



TECHNICAL MEMORANDUM TASK 1:

THE INTERSTATE AND NATIONAL HIGHWAY SYSTEM- A BRIEF HISTORY AND LESSONS LEARNED

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Executive Summary – The National System of Interstate and Defense Highways

On June 29, 1956 when, with little fanfare, President Eisenhower signed the Federal- Aid Highway Act of 1956 from his hospital bed, neither he nor anyone else in the country could have appreciated the scale and scope of the forces that were set in motion. The story of the Interstate often begins with President Franklin Delano Roosevelt in 1937. FDR summoned the Chief of the Bureau of Public Roads, Thomas MacDonald, to the White House and drew on a map his vision for a cross-country high level road system and asked for an evaluation. The result was the 1939 report, *Toll Roads and Free Roads*, which can be said to have initiated the drive for an Interstate System.

WW II intervened and during the war, Roosevelt called for a second report as part of planning for recovery efforts. That 1943 report, *Interregional Highways*, is credited by many as the most important document in the history of America's highways. It took the original Roosevelt map, tested several system lengths, and recommended a network of about 26,900 miles. During the late 1940s the network was mapped, but it took until the Eisenhower years to get serious about the system. After reports by several Commissions and extensive Congressional debate, the 1956 Highway Act was passed. Two important breakthroughs were pay-as-you go funding and the establishment of a trust fund.

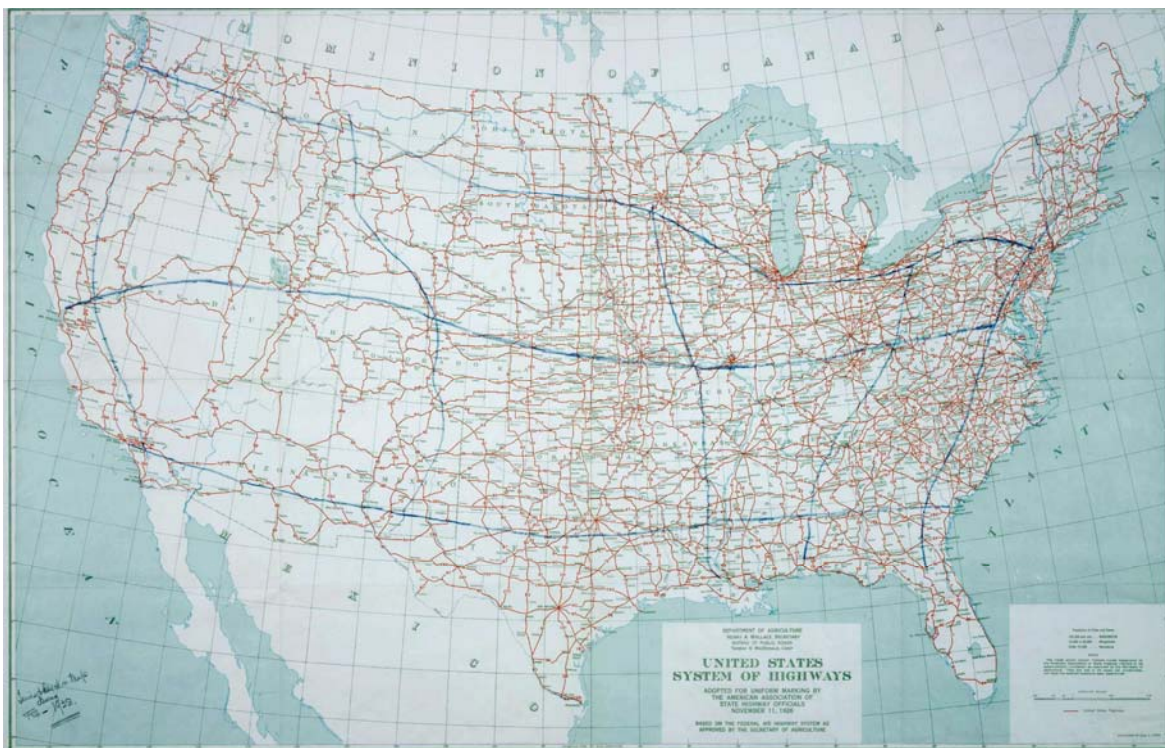
The Interstate construction era ended with the 1991 passage of ISTEA. The Act included the National Highway System (NHS). The NHS has a number of conceptual underpinnings, one of which was to provide a means to "grow" the Interstate System. At the time ISTEA was enacted, the mileage of the Interstate System stood at 45,074 miles. The current system of 46,718 miles indicates only modest growth since ISTEA. Interstate System statistics show that 255 of those miles were cost-to-complete sections being finished, leaving 1,389 new miles or less than two miles per state per year. In the 15 years since ISTEA, there have been 45 additions in 18 states. National statistics can be misleading. The growth is very concentrated, 18 states have added 42 routes to their Interstate Systems, totaling just under 1,400 miles. However, 60 percent of the mileage is in just four states: Illinois, North Carolina, New York, and Pennsylvania. Thus, four states are growing their Interstates significantly, 14 others to a modest extent, while 32 states are not involved in expanding their Interstate System mileage at all.

The first great lesson is that there are few really new issues. All of the familiar challenges of today were faced 50 years ago: funding gaps, federal/state relations, metropolitan challenges, allocation formula issues, donor-donee issues, etc. There are certainly new contexts and new technological frameworks in which these issues arise. These are true issues – in the sense that they are never really solved, only resolved at any point in time, but when the contending forces change in influence, or the effects of the decision change, the issue rises again.

ISTEA was the turning point between the Interstate and post-Interstate eras. TEA-21 and SAFTEA-LU have made adjustments to the ISTEA concepts, but not changed the substance. At the 50th anniversary of the Interstate System, it is perhaps wise to pause and ask: have ISTEA, TEA-21, and SAFETEA-LU preserved and enhanced the enormous benefits of the Interstate System? Or are there corrections or new directions to be taken to insure that the nation's personal mobility needs, safety, and economy will continue to benefit and grow with support from the nation's premier highway system?

The Vision

The story of the Interstate often begins with President Franklin Delano Roosevelt in 1937. The great image of the beginnings of the Interstate is often depicted when FDR summoned the Chief of the highway agency, Thomas MacDonald, to the White House and drew on a map his vision for a cross-country high level road system and asked for an evaluation. (A reproduction of that original map appears below.) The Congress also added its official request in Section 13 of the Federal Highway Act of 1938 which stated:



The Chief of the Bureau of Public Roads is hereby directed to investigate and make a report of his findings and recommend feasibility of building, and cost of, super highways not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads.

When the President or Congress acts on an idea like this it is a good bet that the idea has been percolating in the country for some time. That was certainly true with respect to a national system of “super highways.” There had been coverage in the nation’s press on the subject for years; Congress had seen at least a dozen bills on the topic. Much of this was geared to creating jobs to help end the depression.¹ Chief MacDonald had spoken at AASHO² in 1936 after a visit to the autobahn in Germany, and again to ASCE³ in 1937

¹ *Origins of the Interstate*, Unpublished manuscript, W.L.Mertz

² American Association of State Highway Officials, before the T for transportation was added



recognizing what had been accomplished. He described the very attractive attributes of their system of about 4,500 miles of roads (interestingly enough providing three East-West and 3 North-South Routes) and indicated that we needed a similar system in the United States, but he focused on building around metropolitan areas where they were justified by heavy demand.

In one other important respect the stage had been well set for the elucidation of such a vision. In 1934 Section 11 of the Federal Highway Act set out funding at 1½ % of a State's apportionments for "surveys, plans, and engineering investigations".⁴ Since then the Bureau of Public Roads had been working with the States to conduct highway planning surveys to obtain the kinds of data that would be needed to address such a question. They were ready now. By 1936, 38 states had completed surveys. This may have been depression era "make work" for white collar workers but it succeeded in generating a unique data set. The president cited again and again to the Congress "the wealth of exact data" employed and that the BPR had compiled the best national highway data set the nation had ever seen.

