The Ultimate Expert

“We pay for good roads whether we have them or not.” (THM)

The Federal-Aid Road System: Federalism in Action

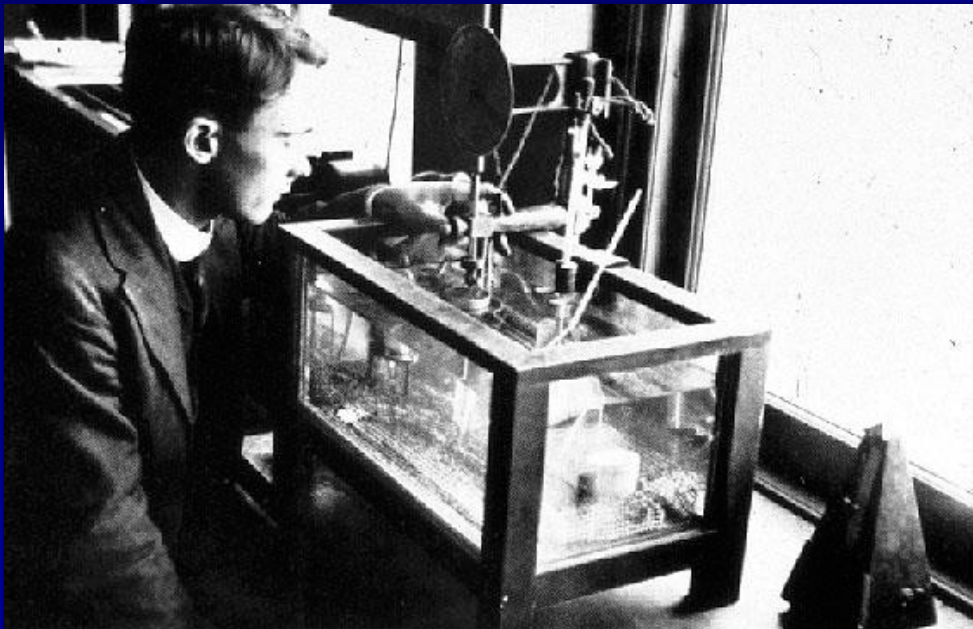
- State-federal sharing with distribution formula for fed-aid;
- BPR approved state road organizations – emphasized engineering direction;
- States build, after BPR approval of plans and standards;
- States maintain roads;
- BPR officials expected to work *with* state engineers as *partners*;
- States respected BPR and trusted their leadership: witness Donor-Donee issues in 1920s.



The Federal-Aid Partnership: Cooperation & Trust in Experts



While possessing the expertise, THM always worked *through* numerous professional partners.



- Construction and Materials Standards → TRB, ASTM, PCA, other technical groups, but released by AASHTO;
- Legislative initiatives → AASHTO/BPR partnership at hearings;
- Congress and presidents alike deferred to THM's "apolitical expertise."

Example: THM encouraged states to build research/testing labs with federal-aid funds

Paying for Roads: The Gas Tax, The Perfect Answer

Adopting the Gas Tax

1920: 4 states
1921: 10 states
1922: 4 states
1923: 16 states
By 1925, 44 states & DC
1929: New York is last

WHY?

- *Automobile culture and motorists' desire for roads!*
- Prosperity of 1920s; depression of 1930s;
- Small & Invisible:
A "popular" tax!
- Seemingly devoted to roads;
- Gas Prices kept dropping.



Still: Gas Tax not the Only Element

“Highway Expenditures expected to Double after 1928”

Increased federal-aid

Increased taxes on heavy vehicles

Gas tax increase to \$0.05/gallon

State tax increase

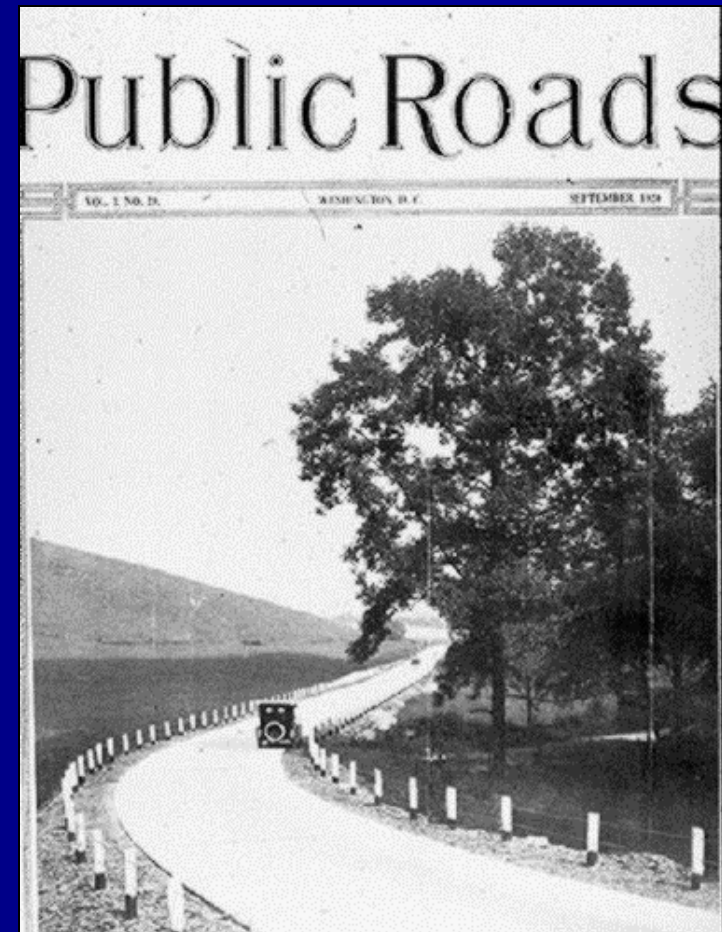
More Bonds, retired after system in place

Special assessments and condemnations

Administrative reforms → efficiency

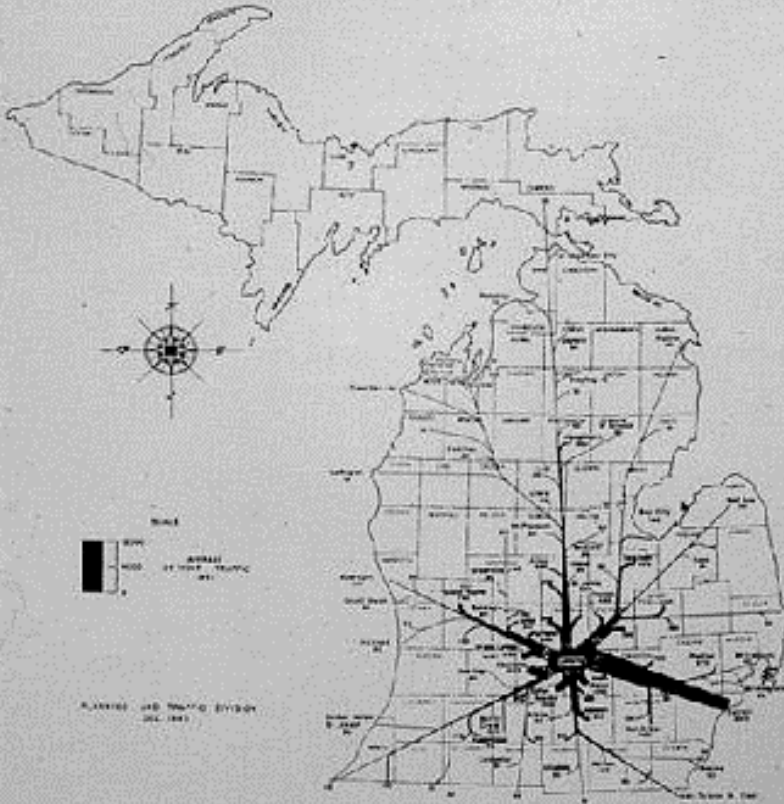
Source: T.R. Agg, *ENR* 1/3/1929

And Depression brought federal government into larger role.



Federal-aid Partnership in Action: State-wide Planning Surveys, 1930s

HIGHWAY TRAFFIC *Between* LANSING
And OUTSTATE AREAS



**H.S.
Fairbank**



IBM Technology

MichiganTech



History of the Interstate Highways: Winning Approval, 1939-1956



Toll Roads & Free Roads, (1939) grew from THM report to FDR on cross-country toll roads in 1938.



The 26,700-mile system tentatively proposed as an interregional highway system by the Public Roads Administration in the report, *Toll Roads and Free Roads*.

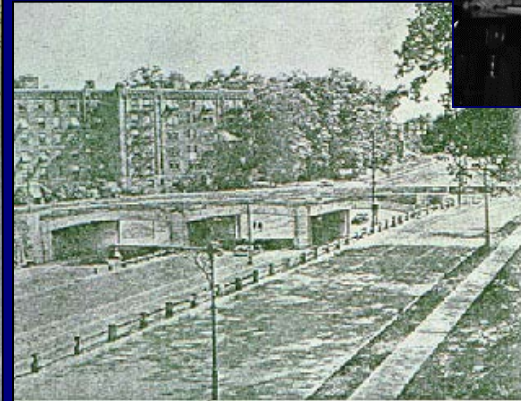
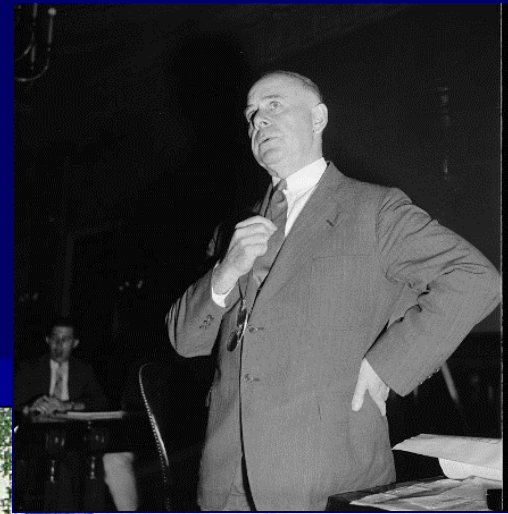


PLATE 33.—A two-lane toll road widened to four lanes approaching an access point at which only one toll booth is provided, showing the grade separating structure necessary to avoid hazards of left turns on the toll road.

