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

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

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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

By mid 19th century, roads a local concern

National funding sought after 1800, but constitutional limits were soon reached.
The Good Roads Movement: 1880s

Bicycles & railroads, not autos, started this movement.
Get Rural America out of the mud! Roads served moral purposes.

Serve transport and social needs in rural America: education, civic life, and access to the modern economy for rural Americans.
1893 – Office of Road Inquiry: disseminate technical information on road construction. Became BPR.

Object-lesson road: before & after
Roads as Progressive Reform: Office of Public Roads and Expanding Expertise

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

“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.
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

<table>
<thead>
<tr>
<th>Year</th>
<th>States Adapting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>4 states</td>
</tr>
<tr>
<td>1921</td>
<td>10 states</td>
</tr>
<tr>
<td>1922</td>
<td>4 states</td>
</tr>
<tr>
<td>1923</td>
<td>16 states</td>
</tr>
</tbody>
</table>

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.

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**Michigan Tech**

**A Symbol of Freedom**

**Interstate 50 Years 1956 - 2006**
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

H.S. Fairbank

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

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.
The National Interregional Highway Commission, Congress and postwar roads

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

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

Continued Trust in Expertise:
• Sufficiency Ratings
• Congressional respect for THM
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.
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

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

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

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

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

Francis Turner, BPR
George Fallon
Hale Boggs
Albert Gore, Sr.
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—1-94 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

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
Consequences: Largest Public Works Project in History

90%/10% model signaled tilt toward federal funding as the driver of change
Suburbs not new in 1950s, but postwar housing expansion in suburbs spurred by new roads.

The Sunbelt

Consequences: Land Use & Sprawl
Consequences: Public Support for Roads Slipped…

Preserve neighborhoods and parks

San Francisco, 1959

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

<table>
<thead>
<tr>
<th>State</th>
<th># Earmarks</th>
<th>Value</th>
<th># Earmarks (House)</th>
<th>Value (House)</th>
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<tr>
<td>California</td>
<td>547</td>
<td>$2,651,995,251</td>
<td>479</td>
<td>$1,421,427,000</td>
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<td>Illinois</td>
<td>330</td>
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<td>$599,990,000</td>
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<td>Alaska</td>
<td>120</td>
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<td>$721,900,000</td>
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<td>New York</td>
<td>494</td>
<td>$990,268,885</td>
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<td>Texas</td>
<td>231</td>
<td>$754,384,684</td>
<td>204</td>
<td>$766,950,000</td>
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<td>Missouri</td>
<td>97</td>
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<td>Pennsylvania</td>
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<td>$706,691,502</td>
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<td>Florida</td>
<td>232</td>
<td>$694,616,440</td>
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<td>Ohio</td>
<td>245</td>
<td>$665,231,434</td>
<td>183</td>
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<td><strong>Total:</strong></td>
<td><strong>6,373</strong></td>
<td><strong>$24,215,018,641</strong></td>
<td><strong>4,128</strong></td>
<td><strong>$12,426,577,151</strong></td>
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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.
- 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

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

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