The response, to both the President's and the Congress' request was a report, *Toll Roads and Free Roads*, delivered to Congress on April 27, 1939, eight months after the Congressional request, that extolled the concept of a national system but indicated that a toll system such as first suggested by the President as a way to fund it was infeasible. The document stands as one of the cornerstones of the federal-aid highway program with its immense emphasis on engineering data and quantitative analysis and the influence it had on the evolution of the Interstate System concept.

The mapping of the travel data clearly demonstrated that at that time there was only a miniscule amount of travel that was truly long distance in nature. Within that framework the BPR delineated the prospective three North-South and three East-West routes as laid out by the President in a way that would maximize the usage of the routes. A North-South screen line through Idaho, Nevada, and Arizona indicated only about 300 vehicles per day crossing the nation from west to east. Between the west coast and Florida about 20 vehicles per day in each direction were identified. Some segments were indicated as being able to support the costs of construction and be self-liquidating. These were not surprisingly in the North-East Corridor, and around Chicago and Southern California. With an estimate that travel by 1960 would be 2.5 times the 1937 levels, the final conclusion was that about 40% of the costs could be returned in tolls over the period from completion in 1945 to 1960.

Had *Toll Roads and Free Roads* ended there it would have been a ground-breaking analytical study, but Herbert Fairbank, the true genius that prepared the study, in a memorandum to Chief MacDonald accompanying the early work noted that "the interest aroused in Congress would not be satisfied with a mere negative report", seized the opportunity to provide a separate positive response to the vision of the Congress and the President, in effect a second report, appended to the requested study, in which it was indicated that the data indicated the great need for a nation-wide system, and that it could be funded by fuel taxes. It is clear that

³ American Society of Civil Engineers

⁴ *America's Highways, 1776-1976*; FHWA; this was indicated as "may" be used, later changed to "shall." The word planning itself was not used, given that planning had an unacceptable connotation at that time.



this second part was done in accordance with the support of both the secretary of Agriculture and of War, and most certainly the President as well. That second part called for action by the Federal and State governments to provide for:

“A special system of direct interregional highways, with all necessary connections through and around cities, designed to meet the requirements of the national defense in time of war and the needs of a growing peacetime traffic of longer range.”⁵

It presented a 26,700 mile system connecting the principal cities and regions of the country and proposed that it, “or a closely similar system be designated as the Primary Highway System of the United States.” Secretary of Agriculture Wallace, in his transmittal to the President, said that the report’s second part “presents the general outlines of what is in effect, a master highway plan for the nation,” and referred to the already planned-for cooperation with the States to refine the system. There is little doubt that this proposed network is the direct forerunner of the Interstate System. In response, by early April of 1941 the President established the National Interregional Highway Committee “to investigate the need for a limited system of national highways to improve the facilities now available for interregional travel.”⁶ As happened with *Toll Roads and Free Roads*, the Congress added its request for the same effort in 1943, but by then the war had intervened and the study was held in abeyance until 1944.

The Urban Focus of the Program

The General Motors Highway and Horizons exhibit, usually called Futurama, at the 1939 Worlds Fair in New York is often given credit as stimulating national interest in futuristic highways. While it did excite a great deal of attention at the Fair, and its designer, Norman Bel Geddes, was invited to the White House to present his show, the exhibit’s effect was more to provide support for planning that was already underway than to create a new idea. Bel Geddes’ book *Horizons* from 1932 may have had some influence on thinking about the future throughout the period.

It seems clear that the vision of MacDonald and Fairbank at BPR, and the President included strong recognition of the need to support urban transportation needs. One might even say that one of the weaknesses of *Toll Roads and Free Roads* was Chief MacDonald’s insistence on justifying the system on grounds of actual or forecasted demand. It therefore had a greater urban component than an interregional focus. The rural component was oriented to design and safety; capacity was a factor in only a few places. It could be said that his entire career he was not certain that there would ever be a major component of highway travel, in either passengers or freight that were truly long distance in character. A large part of *Toll Roads and Free Roads* used Baltimore as an example of blighted areas ill served by the road system. The need was seen not just to deliver travelers to the edge of the city but to provide direct access to the center both for commercial and later for defense purposes. Roads had to be consciously designed to replace the wandering paths that had been extended into the

⁵ Transmittal letter of President Roosevelt to the Congress, April 27, 1939; note the emphasis on defense

⁶ Message of the President to Congress, January 12, 1944



cities as rural roads were paved and became the major arteries of the city and now were overwhelmed by the city itself. The report saw the need to overcome the early expedient of road programs which was to pave pre-automotive roads from colonial times rather than to focus on what was needed now.

The additional key to understanding the urban approach in the building of the interstate is that the 30's in America was a bad time for cities. As part of federal response to the national depression, there grew up a great recognition of the need to address the challenges of the cities. This was only strengthened by the necessary further neglect of urban needs of the war years. The centerpiece of the government interest is exemplified in the study "Our Cities" a report to President Roosevelt by the Urbanism Committee of the National Resources Planning Committee, later Board. The committee included all of the main cabinet secretaries and WPA Administrator, Frederick A. Delano, President Roosevelt's uncle.

The Committee saw the rise of urban problems as a product of a tripling of population in cities in 40 years, resulting from the shift of population and commerce from rural areas to the cities, and an unprecedented rise in mobility, giving rise to metropolitan districts (what we would call today metropolitan areas) rather than distinct cities. Fourteen emerging problems were identified and 11 recommendations made.

The emerging problems cited can be summarized as large numbers of poorly housed people in unhealthy environments with crime, and poor government as additional factors. Transportation is cited as causing dislocations as American cities went from rivers to canals to railroads and now to the roadway and the airplane. Although the 11 recommendations do not single out transportation per se, they focus on better planning, better government, and more regulatory control. The report does contain reference to control and manipulating the existing transportation network to preserve or to reshape the existing national urban pattern and the urban community or region.

There was seen to be a need for quick response to urban needs because: a.) the need for roads for national defense and a growing peacetime need for longer trips; b.) cities at a critical point, needed to serve massive entering traffic to the centers; 3.) early action to support the acquisition by government of slum areas for renewal; 4.) sporadic development could hobble the logical projection of new arterials; and 5.) the decline of business districts in city centers -- had to rank first in needs. Next to the provision for providing safer and more efficient conduct of large traffic streams into and across cities the facilities most urgently required were belt-line roads (beltways today) around the larger cities and bypasses around many of the smaller cities and towns.

It is important to clarify here that while the "freeway revolt" against the Interstates in later years was premised on the lack of sensitivity of the process to urban needs, the original Interstate plans were deemed to be directly responsive to those needs and concerns. It was President Franklin Delano Roosevelt's sense, a view shared with the enlightened opinion of the day, that our cities had suffered from neglect in the depression and the war and that a major national slum clearance and improvement in housing was essential. Home ownership had plunged during the depression and the war years. Inadequate housing was considered a national disgrace. It must be recognized that many of the views in "Our Cities" had their genesis in the so-called "progressive era" with a bit of the prevalent socialist centralized



planning flavor, where it was believed that government, with good will and with sound data and analysis, could solve almost any problem.

Toll Roads

In 1935 a Federal WPA project⁷ authorized by the Pennsylvania State legislature, began surveying for a possible road to be built on a never used railroad alignment from Harrisburg to Pittsburgh. Based on the survey a commission was created in 1937 to build and operate the road and work began after federal grants and loans were arranged in 1938. The Pennsylvania Turnpike officially entered service in October of 1940, cutting travel times from Harrisburg and Pittsburgh by three hours, with usage almost twice the forecasted patronage reaching 10,000 vehicles per day. The Turnpike became a model of safety, design, concept, and finance that would have been quickly emulated elsewhere, but for the interruption of World War II.