Congress requested a formal review & BPR drew upon the state-wide planning surveys. *TR&FR* refuted toll funding and the autobahn approach; endorsed urban roads. *FDR resisted the latter argument.*

A SYN
OF FRI
INTER
5
YE
1956

The National Interregional Highway Commission, Congress and postwar roads



The Henry Hudson Parkway Continues the West Side Highway in New York City Northward to a Junction with the Westchester County Parkway System, and with These Connections Provides a Continuous Express Highway Through the Nation's Greatest Metropolis. In This View the Parkway is at the Left. The Road at the Right Is One of the Local Service Roads.

INTERREGIONAL HIGHWAYS

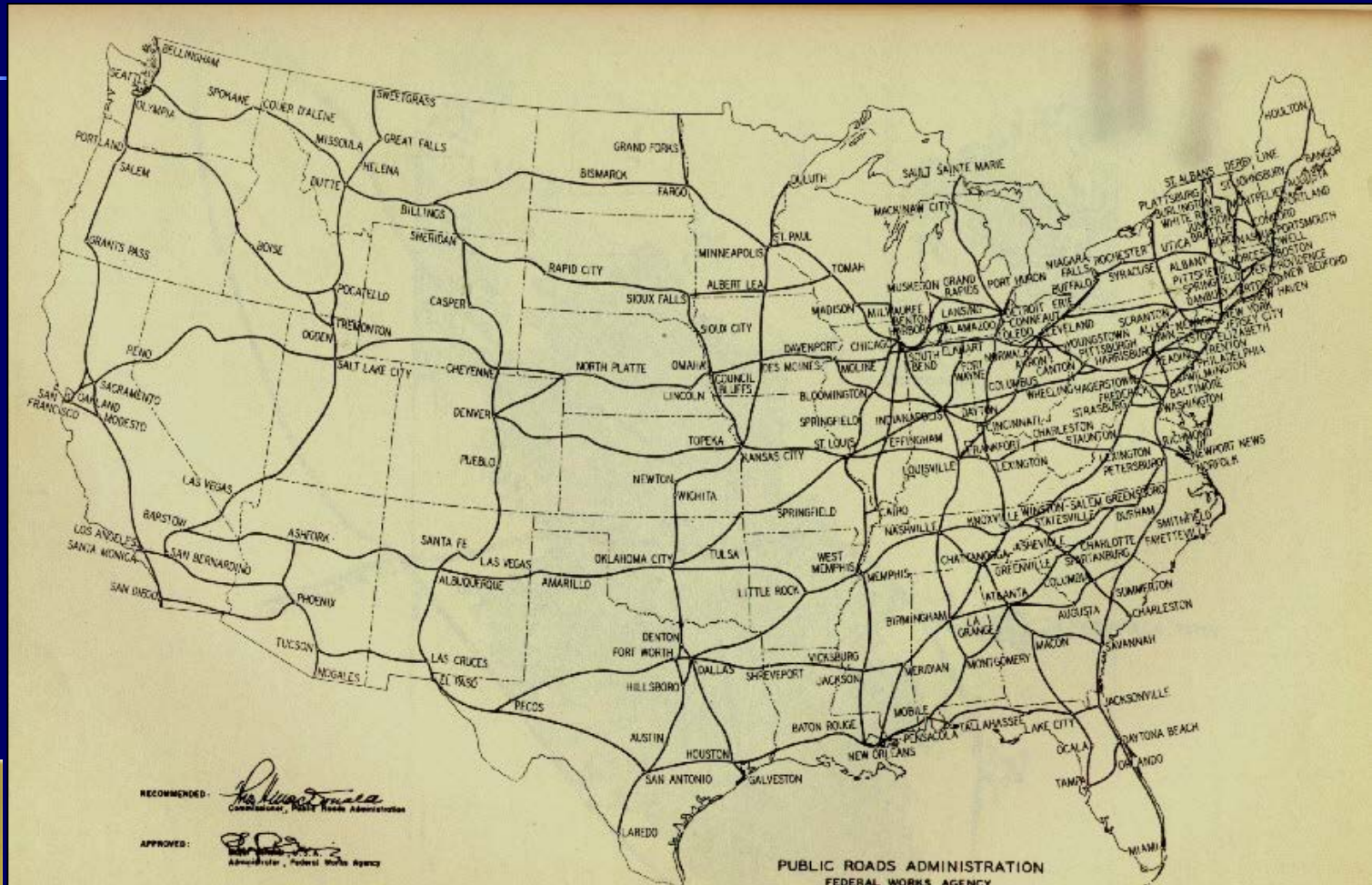
Indicated by State-Wide Highway Planning Surveys

By H. S. FAIRBANK

Chief, Division of Information, Public Roads Administration, Federal Works Agency

Commission (1941-43) prepared plan to address postwar unemployment; Congress approved IHS (40,000 miles plus 1,000 miles of urban routes to be determined later) in 1944. IHS born!

National System of Interstate Highways defined: August 1947



RECOMMENDED: *W. W. C. Sullivan*
 Commissioner, Public Roads Administration

APPROVED: *W. W. C. Sullivan*
 Administrator, Federal Works Agency

PUBLIC ROADS ADMINISTRATION
 FEDERAL WORKS AGENCY

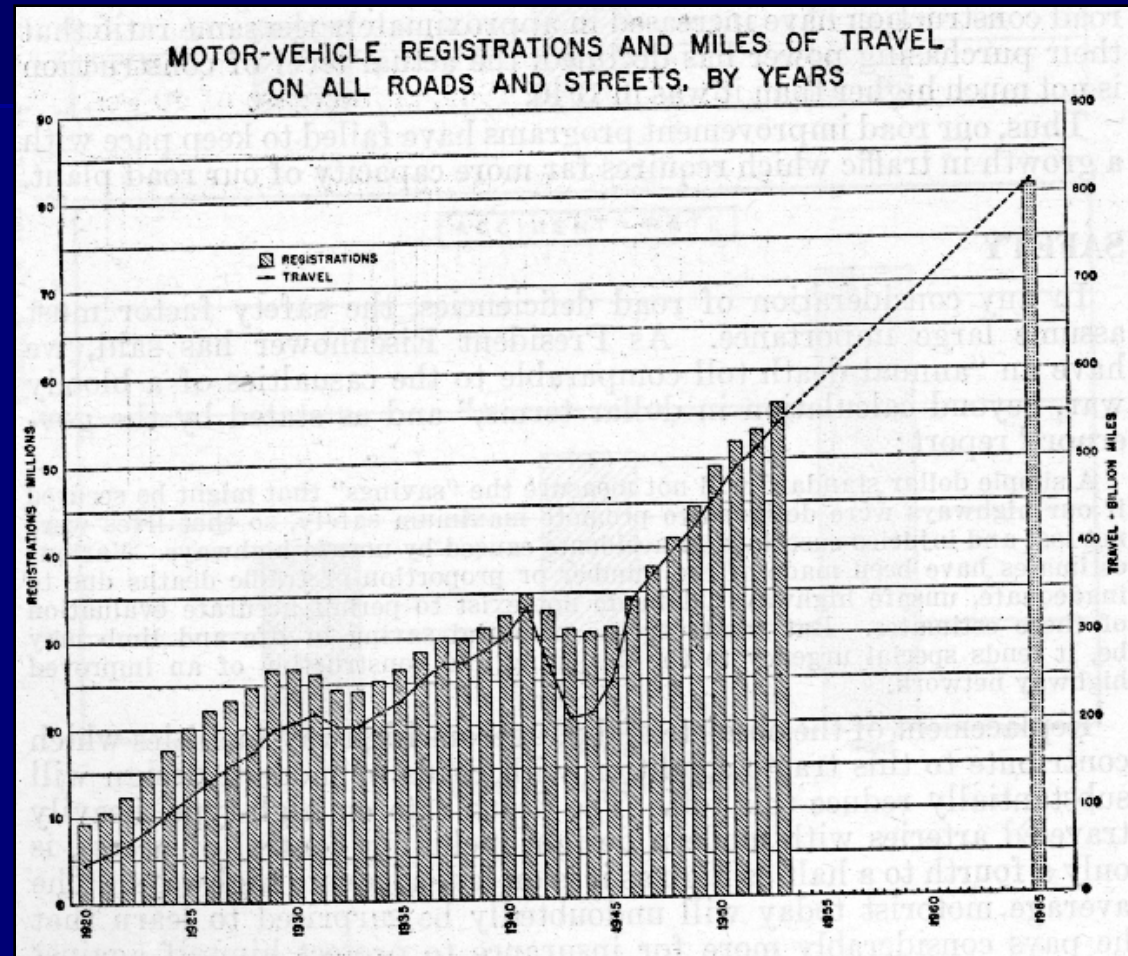
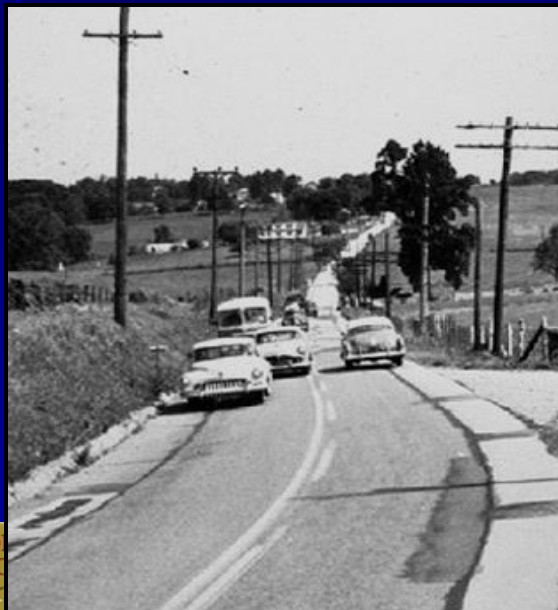
NATIONAL SYSTEM OF INTERSTATE HIGHWAYS
 SELECTED BY JOINT ACTION OF THE SEVERAL STATE HIGHWAY DEPARTMENTS
 AS MODIFIED AND APPROVED
 BY THE ADMINISTRATOR, FEDERAL WORKS AGENCY
 AUGUST 2, 1947

NOTE: Over 1000 miles of urban routes not defined.