After the opening of the Pennsylvania Turnpike several states began consideration of toll roads. The legislature of Maine created an authority in 1941 to undertake such a system, which had to be placed in abeyance until 1946 when work could begin. Unlike the Pennsylvania facility the Maine Turnpike had difficult financial sledding in its early years.

The Turnpike Era⁸

Facility	Year first Opened	Miles
<i>Pennsylvania Turnpike</i>	<i>1940</i>	<i>531 miles</i>
<i>Maine Turnpike</i>	<i>1947</i>	<i>109 miles</i>
<i>New Jersey</i>	<i>1952</i>	<i>122 miles</i>
<i>New York Thruway</i>	<i>1954</i>	<i>641 miles</i>
<i>Ohio Turnpike</i>	<i>1955</i>	<i>241 miles</i>
<i>Indiana Toll Road</i>	<i>1956</i>	<i>157 miles</i>
<i>Kansas Turnpike</i>	<i>1956</i>	<i>236 miles</i>
<i>Sunshine State Pkwy Florida</i>	<i>1957</i>	<i>110 miles</i>
<i>Mass Turnpike</i>	<i>1957</i>	<i>138 miles</i>
<i>Connecticut</i>	<i>1958</i>	<i>129 miles</i>

Kentucky provides an interesting case in which at one point the State had ten toll roads comprising the largest toll road system in America, built to supplement the Interstate. All but two of the roads have had the tolls removed so far as bonds were paid off.

After extensive debate the 1956 Act in Section 113(a) provided a mechanism by which existing toll roads could be incorporated into the Interstate System if design standards could be met and the roads contributed to an integrated system. This avoided costly potential

⁷ *Works Projects Administration*; an anti-depression job creating agency

⁸ All Mileages were not in place at date of opening; only those miles in place preceding the 1956 Act were recognized as eligible for reimbursement.



duplication and reduced the overall costs considerably. It also required the States to drop tolls once the bonds had been paid (this was later rescinded in the eighties). In 1957, the BPR announced that it had added 2,100 miles of toll roads in 15 States to the Interstate System. The inclusions had been recommended by the State highway departments and approved by the BPR. The additions included 1,837 miles in operation. A BPR press release explained that "inclusion of the 2,102 miles of toll roads in the Interstate System will not affect their status as toll roads. The Federal-Aid Highway Act of 1956 permits this, although no Federal-aid funds may be used for their improvement." The press release identified the facilities and their mileages.

The Act also avoided addressing the question of reimbursing states for their previous investments. A study was called for in the legislation but resolution in the form of State reimbursement did not come until ISTEA in 1991.⁹

The substantial development of toll roads in the East and Midwest after the War, has led some to believe that had the interstate approach not been adopted the nation today would have a national network of toll roads. While toll roads would probably have been more extensive than they are; it appears clear that a national network would have been unlikely to arise. In particular crossing the Plains and the Rockies would have been extremely difficult to accomplish. (It has been noted that almost all if not all the toll roads developed were those identified in *Toll Roads and Free Roads*, as feasible.) Such a system that evolved might have tended to further accentuate the East's commercial advantages over the South and the West rather than abetting the significant national population and business redistribution that has occurred. Today, the 46,730-mile Interstate System includes approximately 2,900 miles of turnpikes.

The Plan

As World War II neared its close, the vision expressed in *Toll Roads and Free Roads* re-emerged and the work on interregional highways approached a conclusion. In a report that evaluated various network alternatives based on population, vehicles, agricultural output, manufacturing output, military needs and existing travel a system of 33,920 miles with an additional almost 5,000 miles of urban roadway to be specified later was recommended.

The study requested by both the President and Congress from the National Interregional Highway Committee was released in January 1943, called *Interregional Highways*, is credited by many as the most important document in the history of America's Highways. The document begins where *Toll Roads and Free Roads* ended. It took the original Roosevelt map as tested at 14,200 miles and the recommended network from that report of about 26,900 miles (expanded later to about 29,300 miles by BPR) and added a range of other alternative networks up to one encompassing almost 80,000 miles, for testing. The goal, as succinctly stated in the Introduction to the report, was:

To incorporate within each of the several mileage limits adopted, those principal highway routes which would reach to all sections of the country, form within themselves a complete

⁹ Interstate Highway System is 40 Years Old; Richard Weingroff, *Public Roads*, Summer 1996.



network, and jointly attract and adequately serve a greater traffic volume than any other system of equal extent and condition.

Two findings expressed immediately in the Introduction having to do with the urban side of the need and the federal role, bear repeating here:

On cities:

All facts available to the Committee point to the sections of the recommended system within and in the environs of the larger cities and metropolitan areas as at once the most important in traffic service and least adequate in their present state of improvement. These sections include routes around as well as into and through the urban areas. If priority of improvement within the system be determined by either the magnitude of benefits resulting or the urgency of the need, it is to these sections that first attention should be accorded.

On the Federal Role:

The Committee believes it would be a mistake to regard the interregional system as an object of exclusive attention, even by the Federal Government, or to concentrate upon it all or a disproportionate part of any effort and funds that may be applied to highway improvement. The Federal Government has substantial interests in many other roads and possibly other city arteries. Its assistance should not be confined to the routes included in the recommended limited system.

Nevertheless, it is important, both locally and nationally, to recognize this recommended system and the routes that comprise it for what they are – as that system and those routes which best and most directly join region with region and major city with major city.

The Committee set about testing the various alternative networks against an array of quantitative criteria, much of which had been developed by the State Planning Surveys.

The Recommended System

- With a total length of 33,920 miles it represents 1.04% of the 3,267,717 miles of rural roads and urban streets in the United States including: 29,450 miles of rural roads .99% of rural roads; and, 4,470 miles of urban sections, 1.48% of urban streets.
- The system connects directly all cities of 300,000 or more population. It is the smallest system that provides these connections.
- It reaches 59 of the 62 cities of population between 100,000 and 300,000 persons, and is superior in this respect to the larger systems previously tested.
- The recommended system reaches directly only 82 of the 107 cities of population between 50,000 and 100,000. The larger systems tested are little superior. It would take a system of almost 100,000 miles to reach them all.



Various Network Tests of Interregional Highways

CRITERION	RECOMMENDED SYSTEM	NOTES
Access to Population	Smallest system to reach all cities over 300,000	Ranges of population were tested down to 10,000
Manufacturing Value Added	55% of all cities over 10,000 with 83% of total mfg. VA in the country	Very similar to population: to reach 100% of VA would require a 92,900 mile system
Agricultural Production	34.3% of counties with 43% of agricultural value	1056 of the nation's 3,076 counties are on system; largest system reaches below 70%
Motor Vehicles	18.7 vehicles sq. mi. in counties traversed vs. 5.5 for other counties	One vehicle per 3.9 persons in counties traversed vs. 4.5 for other counties
Areas of Prospective Post-War unemployment	Fortunate location in areas where expected unemployment exists	Based on employment increase. Expected that construction would soften loss of war time employment
Relation to Strategic Network	Given its extent the system conforms closely to Strategic Network	In total war the entire system has a role in the Strategic Network
Relation to War Industries	the close proximity to the great majority of war establishments indicates it will serve well	The system discharged its war duties well
Relation to Traffic	Total rural VMT on routes close to the system was 78 million per day, 16% of all rural VMT	Similar urban not possible.
Relation to Topography	Influenced in few places by topography	

The study had determined from State Surveys that about 85% of all trips had trip lengths below 20 miles, with only about 5% greater than 50 miles. They also examined flow patterns of both passenger and truck traffic in a sample of states selected from each region and ascertained that 50% of traffic had both its origin and destination in cities, about 37% had one or the other end in a city and only about 14% had neither origin nor destination in a city. Specifically, 75% of truck movements were intrastate in character, with 20% crossing a state line, and less than 5% traversing a state (i.e. involving more than two states). The Inter-state and trans-state flows had the greatest orientation to cities at their ends. They constructed a "zone of influence" around cities which varied from 35 miles for cities over 3 million to 6 miles for areas of 10,000 to 25,000 and then determined that 24% of the system was within these zones.