The Traffic Explosion and Paying for Roads: Legislative Stalemate, 1945-52

"We are being overwhelmed by a flood of traffic."
BPR, 1951



Priority dispute: Funds for rural roads or urban expressways? Few politicians or highway department enthusiastic about expensive urban routes, but problems were becoming severe.



Solution 1. Get Roads out of Politics

HIGHWAY RESEARCH BOARD

Bulletin 53

Highway Sufficiency Ratings

Presented at the
THIRTY-FIRST ANNUAL MEETING
January 1952

1952

WASHINGTON, D.C.

Continued Trust in Expertise:

- Sufficiency Ratings
- Congressional respect for THM



A SYMBOL
OF FREEDOM

INTERSTATE

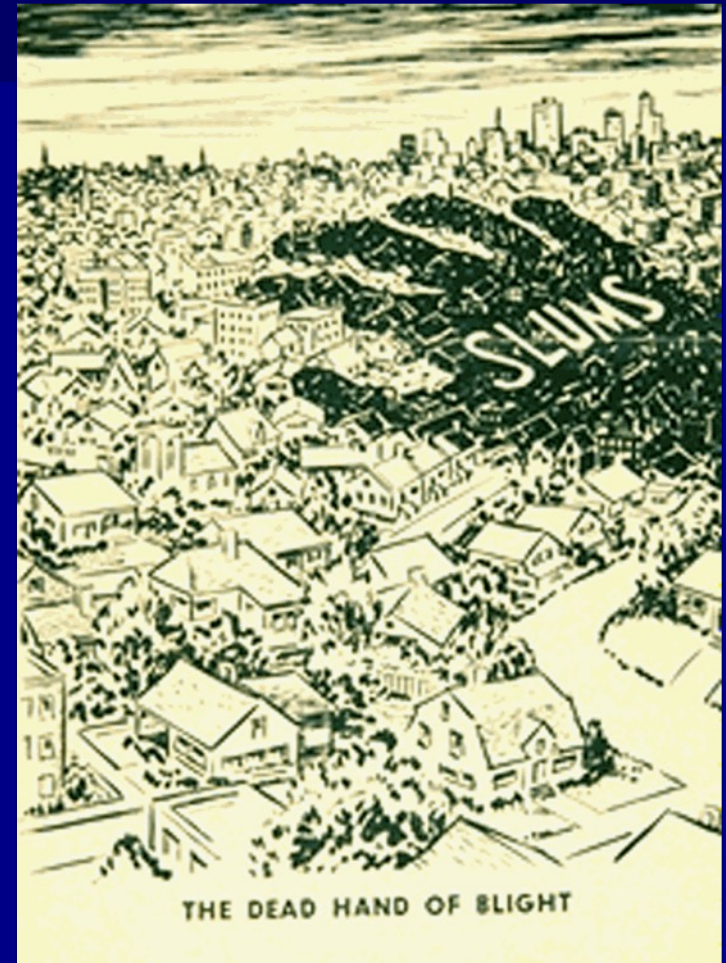
50
YEARS

1956 - 2006

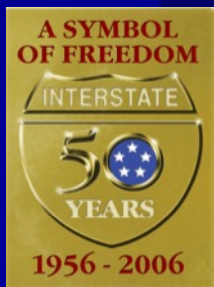
Solution 2b. More Money → All Roads but especially Cities



Federal-aid increasing by 1950, but results uneven as many states could not match federal dollars.



Urban roads linked to urban renewal in late 1940s: ideals and land costs



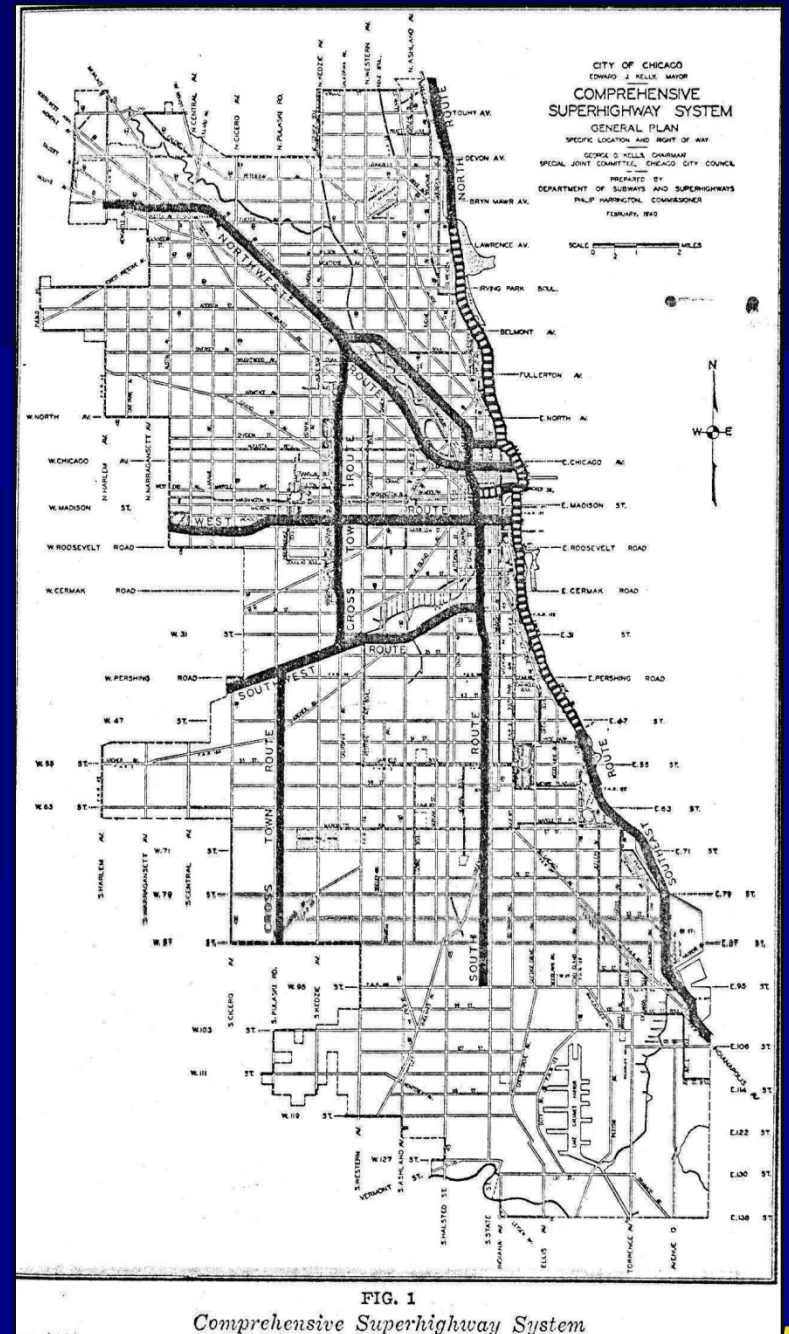
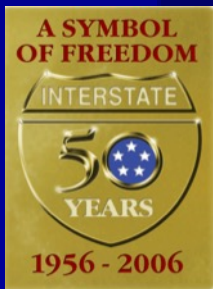
But had to learn to build expressways. A handful of cities led the way: New York, Los Angeles, Chicago



Robert Moses



Arroyo Seco Parkway, LA

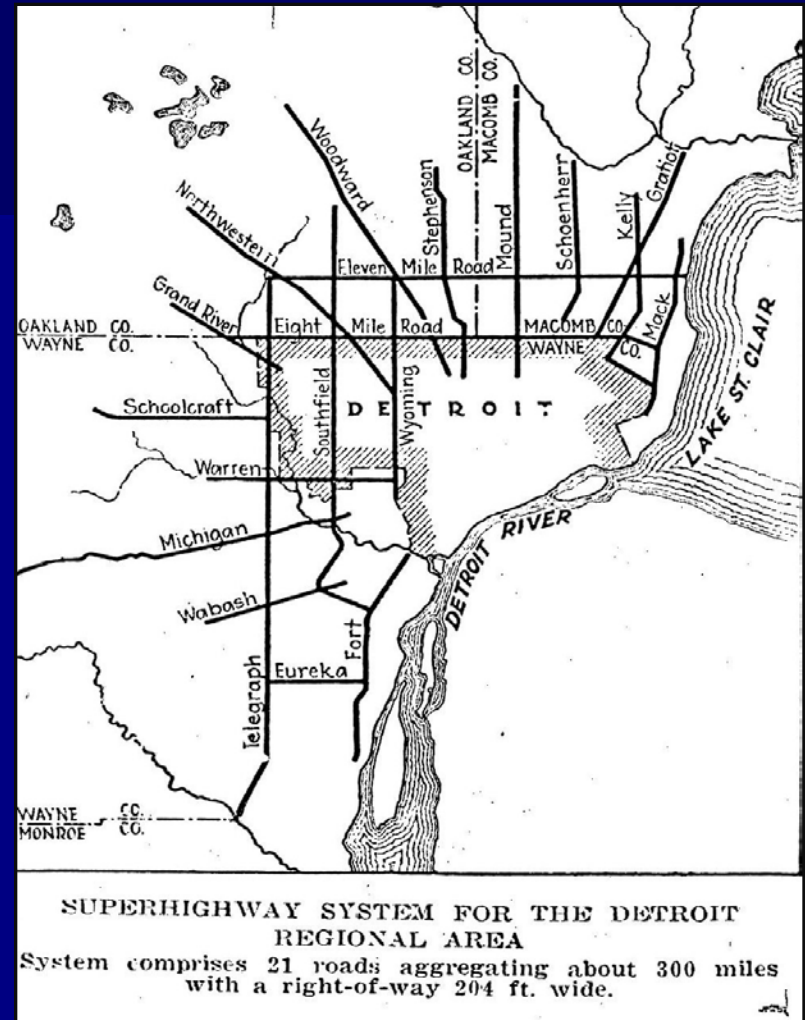


Detroit as Pioneer: Rapid Transit Commission, 1922

- Street Railways (65 miles); Subway plans; AND Roads (217 miles).
- "Super Highways" - Radial Routes every 3 miles, 205 ft. wide



Expressway design: Divided highway with access roads



Note: Only road plans implemented

Willow Run Expressway: Later Edsel Ford Expressway

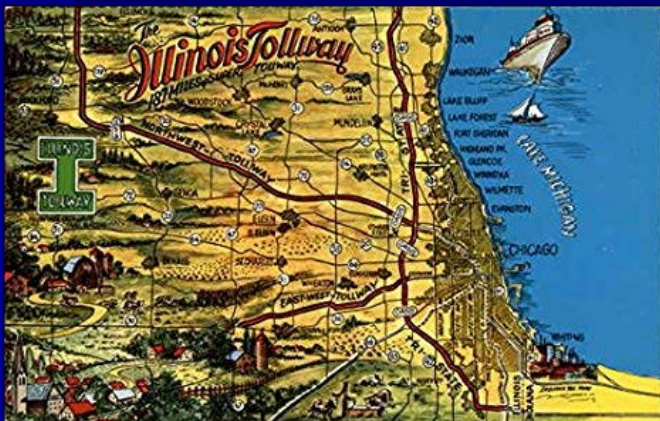
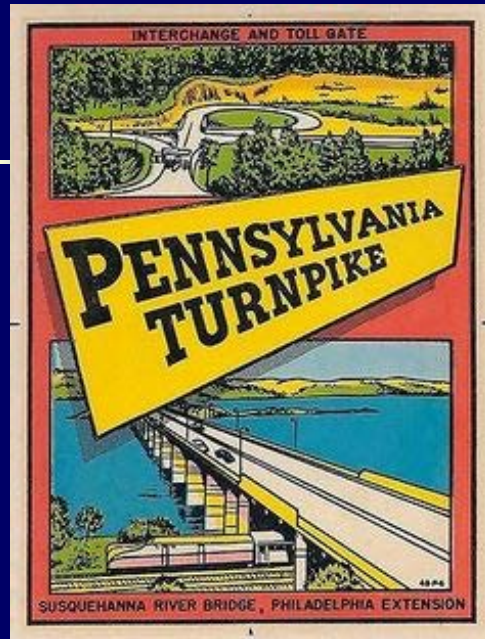
One of several war-time tests of new style of urban road construction techniques, but on a limited scale.



Now Interstate 94



Solution 2b. More Money → Toll Roads



PA Turnpike (1939-40 proved the concept; idea spread in late 1940s.

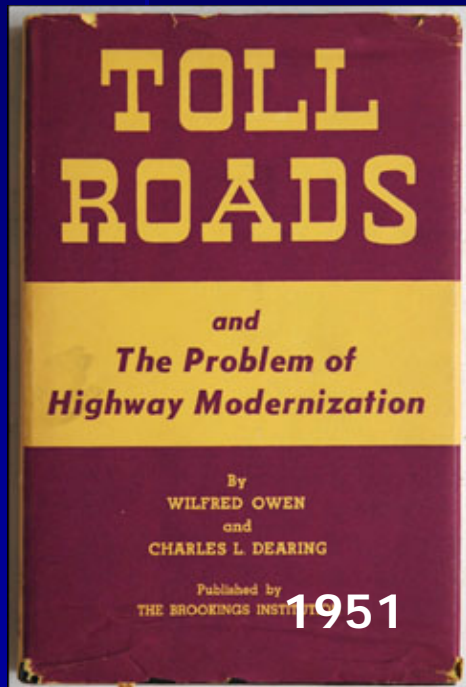
But could toll roads work?



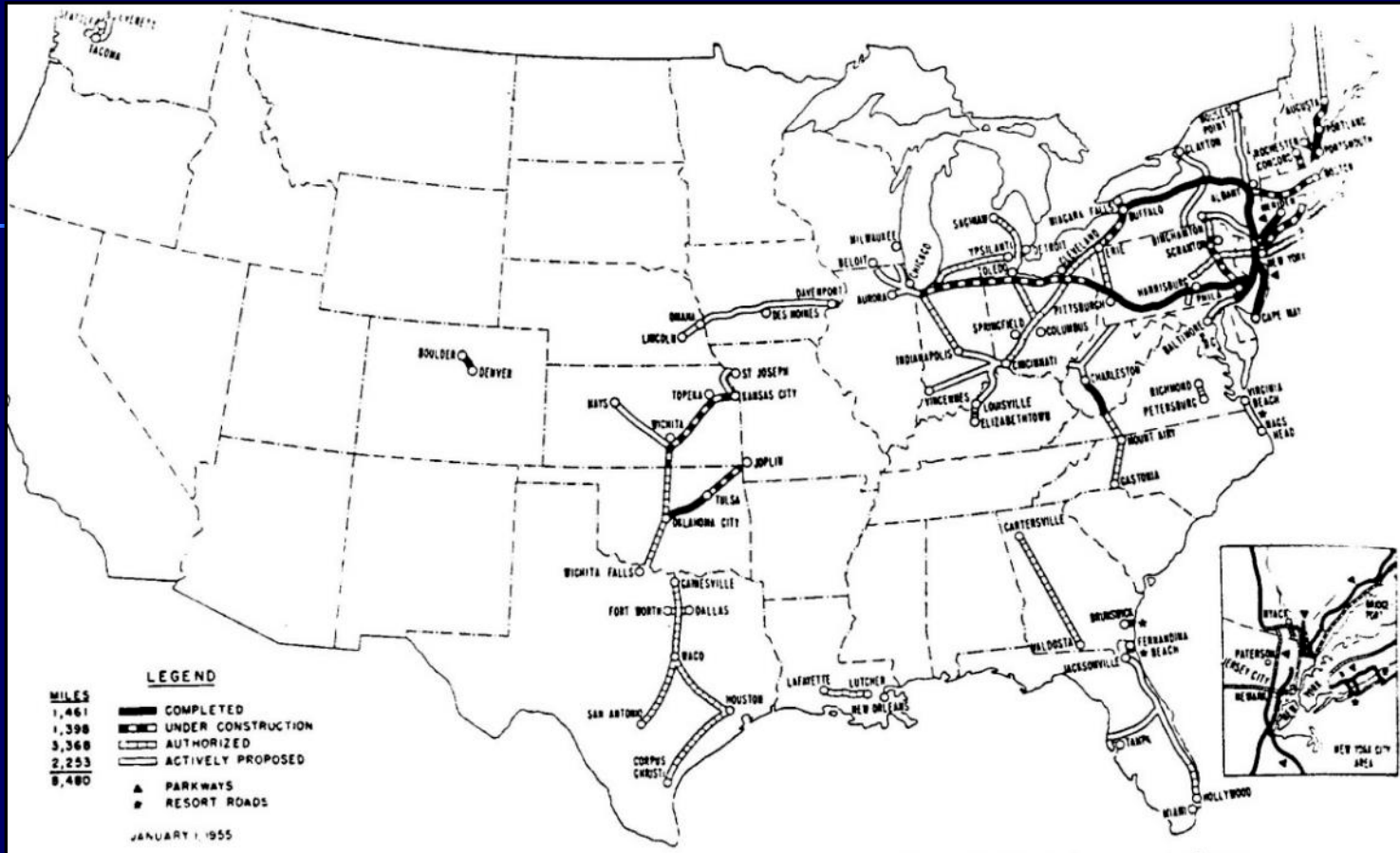
BPR had always opposed toll bridges and described tolls as “double taxation.”

Owen & Dearing agreed in part: Tolls showed “failure of public policy;” reflected opposition to borrowing, taxes, or reallocation. They were a “substitution of political considerations for *economic and engineering tests* in highway programming.”

Yet final conclusion: Done right, tolls can make financial sense, but not everywhere.



Toll road experiment of the 1950s



1953: 762 miles open, 1,077 under construction.

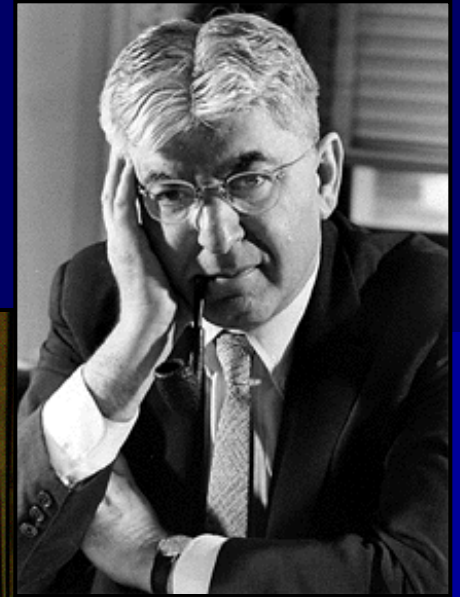
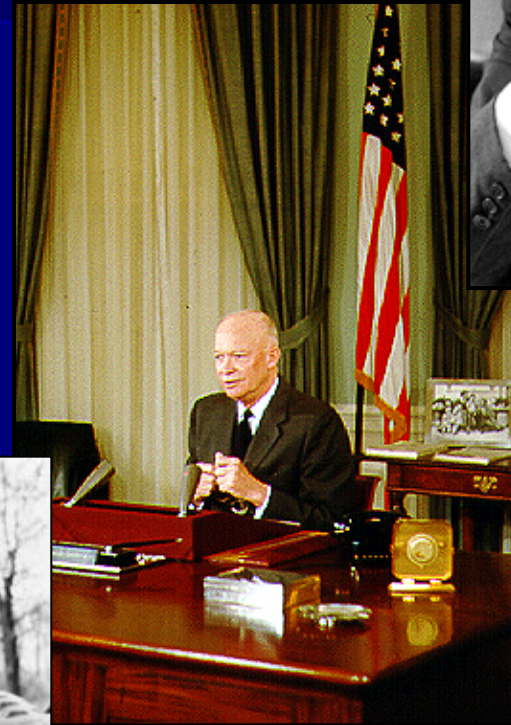
1963: 3577 miles open but 8500 miles planned were not built. Lesson: **Tolls could not support a NATIONAL IHS.**



Yet some hoped to adopt this approach: Eisenhower and IHS



4/2/59



Note: 1919
convoy and
WW II less
important for
Ike than
economic
plans of
Arthur Burns
and other
advisers.