Their belief was that a small system would have low average volumes due to lack of access and that a very large system would also have limited volumes because of being too wide-



spread and so sought that system with the maximum average volume. This led to identifying additional tested networks in 3,000 mile increments near the tested system of 29,300 miles. By this means they identified that the 33,920 mile system recommended had the maximum average daily traffic of almost 2,600 on rural sections. It was established in their view that this volume would be greater than any other system either more or less extensive.¹⁰ In its conclusions the Committee indicated that the additional metropolitan miles required would need to be ascertained by detailed study so an estimated 5,000 miles were added to their recommendation to yield about 39,000 miles.

The legislative process in 1944 was unable to agree on many things regarding national transportation needs and tended to produce a status quo Act. But Section 7 of the Federal-Aid Highway Act in December of 1944 authorized a 40,000 mile system of Interstate roads to be selected by joint action with the States:

“so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers, to serve the national defense, and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico.”

The report had provided an extensive consideration of the scale of the program in terms of the actual dollar requirements and as a share of the total economy. The expected impacts on the reemployment of manpower in a postwar environment were also considered. Although no separate funding was provided the highway agency now called the PRA, Public Roads Administration, began to interact with the states regarding selection of routes and design standards. The standards, established in August 1945, were not the uniform standards seen in the eventual Interstate System but called for uniformity where conditions were similar.¹¹

Interregional Highways, with its profound and sophisticated treatment of the problems challenging the nation had won the day, but it was to be more than another 10 years for the plan to really get underway.

The Funding Mechanism

The Interstate System identified by Congress in 1944 made little progress until a dramatic series of studies and Commissions created by President Eisenhower stimulated the earnest inauguration of the program to create the system. It was Eisenhower's genius for organization in getting a job done along with some very creative and visionary members of the Congress who dedicated all federal fuel user fees to highways and established the Highway Trust Fund into which they would be deposited. Without that funding mechanism the system would probably never have come about.

The President had worked hard to bring the day about. Since the armistice in Korea his strong focus had been on moving the highway program ahead. In his State of the Union addresses in 1954, 55, and 56 he had earnestly called for the start of the program

¹⁰ *Interregional Highways*, pg. 49

¹¹ Interstate Highway System is 40 Years Old; Richard Weingroff, *Public Roads*, Summer 1996.



1954 – *So that maximum progress can be made to overcome present inadequacies in the Interstate Highway System, we must continue the federal gasoline tax at two cents per gallon. This will require cancellation of the ½ cent decrease which otherwise will become effective April 1st, and will maintain revenues so that an expanded highway program can be undertaken.*

1955 – *A modern efficient highway system is essential to meet the needs of our growing population, our expanding economy, and our national security. We are accelerating our highway improvement program as rapidly as possible under existing State and Federal laws and authorizations. However, this effort will not in itself assure our people of an adequate highway system.*

1956 – *If we are ever to solve our mounting traffic problem, the whole interstate system must be authorized as one project, to be completed approximately within the specified time. Only in this way can industry efficiently gear itself to the job ahead. Only in this way can the required planning and engineering be accomplished without the confusion and waste unavoidable in a piecemeal approach. ... As in the case of other pressing problems, there must be an adequate plan of financing.*

The Commissions

President Eisenhower had actually established three groups to work on the plan. The best known was the Presidents Advisory Committee for a National Highway Program, known as the Clay Committee¹²; a second was a group of federal agency¹³ heads and a third consisted of State Governors¹⁴, established at the President's request transmitted to them via Vice President Nixon. The Governors formed a body "to study both the problem and methods by which the Federal Government might assist States in its solution." Their report, *A Cooperative Program for Highway Construction*, fundamentally saw the program need as a federal responsibility. The Clay Committee, amply supported by a series of Needs Studies and other research mandated in 1954, conducted hearings with industry, took into account the reports of the other Committees and presented their report to the President and the Congress. While there was broad spread agreement on the problem and the goal the financing plan as proposed by the Clay Committee did not meet acceptance. It did establish the base for discussions that were ultimately successful.

The program proposal transmitted by the President to the Congress in 1955 called for a federal corporation to issue bonds to be paid off by the federal gas tax and other fees. The program failed amid disagreement about the costs of debt financing on the one hand and objections of users to the fairness of the costs they would be asked to bear. Resolution came finally in 1956 with two important breakthroughs. The first was the shift in willingness of users

¹² Chaired by General Lucius D. Clay and including Steven Bechtel, David Beck, S. Sloan Colt, William Roberts. Francis Turner served as Secretary of the Committee

¹³ including Bureau of the Budget, the Council of Economic Advisors and Departments of Treasury, Defense, Commerce and Agriculture

¹⁴ The Governors created a special 7 man Highway Committee with Governor Koehler of Wisconsin as Chair



to take on the costs involved,¹⁵ and this was largely based on the second breakthrough, the creation of a trust fund to which fuel taxes would be credited and assured that they would be dedicated to the program. Up until that time only a portion of federal fuel fees had been returned to the States. Previous objections of the State Governors to the continuation of the federal fuel tax disappeared once it was clear that all funds would be dedicated to the program. Within 13 days of the President's approval of the Act the standards for improvement of the Interstate were adopted by AASHTO and approved by BPR.

Another factor that added support was the preparation of the so-called "Yellow Book" which laid out more clearly the road plans for the nation's major metropolitan areas giving legislators and urban advocates a better sense of what they would be receiving. Intended by BPR as a guide for their own purposes it became almost an urban plan bible in the Congress.

Many, including the President had a great sense for the potential need and the potential opportunity. In his transmittal to the Congress, the President had cited four key areas in his justification of the program.

- Accidents and Deaths – 36,000 fatalities at a cost of \$4.3 billion per year
- Costs of Poor Roads – estimated at 1cent per mile of travel equal to \$5 billion per year
- National Security –serving military movements and evacuation of urban populations as a critical need
- National Economic Activity – dramatic economic growth creating congestion beyond any present experience

In fact the economic explosion that occurred far exceeded the very optimistic forecasts made for the nation at the time. Instead of an increase to 180 million in population by 1965 they got 194 million; instead of a 50% increase in vehicles to 81 million they got over 90 million; and a VMT of 888 billion instead of an expected 814 billion.

The Exhibit below shows some of the other prodigious transportation related changes of the period and how they overwhelmed the forecasts.

What the Country Expected and what it Got

Measure	Actual 1956	Expected 1965	Actual 1965	% chg Expected	% chg Actual
Pop millions	169	180	194	7%	15%
Vehicles millions	54	81	90.3	50%	67%
VMT Billions	628	814	888	30%	41%
GDP billions	357	500	720	40%	102%

¹⁵ Part of this was resolved by including a study of costs caused by classes of vehicles in the legislation, Richard Weingroff, Moving the Goods, Draft Paper, FHWA



In addition to the dramatic challenges implied in these numbers there were two other goals that guided the Presidents dedication to the Interstate concept: one was safety, the need to improve on a dismal fatality record was great; The effectiveness of that response can be gauged by the fact that the President cited 36,000 fatalities in 1954 and it has only risen by about 6,000-7,000 in the fifty years since. Second, the importance of a national intercity network to serve military mobilization needs, and an urban network to permit major evacuations in a prospective nuclear conflict was strongly a factor in most leaders' minds in that period.

Since 1965 the prodigious growth has continued with a nation with 120 million more people, 150 million more vehicles and approximately five times the economic output as that planned for in the Interstate System; and all of it dramatically redistributed across the nation.