Ike's Hopes for Clay Committee: A New Philosophy



Eisenhower and Clay, 1945.

1. National System, not federal-aid or formula;
2. Financial mechanism: tolls to pay off bonds;
3. Roads as counter-cyclical economic tool;
4. Avoid cities, but address congestion.

Lucius Clay headed a study committee in 1954 to propose a highway plan.

A SYMBOL
OF FREEDOM

INTERSTATE

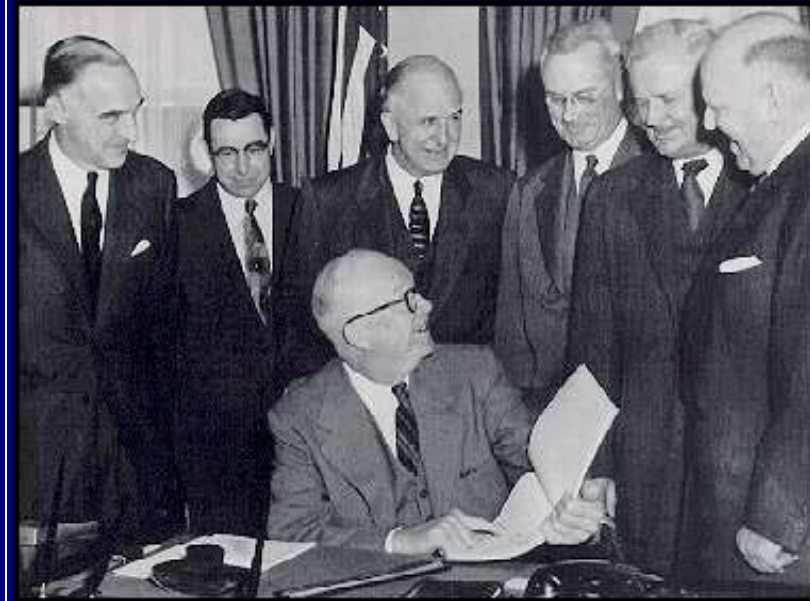
50
YEARS

1956 - 2006

Impact of the Clay Report?

None of Ike's conceptual changes recommended. Instead:

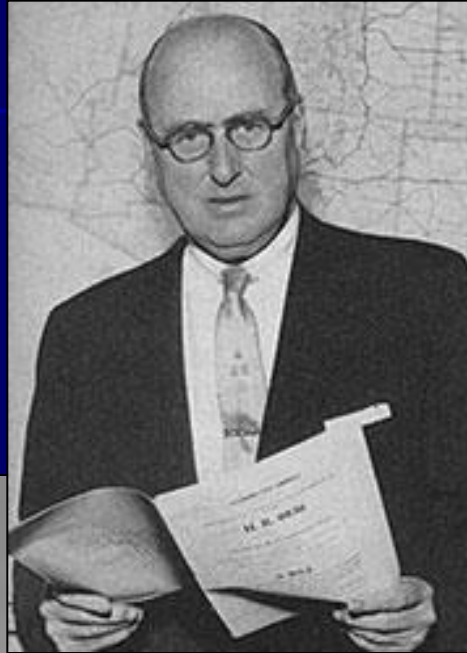
- IHS to be focus for federal highway funding;
- Scale of the problem: \$25 billion;
- Shift funding formula to reflect higher cost of roads;
- Reimbursement formulas;
- Overall, retained federal-aid approaches.



NOTE: Military/civil defense rationale only for public relations.

Legislative Success, 1955-1956: Politics, Expertise and Federal Aid

George Fallon



- 90/10 Formula
- \$25 billion, 12 years
- New Taxes & the Hwy. Trust Fund



Francis Turner, BPR



Albert Gore, Sr.

Hale Boggs



Getting the IHS Built

Initially progress slow:
State engineering and design capacity shortages;
Property acquisition costs high;
Faster in country than in cities
– thin knowledge of urban expressways.



Missouri



Kansas



Ribbon-cutting ceremony along the first portion of Interstate highway to be completed in Wisconsin on September 4, 1958—I-94 in the Waukesha area. (Photo courtesy Wisconsin Historical Society Archives.)

Accurate Projections: Routes



H.S. Fairbank

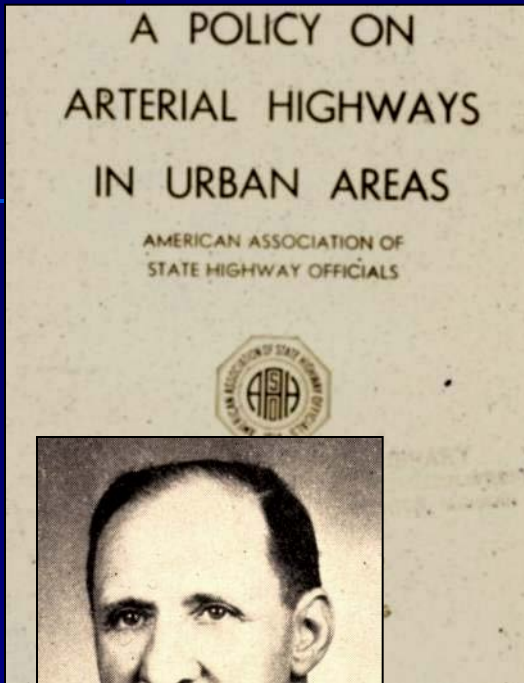
Traffic Utilization



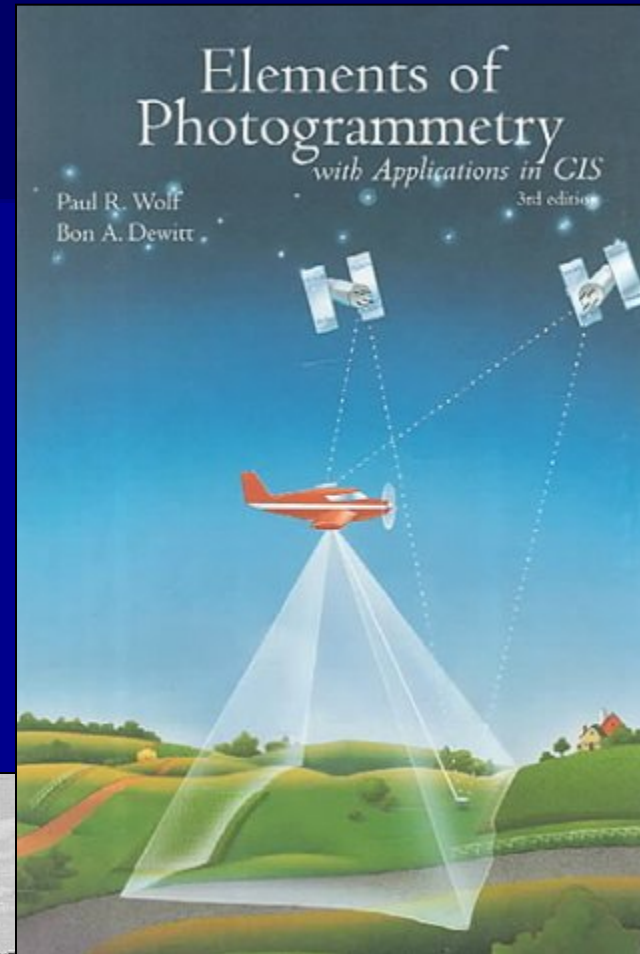
More than 25% of traffic,
1% of the mileage



Research Process & Implementation



Joseph Barnett,
BPR urban design
specialist



AASHO Road Test.
Illinois, 1958-60

Pavement guidelines issued in 1961, updated in 1972, 1993.



Roads into Cities

"It is within this urban zone that the Public Roads Administration will be most interested in the development of the Interstate System." (THM, 1947)





Less Accurate Projections: Time to Completion & Cost?

Original plan: 41,000 miles over 12 years (1969), \$25 billion.

State engineers had a lot to learn.

Final section completed through Glenwood Canyon, Colorado, in October 1992.

Total cost: \$114 billion (1956 \$).

Additional mileage by 2013: total of 47,856 miles.



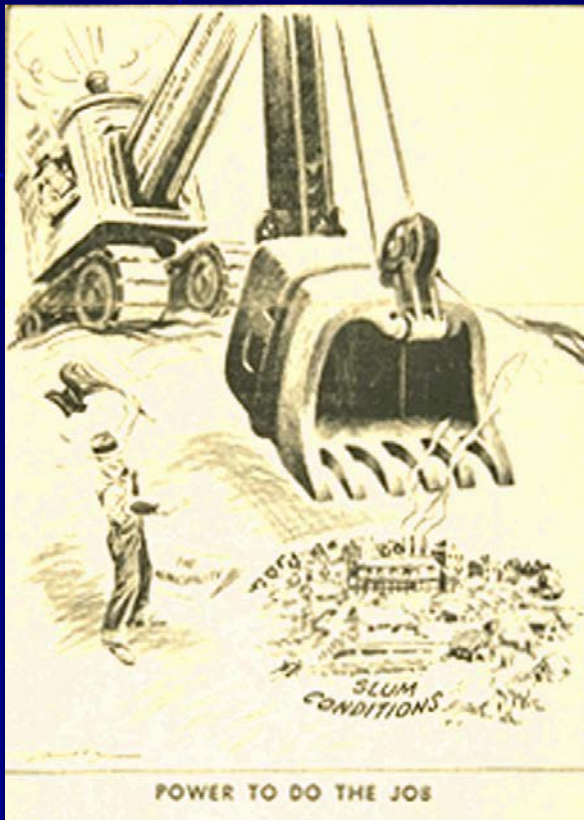
Central Business Districts Stronger?



Hollowed out Downtowns
vs. Suburban Malls



Roads & Urban Renewal: Impact on Minority Neighborhoods?



Miami's Overton district, before and after I-95 & I-395



Oakland CA, ca. 1957



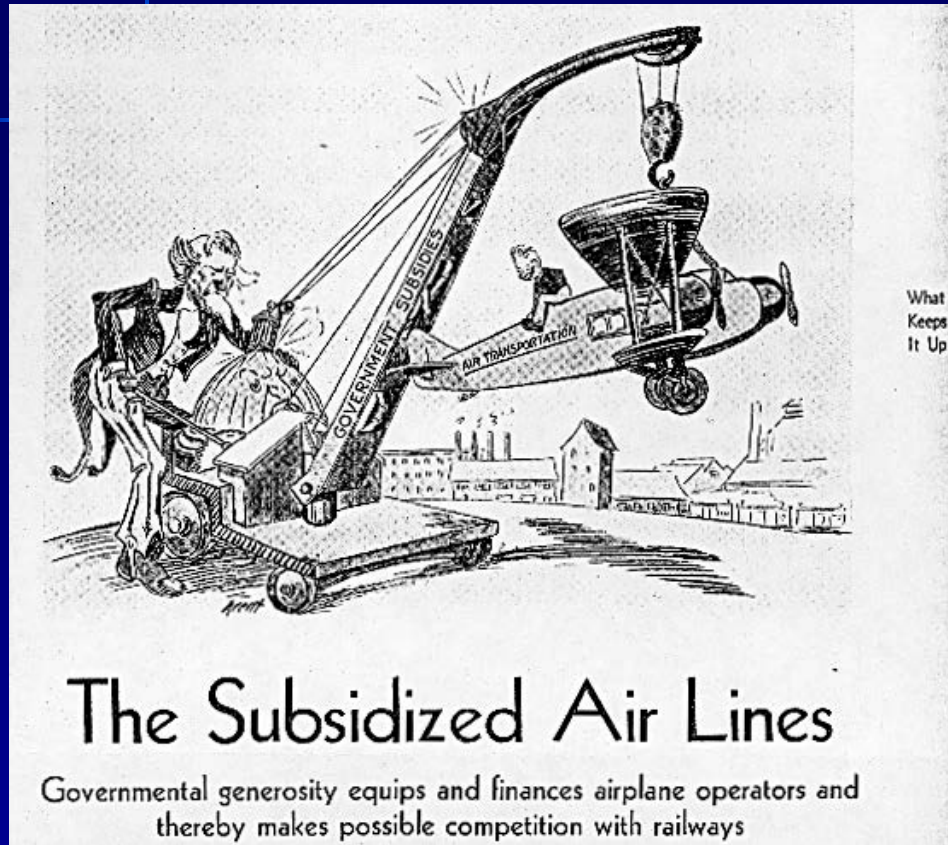
Pittsburgh's Hill District, 1957



Highway Policy rather than Transportation Policy



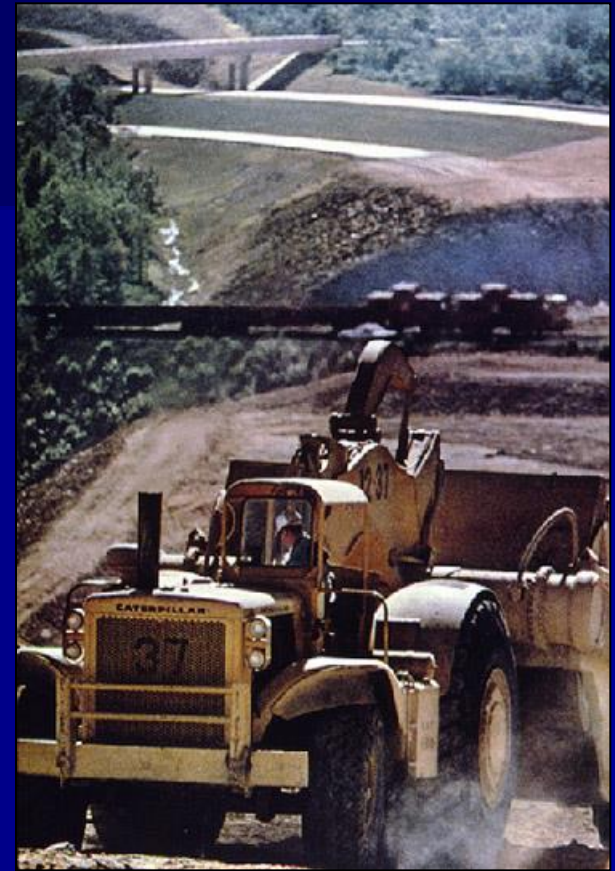
Limited Vision: Modal Politics vs. Integrated Transportation Policy



NOTE: Policy/funding handled by different congressional committees, reinforced modal visions and divergent policies. The Intermodal Surface Transportation Efficiency Act (ISTEA - 1991) was the first attempt to integrate strategy and policy across modes.



Consequences of the Interstate Program



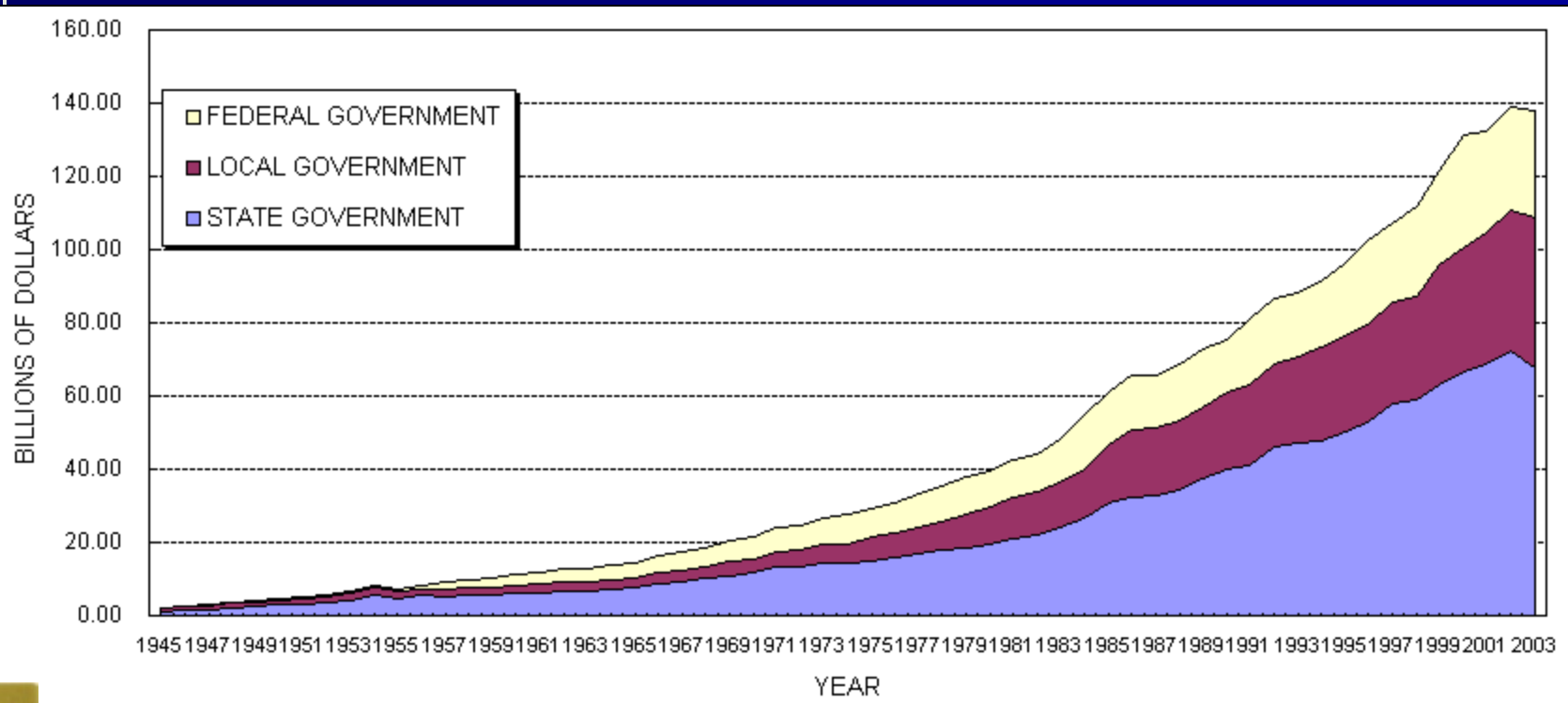
"In the Interstate Highway System we have done nothing less than express our vision of ourselves Ultimately, the Interstate have become a physical expression of the part of the American character that desires to resolve our destiny in this seemingly limitless land."