What We Have Today

Measure	1965 Design Year	2006
Pop millions	180	300
Vehicles millions	81	237
VMT billions	814	3,000
Fatalities	36,000+	42,600
GDP billions	\$500	\$13,000+



The National Highway System (NHS)

Background

The NHS had its most recent origins in the various efforts in the late 1980's to develop a post-Interstate surface transportation program. The Interstate System was essentially complete and mere reauthorization of the other program elements was not a meaningful option. The US Primary program had lost its relevance, as a large number of US numbered primary routes were not on the federal-aid Primary system and many routes on the official Primary system were not signed as Primary routes. The Interstate Program had changed the concept and the actuality of what was the nation's primary program. An internal FHWA study found that no state was using the US Primary system as a basis for highway investment.

The Secondary and Urban system programs while popular with their constituencies carried a lot of administrative baggage and the federal government had for some time been trying to convert them to block grants to the states with minimal federal oversight or restrictions.

Backing up 80 years

The concept of a national highway system can be considered to begin with attempts to overcome the flawed original approach to federal-aid enacted by the Congress in 1916. The Federal Aid Road Act of 1916 made federal-aid available to the states, one-third according to area, one-third according to population and one-third according to post road mileage. Places of more than 2500 population were not eligible for assistance. There were no system requirements. In October 1918 after only two years experience *Engineering News Record* observed that the projects already approved were so scattered that they could never be connected into a workable national system.

The Federal Highway Act of November 9, 1921 made an attempt to overcome the 1916 Act problems by providing that future federal-aid be limited to seven percent of a state's roads with the "system" to be designated in a federal/state cooperative process to ensure, in particular, connectivity at state lines. Three-sevenths of the system was to be "interstate in character". Based on a certification by each state of its public road mileage, the national total came to 2,859,575 miles. The maximum extent of the seven percent Federal-aid system was thereby fixed at 200,170 miles with the "interstate in character" portion limited to 86,787 miles.

Federal-aid advances

Throughout the 1920s and 1930s the cooperative federal/state process worked to build a paved highway system that provided national connectivity and it also got the farmers out of the mud. Elsewhere in this report the evolution of the Interstate Highway System beginning with a study in the 1930s is covered. The impending successful completion of the Interstate System in the 1980s reopened the debate about a national highway system. Most observers



believed that while the Interstate Highway System was a premier national highway system, it did not totally define the federal interest. During the period of Interstate System construction there were suggestions for the development of a “second tier” Interstate system and a junior Interstate system, but these never received serious consideration by an administration or Congress.

The Concept of a National Highway System

The NHS has a number of conceptual underpinnings. Not in any particular order of significance, there was the desire for the future federal-aid program to provide a means to “grow” the Interstate System. A number of states had corridors that they wanted to eventually add to the Interstate System when completed to Interstate standards and they needed a federal program structure with a source of revenue to accomplish it. Most all the interest groups and the Congress had decided that it was time to conclude the Interstate Program. The “Cost to Complete” financial system which served very well in the early years had become cumbersome, costly, and political when used to bring the system to completion.

In addition there were a number of states that had developed highway investment programs that had been politically brokered and enacted through their state legislatures, were system based, and had specific time frames for accomplishment and revenues sources to permit their accomplishment. A number of these state systems drew on US Primary System funds for a portion of their finances and wanted the post-Interstate federal-aid program to have a source of funds for similar purposes. One characteristic of these state investment systems, many of which had the word “development” in their title, was that they were limited in mileage, constituting only 10 to 20 percent of their state’s Primary system. They generally had a rural focus and were laid out to provide good quality four-lane, but not limited access, roads to most areas of the state with an emphasis on those areas not served by the Interstate System.

Lastly, there was a desire, particularly at the federal level to stratify any future federal-aid into a) those programs where there was a strong federal interest in leveraging the federal investment because of national purposes served and, b) those programs, fully commendable and worthy, but where the priorities and benefits were more state and locally oriented. The rationale for this split was the recognition that federal-aid funds carried with them a significant burden of federal requirements. The federal-aid program had been relatively successful in reducing the administrative burden relating to engineering and accounting oversight, but had been much less successful in reducing the administrative burden associated with the series of requirements that fall under the general umbrella of environment. No one was arguing to change or reduce the environmental standards, but rather the multiple layers of federal and state administering bureaucracies and the many overlapping federal and state laws and regulations were by their very nature greatly increasing project development time and costs. By stratifying the program structure by level of federal interest it was intended that a mechanism would be created for stratifying the federal oversight. The HUD Community Development Block Grant (CDBG) was the model followed. Under CDBG county and municipal governments are responsible for carrying out the federal environmental requirements while still being subject to federal review, but not step-by-step approval and federal judicial oversight.



While the arguments noted above relate to the structure of a national federal/state cooperative highway program, an equally important series of arguments were developed relating to the importance of roads to the national economy, international economic competitiveness, road safety, freight mobility, national defense, and travel and tourism. Equally as important was the recognition that since the start of the federal-aid program, federal resources had always served to stimulate the development of higher order principal arterial facilities. These served the longer distance interstate trips, and a high percentage of freight shipments. Federal resources had also encouraged higher standard (freeway) facilities that were more productive in terms of speed and capacity and were safer.

The AASHTO Task Force

On April 30, 1985, the AASHTO Task Force on Future Directions for the Federal-Aid Highway Program issued a report with 45 recommendations. One of those recommendations was to establish a "System of Highways of National Significance" to consist of the Interstate System, the Federal-aid Primary and bridges on all current Federal-aid systems. This AASHTO effort led to the establishment of a broad coalition to pursue the development of post-Interstate surface transportation concepts reflecting broad national interests.

The Broad Coalition

In the 1980s, the Highway Users Federation, under the leadership of its Executive Director, Lester Lamm, helped organize a coalition of groups interested in the reauthorization of the post-Interstate highway and transit programs. This effort, under the immediate direction of Steve Lockwood was not limited to the traditional highway oriented interests such as ARTBA, AGC, AASHTO, AAA, ATA, etc., but also included transit, environmental, biking, tourist, and recreation interests. The tent was very large and the promise was that there would be something in the reauthorization for everyone.

The FHWA Futures Group

As the non-federal effort got underway Richard Morgan, FHWA, Executive Director, initiated a staff effort under the leadership of Anthony Kane, FHWA's Director of the Office of Policy, to look broadly at the issues relating the surface transportation reauthorization with emphasis on the highway program. Morgan's charge was very broad and included the mandate that the group not assume any future federal-aid highway program if that is what the studies indicated, given that the Interstate Program was coming to a successful conclusion.

While the Future's Group appointed by Morgan had fewer than ten members a much larger number of FHWA staff from throughout the agency became involved. A series of studies was commissioned. At the core was a classic planning study involving inventories, forecasts, alternatives and analysis. In addition, topics such as freight, safety, transit use, federal lands



programs and highway operations were also studied. The end result was a series of white papers that formed the basis for the FHWA recommendation to the Secretary of Transportation for highway reauthorization. One key finding was a proposal for a national highway system.

The Competing Urban Concept

The urban, transit, and environmental interests, generally working under umbrella of the Surface Transportation Policy Project (STPP), had a different perspective when it came to urban areas. STPP believed that funds for highway and transit projects in metropolitan areas should be made available to Metropolitan Planning Organizations (MPOs) rather than state DOT's. Their concern was not about system, but about who decides on the allocation of resources. The underlying thinking leaned to the more presumably transit friendly MPOs rather than, again presumably, the highway friendly state DOTs. Congress very late in the enactment process sided with the Administration and opted for the national highway system administrated through the states.

The Mapping of a System

In early 1989, FHWA and AASHTO agreed to undertake a joint effort to define and map a national highway system that would be a major element in a post- Interstate highway program. There were two basic questions to be addressed. The first question was what should be the mileage or extent of such a system and the second was how the mileage should be distributed among the states on an equitable basis. The basic planning tool for dealing with highway systems is functional classification. In this process every link or segment in the existing system is classified by function: freeways and expressways, other principal arterials, major arterials, minor arterials, collectors and local streets. Every state had functionally classified their state roadways a number of times, including several national exercises associated with congressionally mandated highway needs studies in the pre-Highway Performance Monitoring (HPMS) days. FHWA had used the results of these studies for various purposes and determined that they would need to be updated. The problem was that the published guidelines permitted ranges of mileages, expressed in percents, for placing roads in a particular functional class.

The public road systems of the states can be placed into three broad categories, relating to density, expressed as miles of road per square mile of land area. On the high end there are the plains states with section line road systems that provided a lot of coverage and high density road systems. At the low density end there are the mountain and desert states with low rural populations and very lean highway systems. In the middle is the remainder of the states with road systems originally developed to serve modest size farms.

FHWA and AASHTO agreed to undertake a new national functional classification using narrower standards so that like states would have similar results in the principal arterial systems from which any national system would be drawn. Bob Gorman of FHWA developed a functional classification approach that recognized the differing characteristics of the states and narrowed the flexibility allowed in assigning percentages of roads in each functional class.



The results were then used to consider what a final system might look like. Congress was aware of this effort and on May 23, 1990 wrote to then FHWA Administrator Thomas D. Larson, asking the results of the Task Force effort be submitted to the Congress to assist them as they worked on post-Interstate legislation. Since the informal planning efforts were now to result in a report to Congress, the federal Office of Management and Budget staff became involved and an agreement was reached that rather than attempt to develop a single proposal, the effort should test three different mileage levels.

- Option 1: 120,000 miles
- Option 2: 150,000 miles
- Option 3: greater than 150,000 miles

Option 3 would be at the discretion of the individual states.

Within each option the Interstate System and STRANET, the system important for military purposes, were considered to be givens. The OMB staff recommendation to include options proved to be a very useful as is added a great deal of information to the exercise. The option 2 mileage of 150,000 had been the presumed outcome for the system's extent based on an extrapolation of the mileage of the systems in those states with formal arterial investment systems.

This exercise in which the states had the opportunity to submit three systems resulted in an extensive, cooperative, state/ local effort followed by extensive negotiations. The negotiations were between FHWA and the states and FHWA and OMB. The immediate result of the exercise was to demonstrate that the 120,000 mile system was not workable. In many instances western mountain and desert states did not have sufficient mileage to provide connectivity at state lines and had large land areas with no NHS access. In a telling presentation at a Senate field hearing in Montana, Senator Max Baucus (D-MT) and Secretary Pena heard that there were a number of areas the size of Rhode Island that had no NHS coverage.

FHWA and OMB agreed that the 120,000 system was not workable and FHWA and the states began negotiations about what constituted an equitable system that provided adequate coverage for a national system. FHWA immediately accepted any routes where a state demonstrated that they were seriously investing. Under FHWA Administrator Thomas Larsen's leadership FHWA had been promoting the NHS as the basis for state/federal partnership in transportation investment.

Adding mileage to the 120,000 mile Option 1 was not a difficult problem. Any state that was investing in a principal arterial highway route that did not make the mileage limitation of Option 1, or any state that needed additional mileage to establish a link to an adjacent state's system for connectivity, was provided the mileage without question.

The problem came with those states that wanted additional mileage based on their assumption that system mileage would enter the apportionment formula, or even more optimistically, that the system would be enacted as a cost to complete system and thus they wanted to enter the process with maximum mileage. FHWA conducted extended negotiations with those states and basically held to the criteria of connectivity and demonstrated



investment. A number of routes were advanced through the Congress, but in a somewhat unique display of cooperation, the Congress did not advocate/support routes that did not have Administration/FHWA support.

The net result was a system of about 155,000 miles. The map of this system came to be known as the "Illustrative System" and it was submitted to the Congress in February 1991 to illustrate the NHS concept that was part of the Administration reauthorization proposal.

When the Intermodal Surface Transportation Efficiency Act (ISTEA) was enacted in December 1991, the NHS was included. The legislation required that FHWA formally work with the states to define a NHS of 155,000 miles plus or minus 15 percent and submit it to Congress by December 18, 1993 for formal Congressional approval.

The Act stated that:

"The purpose of the National Highway System is to provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, ports, airports, public transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and regional travel."

The system was to include:

- The Interstate System
- STRANET (Strategic Corridor Highway Network)
- Other selected principal arterials
- Connectors to major military installations
- 21 High Priority Corridors identified in the Act

FHWA and the States joined now by the MPOs followed up on the passage of ISTEA and agreed on the designation of routes in metropolitan areas. These had not been included in the illustrative system. The recommended NHS in metropolitan areas was transmitted to Congress on February 4, 1994 in a series of maps. FHWA also worked with the states to define the intermodal connectors that had not been a part of the original exercise.

The next step was getting the system through the Congress. The House focused on demos, but the Senate became seriously engaged in the designation of the system. The bottom line was that no routes were congressionally mandated, that FHWA had not already agreed to. The one route that came into internal debate within FHWA was the Alaska pipeline haul road. FHWA determined that it had national significance and deserved designation although there were traffic restrictions on it. Thus a process that had planning, policy, political ramifications many players and many differing perspectives appears to have worked.

Congress did not get involved to any serious degree in designating the routes on the system, but the debate itself was lengthy and contentious. Demo projects came into the picture. The Act had many and debate revolved around who would approve future changes in the system. The Administration wanted the Secretary to have the authority, to modify the system, in



cooperation with the states and MPOs, as had always been the case with highway systems. The House wanted the Congress to approve changes in a move that appeared to set up a process whereby the Congress would have a continuing basis for approving new demos. The abolishment of the 55-mile per hour national speed limit also became a contentious element.

After much delay and debate, Congress agreed to the Secretary's approving system changes and it abolished the national speed limit. A number of demos were also included in the bill. Congress enacted the NHS Designation Act and the President signed it on November 28, 1995.

There was one issue hanging loose and that was that the intermodal interests were unhappy with the intermodal connectors delineated in the process to date. FHWA had worked with the states, but clearly some states had taken the efforts more seriously than others. The designation act required that FHWA and the states work together to provide a more comprehensive analysis of the intermodal connectors. FHWA was to provide a report to Congress within 180 days that provided a complete definition/designation of connectors. This requirement was met and the initial designation of the NHS was complete.

Jumping ahead, to date, no one has answered the question of whether the billions of dollars made available for the NHS under, ISTEA, TEA-21, and SAFETEA-LU made a difference to the Interstate System. Have the states used the NHS resource to "grow" the Interstate in terms of length and lane miles. To get at an answer we have taken a quick look at federal-aid and Interstate System mileage.

Federal-aid System Mileage

As noted above, the Federal-aid Highway Act of 1916 made all rural roads eligible for federal assistance. A 1914 national inventory showed that there were 2,445,760 miles in this category. Thus, in 1916, we had the largest mileage of federal-aid system ever in the history of the federal-aid program as all roads were eligible for federal-aid. Also, as noted above, Congress in 1921 amended the program to make only seven percent of the mileage of rural highways eligible for federal assistance. Based on the then mileage of roads the federal-aid system was fixed at 200,170 miles, all rural and generally referred to as the seven percent system. But the seven percent system had two parts. There was a three percent system "interstate" in character which in time came to be referred to as the Primary system. The second part consisted of an additional increment of four percent of roads that were all rural and not interstate in character that in time became to be called the Secondary system. Thus we had from 1921, forerunner of the Primary system providing a paved national system and the forerunner of the Secondary system getting the farmers out of the mud. During the Depression additional roads were made eligible for works relief projects and during WW II roads important to national defense became eligible.