Tom Lewis, *Divided Highways*, 1997

MichiganTech



Consequences: Largest Public Works Project in History



90%/10% model signaled tilt toward federal funding as the driver of change



Consequences: Urban Landscapes



Wilmington,
Delaware



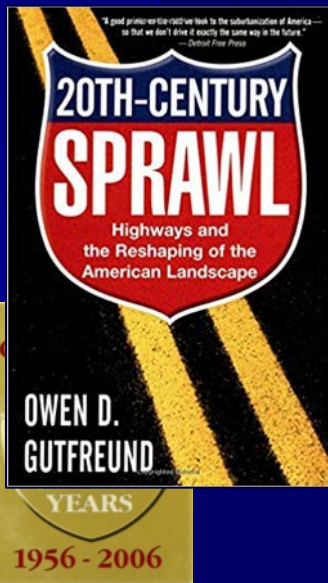
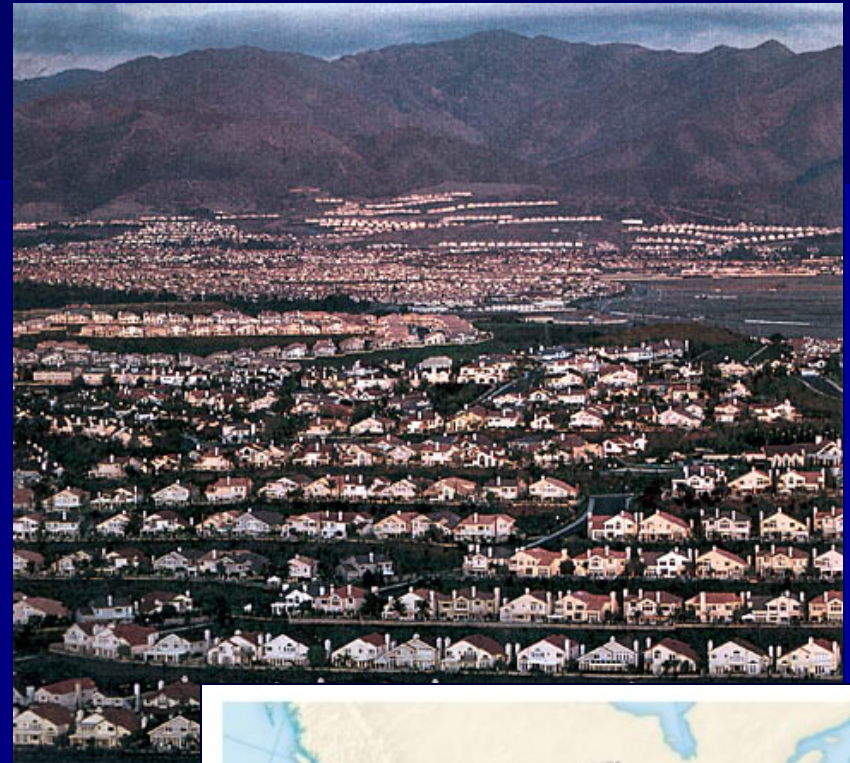
Dallas "High Five"
interchange



Cincinnati



Consequences: Land Use & Sprawl

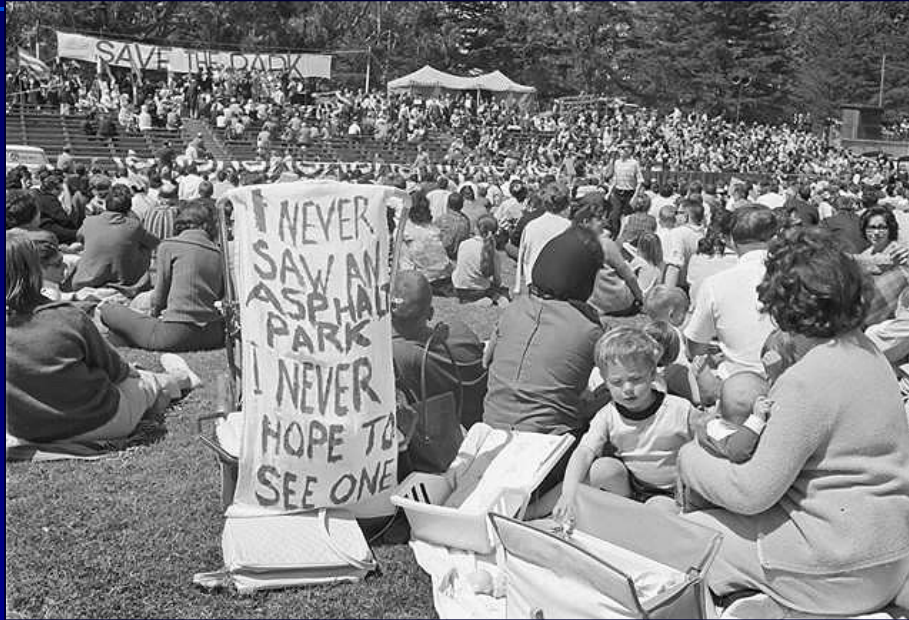


Suburbs not new in 1950s, but postwar housing expansion in suburbs spurred by new roads.



The Sunbelt

Consequences: Public Support for Roads Slipped...



San Francisco, 1959



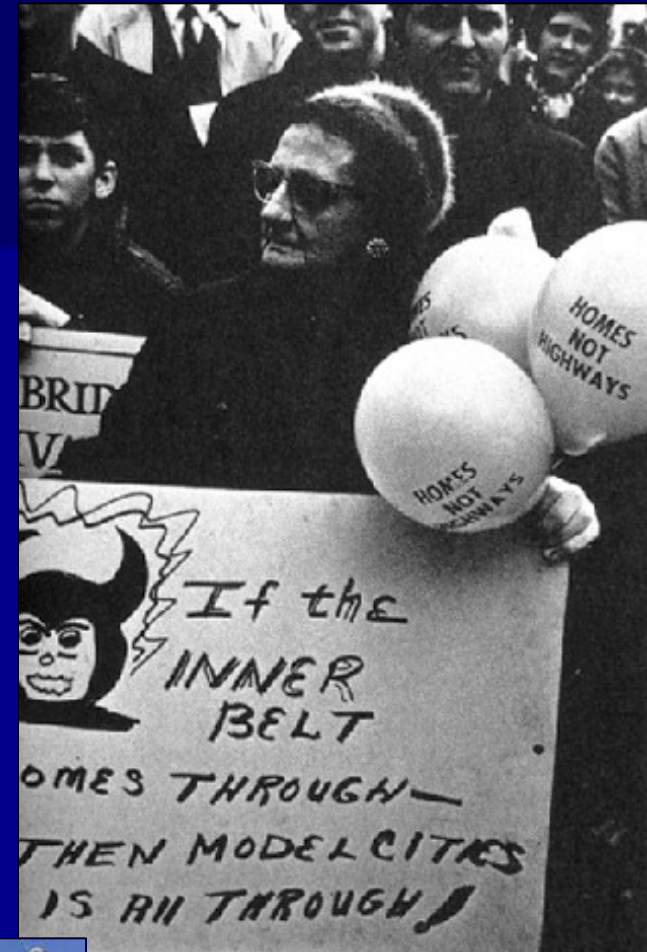
Preserve neighborhoods and parks



Not
In
My
BackYard!



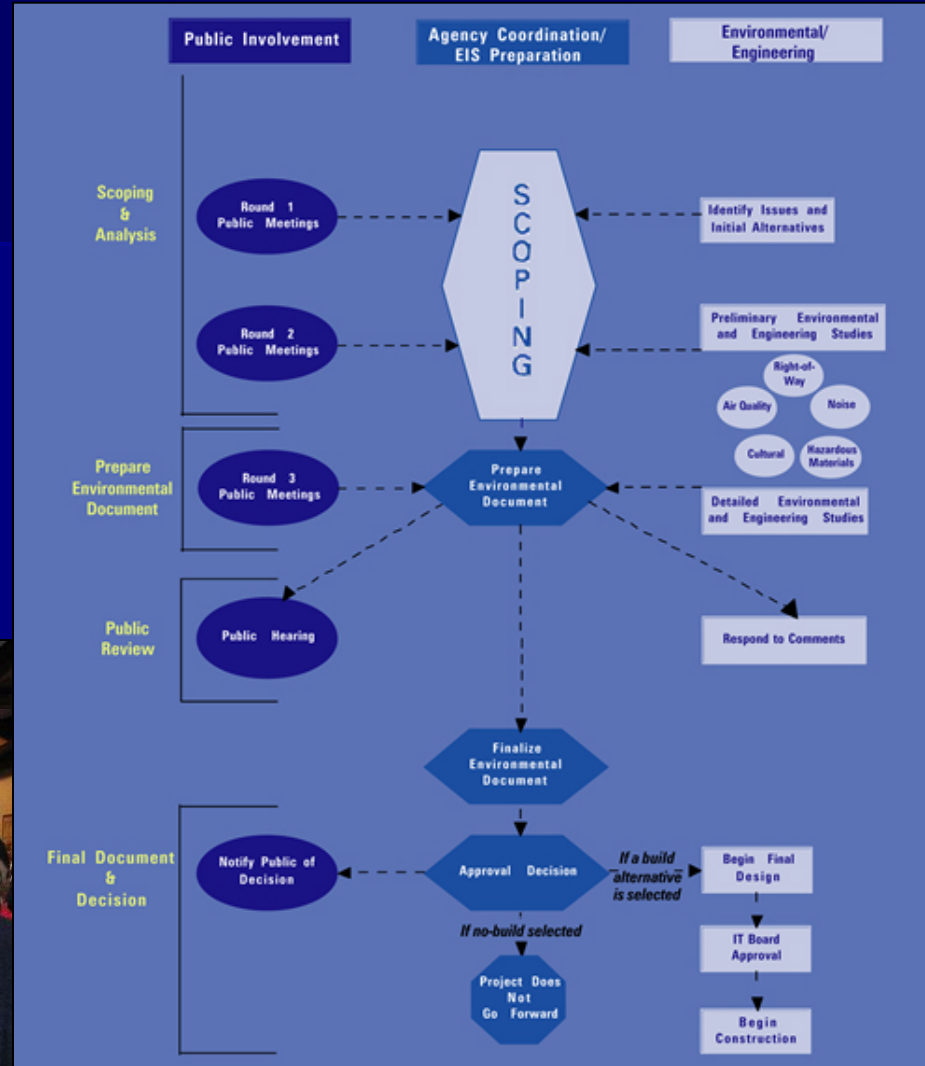
... and then grew into a Freeway Revolt



Consequences: New Processes, New Roles

NEPA (1969)

Open Process,
Environmental
Impact Statements,
Public Hearings



NOTE: The U.S. environmental movement gained significant support from the freeway revolt.