The 1944 Highway Act made extensions of the US Primary system passing through metropolitan areas eligible for federal assistance opening the highway program to urban areas for the first time, except for some short-lived Depression era work relief efforts.



Finally, the urban system which originated with the 1973 Highway Act, made urban roads that were not extensions of rural Primary routes and not part of the Interstate System, eligible for federal assistance.

Highway Statistics for 1990, just prior to revisions brought about by ISTEA show the following federal-aid mileage totals:

Interstate System	45,074
Other Primary System	259,650
Secondary System	399,872
Urban System	148, 266

Total federal-aid system.....	852,862

Interstate Highway System Mileage

To understand the Interstate System as we know it today and to consider how it might be extended, it is helpful to look at how we arrived at the present system. We stand 67 years after the first report to Congress, 61 years after the first cooperatively developed map of the system was prepared, 50 years after enactment of the system, and 16 years after the basic completion of the system. Expressed another way it is 16 years since the passage of ISTEA - often described as the post-Interstate highway program.

Expanding on this summary, the major milestones in the designation of the Interstate system were:

- 1939 - Toll Roads and Free Roads Report – recommended a 26,700 mile interregional superhighway, non-toll network.
- 1944 - Interregional Highways Report - recommended a network with high standards of design and full control of access comprised of 33,900 rural miles plus 5,000 miles of auxiliary urban miles or a total of 38,900 miles.
- 1944 - Federal-Aid Highway Act - directed the designation of a “National System of Interstate Highways” of 40,000 miles.
- August 2, 1947 – General location of main routes of Interstate System of 37,700 miles announced including 2,900 miles in urban areas with the remaining miles reserved for auxiliary urban routes.
- Federal-aid Act of 1956 – set the systems length at 41,000 miles. Congress did not legislate a map, but a map developed cooperatively by BPR and the states was widely available. In September 1955 BPR published a “yellow” book which included maps of the BPR and state agreed to urban routes.



- 1968 - Federal Aid Highway Act – authorized a ceiling of 42,500 miles and allowed the addition of other miles of highway meeting Interstate standards to be added to the system without charge to mileage limitations.
- 1968 - P.L. 90-238 (Howard-Cramer Mileage) – provided for the addition of up to 200 miles for modification or revisions to the system
- 1973 – Howard-Cramer Amendment increased Interstate mileage by 500 miles.
- 1973 - Highway Act allowed withdrawal of Interstate routes and the use of the funds for transit, freeing up mileage. The withdrawn mileage was available for reallocation.
- 1976 - Highway Act made it possible to withdraw urban Interstate routes and to use the funds for other Interstate highways as well as transit with the amount of dollars available limited to the Interstate Cost Estimate value of the withdrawn routes.
- 1982 - Surface Transportation Act extended the withdrawal provisions to rural areas.

The series of provisions cited above in the early stages reflected serious attempts to get right the extent/length and coverage of the system. The 1973 Act which many viewed as “busting the trust” by making trust funds available for transit was viewed by a majority in Congress as providing flexibility as it became clear that all 41,000 miles developed in a mapping exercise were not necessarily the right miles or modes and that some relief was needed. These interests also believed that if serious study showed that other options provided a better solution was available, they should have the option of going for an alternate solution and not lose the funds that the cost to complete financing would otherwise provide.

What is remarkable is that out of the 42,500 authorized cost-to-complete miles existing in 1973 only 343 miles, urban and rural, or 0.8 percent of the system, were ultimately withdrawn. Just as remarkable is the fact that in the entire interstate program only one rural route, 23 miles of I-95 through Princeton, New Jersey, was withdrawn.

The importance of the flexibility feature is, however, borne out by the fact that 21 states took advantage of the provision by withdrawing 50 segments. The states ranged from Massachusetts to Iowa, with New Jersey withdrawing three urban and the only rural segment.

A footnote to this history is the fact that eight routes in seven states that were added pursuant to the mileage addition of 1968 Act were never built and were subsequently withdrawn and substituted for under the 1973 Act provisions.



Funding Sources of Today's Interstate System Mileage

There are four principal ways the mileage was funded:

1. Cost estimate based allocations
2. Toll road mileage brought into the system without charge to the Cost Estimate
3. Mileage built using state or non-Interstate federal-aid apportioned funds and added to the system when they were complete. (Section 139(a) recodified as Section 103(c)(4)(A)), (Section 1105 of ISTEA identified future Interstate corridors, but did not provide funding)
4. Mileage in Alaska and Puerto Rico considered part of the Interstate System to establish eligibility for the use of 4R funds, but not required to meet Interstate Standards

The mileage associated with each of the three provisions is:

1. Cost estimate.....40,562
2. Original Toll Roads..... 2,232
3. Sec. 139(a) & ISTEA 1105.....2,591
4. Alaska and Puerto Rico.....1,333

Total.....	46,718
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There are very minor discrepancies in the table above, but that is because the system continues to change through re-measurement and additions in Category 3. It should also be noted that Category 3 mileage includes 563 miles of toll roads over and above the 2,232 miles that were incorporated into the original system. The system mileage has been very much a moving target. It is made up of the original system mileage, congressionally approved additional mileage, withdrawals and substitutions, re-measurements, state funded additions, and congressionally mandated route specific changes.

Interstate Highway System Politics

Looking back fifty years, the development of the Interstate Highway System Program and the designation/ mapping of the system were remarkably free of politics in the negative sense of the word, but fully reflective of the give and take of our remarkable political system. A series of Administrations recommended, Congress debated and after twenty years, in 1956, a remarkably successful program resulted. Congress continued its oversight after enactment and passed a number of amendments that provided needed administrative flexibility and served to ensure equity among the states.

Following the 1973 Highway Act that allowed withdrawal of Interstate System segments and the use of the funds for alternative improvements, administration of the program became more difficult. The actual highways to transit substitutions were straightforward. However, Congress, while setting deadlines, also took a number of actions to extend deadlines, put additional items in the Cost Estimates, or to directly mandate funding of additions to the system. In ISTEA the Congress set hard and fast limits on Cost-to-Complete mileage and funding and the initial Interstate construction era came to a close.



The Interstate System since ISTEA

At the time of passage of ISTEA in 1991, the mileage of the Interstate System stood (As reported in 1990 *Highway Statistics*) at 45,074 miles, including the Alaska and Puerto Rico mileage as of that date. Thus, if we accept 46,718 miles as the current Interstate System mileage, the system has grown by 1,644 miles since ISTEA. Interstate System statistics show that 255 of those miles were cost-to-complete sections being finished, leaving 1,389 or roughly 87 new miles or 0.19 percent per year. These statistics are, however, very misleading. Since ISTEA, the only way to extend the Interstate has been to reclassify existing mileage or build new mileage to Interstate standards. Since ISTEA there have been 45 additions in 18 states. It has not been possible to evaluate each of the additions as yet, but it appears that many are reclassification of existing mileage rather than new capacity. For sake of argument let us presume that half the mileage is new capacity and that the Interstate is growing at 45 miles per year or 0.1 percent per year. This translates to one about one mile of Interstate per state per year.

Lane-miles are growing at more than twice the rate of center-line miles or 0.5 percent per year as reported in the recently published 2004 *Conditions and Performance*, Report to Congress. Rounding up, it works out to 20 lane-miles per state per year. Some portion of these lane-miles are due to reclassification and allowing for that it can be roughly estimated that the Interstate is growing at 16 lane-miles per state per year.

National statistics can be and in this instance are misleading. Looking at the distribution of growth in Interstate miles, it is seen that it is very concentrated. Since ISTEA, or in the last 15 years, 18 states have added 42 routes to their Interstate Systems. The routes total just over 1,300 miles. However, 60 percent of the mileage of these additions is in just 4 states, Illinois, North Carolina, New York, and Pennsylvania. Thus we have four states growing their Interstates significantly, 14 other to a modest extent and 32 states, not involved in expanding their Interstate System mileage at all.