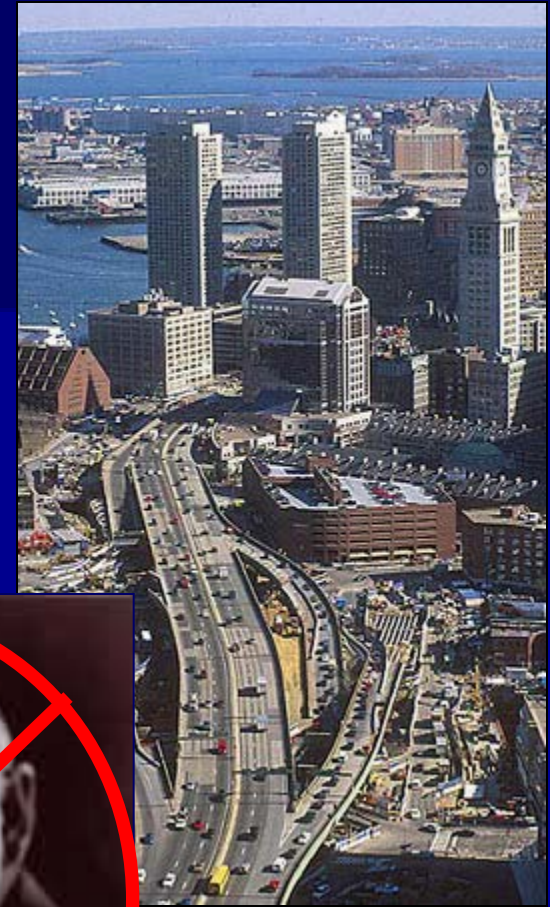


Consequences: Acceptance of Congestion

Perhaps the most surprising thing to highway engineers and planners: drivers now accept congestion rather than agitate for more construction. Urban officials generally agree because of the prohibitive cost and *the Moses rule* (new roads *generate* more traffic).



Consequences: From Experts to Politics



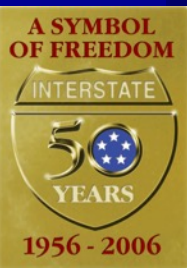
Cities, then state highway departments, and even the FHWA shifted authority from engineers to political appointees.



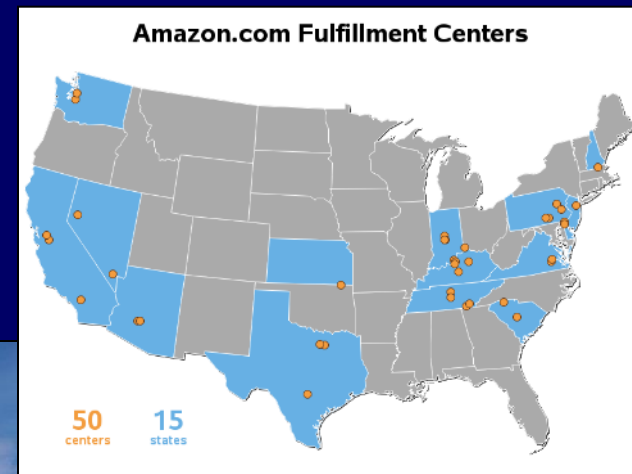
From Experts to Politics, 2005 : Earmarks

State	# Earmarks	Value	# Earmarks (House)	Value (House)
California	547	<u>\$2,651,995,251</u>	479	<u>\$1,421,427,000</u>
Illinois	330	<u>\$1,334,075,702</u>	253	<u>\$599,990,000</u>
Alaska	120	<u>\$1,001,267,966</u>	39	<u>\$721,900,000</u>
New York	494	<u>\$990,268,885</u>	425	<u>\$765,216,500</u>
Texas	231	<u>\$754,384,684</u>	204	<u>\$766,950,000</u>
Missouri	97	<u>\$728,036,000</u>	53	<u>\$252,500,000</u>
Pennsylvania	423	<u>\$706,691,502</u>	259	<u>\$549,712,300</u>
Florida	232	<u>\$694,616,440</u>	176	<u>\$588,430,000</u>
Ohio	245	<u>\$665,231,434</u>	183	<u>\$444,884,400</u>
Total:	6,373	\$24,215,018,641	4,128	\$12,426,577,151

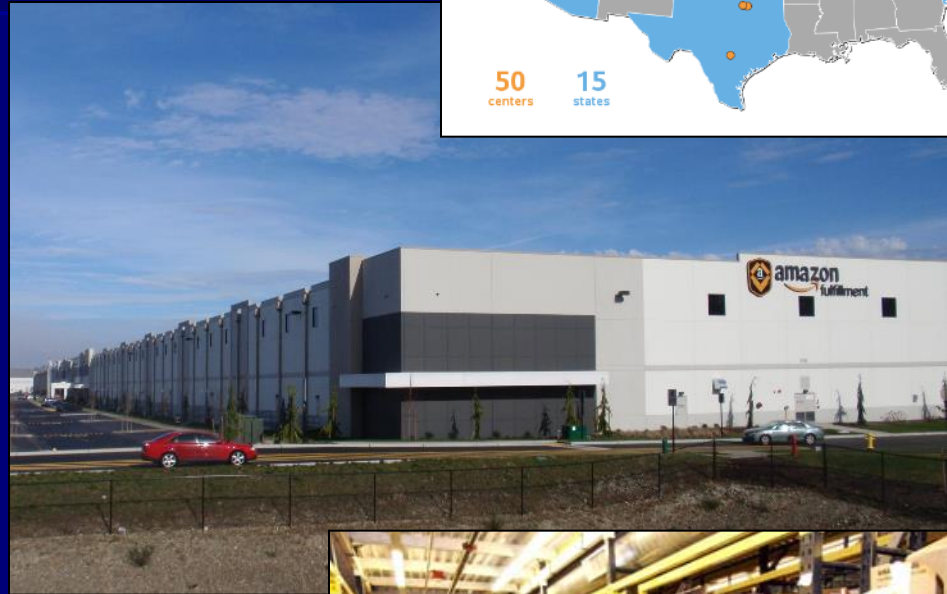
Source: Taxpayers for Common Sense
<http://www.taxpayer.net/Transportation/safetealu/states.htm>



Consequences: Allowing New Economic & Spatial Patterns



The 1st intermodal transport firms rely on IHS

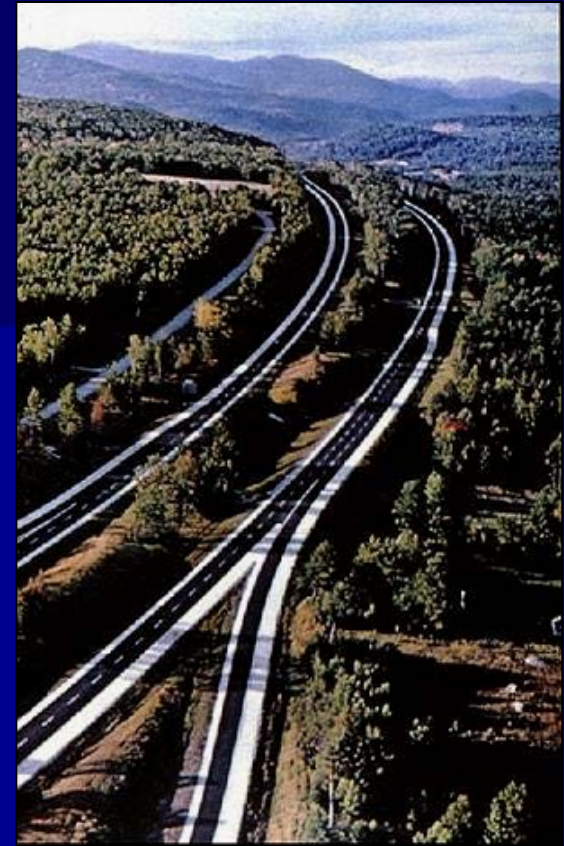


E-Tailers & E-commerce:
Distribution Centers
located at HIS nodes to
allow next day delivery



Concluding Comments: *Interstate as a Large Infrastructure System*

- IHS is a *socio-technical system*. Not just technical; also political, social & economic dimensions.
- Infrastructure systems long-lived & not easily changed. Can shape patterns for decades & restrict future options. Careful planning required.
- System consequences can never be fully anticipated, good & bad.
- When systems are flexible, users generate outcomes very different than those originally intended.





Paying for the System of Roads

Funding Options, ca. 1920

- Property Taxes (cash or road work)
- Labor Taxes (Convict Labor)
- Bonds
- Registration/Licenses
- Gas Tax
- Toll Bridges Only (reluctantly)



Changes in funding patterns

State Highway Department Income (millions)	1904	1923	%	1925	%	1928	%
Motor Vehicle Fees		\$101.284	25.1	\$199.845	30.1	\$259.135	30.5
Gas Tax		\$3.274	0.8	\$89.328	13.4	\$234.164	27.6
Bonds & Notes		\$111.397	27.6	\$141.402	21.3	\$132.484	14.3
Transfers from local gov't		\$35.344	8.7	\$71.737	10.8	\$86.710	10.2
Federal-aid		\$77.457	19.2	\$92.180	13.9	\$80.798	9.5
Appropriations	\$2.607	\$34.432	8.5	\$33.391	5.0	\$42.468	5.0
Misc.		\$8.079	2.0	\$15.052	2.3	\$12.612	1.5
Tax Levy		\$32.801	8.1	\$21.489	3.2	\$11.955	1.4
Total	\$2.607	\$404.068		\$664.425		\$840.327	

Source: T.R. Agg, *ENR* (1/2/1930)