The I-4R Program and its Role in Interstate System Expansion

After older sections of the Interstate System began exhibiting serious deterioration, the states argued that they were financially pressed and found it difficult to continue Interstate construction while maintaining the built sections. Congress responded in the 1976 Highway Act by establishing the Interstate 3R program. It provided funding for resurfacing, restoring, and rehabilitating lanes on the Interstate System. The eligibility of the program was expanded by the 1981 Highway Act to include reconstruction as an eligible program activity, thus making it the 4R program. The funds are apportioned to the states by formula, 55 percent based on lane-miles 45 percent based on vehicle miles of Interstate travel. Only non-toll miles constructed under cost-to-complete provisions were eligible for 4-R funding. In a complicated series of provisions starting with ISTEA and amended in the NHS Designation Act of 1995, and again in TEA- 21, when projects in nine specified high priority corridors were added to the Interstate System under Sec 139/sec 103 such mileage became eligible for I 4R, now re-titled Interstate Maintenance (IM) funds by formula apportionments.



The bottom line is that there are older additions to the Interstate System not having IM fund entitlements, while some, but not all, newer additions are entitled to the IM apportionments.

Strategic Highway Network (STRAHNET)

The concept of STRAHNET, a system of roads important to national defense, goes back to World War I when trucks of newly standardized designs destined for France were driven overland from Ohio to New York City and Baltimore because of congestion on the railroads. Over 30,000 trucks traveled east via designated truck routes, each loaded with 3 tons or more of spare parts and munitions, releasing over 17,000 railcars for other work. During the WW I transportation crisis the federal government had seized the railroads and the newly formed state highway departments cooperated with the War Department to bring road resources to bear on the problem.

Following the war the "Pershing Map" of 1922 defining military needs was produced in anticipation of the defining of first 7 percent highway system required by the Federal Highway Act of 1921. All of the routes on the Pershing map were incorporated into the first Federal-aid system. In 1935 BPR and the War Department restudied military highway needs working with the states. These updated needs were important in the selection of the 26,700 mile system recommended in the 1939 report *Toll Roads and Free Roads*.

At the start of WW II the War Department brought the total mileage it considered important up to 74,600 miles of which 29,000 were considered critical. Bridges unable to support heavy military loads were of particular concern. The Defense Highway Act of 1941 provided some funds for military related highway needs and work on the 1400 mile Alaska Highway was begun. The war efforts resulted in serious deterioration of the nation's highways. At the same time normal road programs ground to a halt with gas rationing drying up revenues and war efforts getting priorities for cement, steel and related materials.

The same 1941 Defense Act provided \$10 million for post war planning and it was this money that led to the Interregional Highways report of 1944 which recommended an "optimum" system of 33,920 miles or about 1 percent of the then total road and street mileage. (Note the precision!) The postwar highway bill that was enacted after 9 months of debate authorized a 40,000 mile National System of Interstate Highways.

Military requirements have changed over the years. They have moved from the need for a paved load bearing system that accessed military facilities and ports, to a system that would transport the missiles of the Cold War era to finally today to the rapid deployment needs of the Iraq wars which stress high volume movements between bases, equipment and munitions manufacturers, and ports and airports.

It is rather ironic to think that many highway histories have characterized the addition of the word Defense to the title of the Interstate System as a ploy to gain support, but the highway/defense connection has a long and continuing history. The most recent evolution is the importance being placed on military needs in the definition of intermodal connectors on the NHS system.



Parallels and lessons from the Past

Study of this period of highway history pays immense dividends in understanding today's issues and challenges. Some of the lessons:

- The first great lesson is that there are few really new issues. All of the familiar challenges of today were faced then: funding gaps; federal/state relations; metropolitan challenges; allocation formula issues; donor-donee issues, etc. There are certainly new contexts and new technological frameworks in which these issues arise. These are true issues – in the sense that they are never really solved, only resolved at any point in time, but when the contending forces change in influence, or the effects of the decision change, the issue will arise again.
- There is a tendency to see the Interstate development process as a purely federal event imposed on states from above. There is a need to recognize that there is a sub-text underlying so much of what happened; that is the story of state-federal cooperation and more important, co-equal development of the plans and ideas that eventually evolved. The process really began with President Eisenhower's message to the state governors to join him in realizing the Interstate system. The development of the NHS is a more recent and perhaps more salient example.
- The concept of a federally defined, built and owned system was rejected in favor of the historical federal-state partnership that had evolved and strengthened over 50 years.
- Vision is crucial, plans are important, but nothing happens until a funding mechanism that makes a difference is developed.
- A positive spirit toward what is achievable is critical. The great "can do" generation was immensely important. There was in the formative years of the Interstate a positive sense that it was worth doing and doable.
- There is a tendency in hindsight to see the creation of the system as inevitable. Anything so fundamental to our way of life had to exist. It did not! The system had to be conceptualized and sold. People had to be convinced. It took an immense number of very dedicated people to make it happen. In a speech in 1954 President Eisenhower said:

Public opinion is not a thing of passing moment, not a thing to be won to our side all in one day. It is earnest, long, dedicated leadership on the part of everybody who understands the problem, and then having once been formed, it takes the same kind of leadership to maintain it and sustain it, so that this problem will not return to us in exaggerated form.

ISTEA was the turning point between the Interstate and post-Interstate eras. TEA-21 and SAFTEA-LU have made adjustment to the ISTEA concepts, but not changed the substance. At the 50th anniversary of the Interstate System, it is perhaps wise to pause and ask; have ISTEA, TEA-21, and SAFETEA-LU preserved and enhanced the enormous benefits of the Interstate System? Or are their corrections or new directions to be taken to insure that the nation's personal mobility needs, safety, and economy will continue to benefit and grow with support from the nation's premier highway system?

There are several questions to ask/ponder at this point. Is the growth rate of the Interstate System as measured by lane miles, adequate to support the nation's competitiveness in the



global economy? Is the NHS program an adequate framework for growing the Interstate System? Are the flexibility features of the NHS and the related surface transportation programs adequate for the diverse characteristics of the nation's urban areas? Are the finance mechanisms appropriate to take advantage of the revolution in financing methods that is sweeping the developed world? Have the recent reauthorizations provided sufficient stimulus to allow and encourage states to take advantage of the many proven techniques and technologies that offer cost effective operational improvements?

Is the current NHS funding adequate relative to the need to support both existing personal and commercial mobility needs and economic growth? Are their incentives that can be introduced that will facilitate the operational effectiveness, sound performance, and growth of the Interstate System in ways that will facilitate both state and national objectives?

Future Vision for the System

Forecasts indicate that our nation's future is expected to include an increasingly large and increasingly affluent society. Although we are an affluent nation we will need to use all of our technological skills, human and financial resources, as well as investment planning to meet our needs, and do so without damage to our safety or environment. A renewed vision for the Interstate and other portions of the NHS must continue to recognize and pursue the necessity to assure all regions and parts of the nation have access to economic opportunities and social services. Importantly, we must also now be much more concerned with connecting our country to the global economy. The Interstate serves as a backbone of both our domestic and international logistics system, providing for critical and timely flows between production sources and consumers.

In closing we go back to history and the words of President Eisenhower transmitting his proposed highway program to Congress:

To the Congress of the United States

Our unity as a nation is sustained by free communication of thought and by easy transportation of people and goods. The ceaseless flow of information throughout the Republic is matched by individual and commercial movement over a vast system of interconnected highways crisscrossing the country and joining at or national borders with friendly neighbors to the north and south.

Together the uniting forces of our communication and transportation systems are dynamic elements in the very name we bear – United States. Without them, we would be a mere alliance of many separate parts.

DWIGHT D. EISENHOWER

*THE WHITE HOUSE
February 22, 1955*