

Chapter 32

“America’s New Design for Living:” The Interstate Highway System and the Spatial Transformation of the U.S.

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32.1 Origins of the Interstate Highway System

In the late 19th century improving roads became an important issue in the US. In 1891 state governments began to assist local governments in building better roads. Unfortunately, that effort saw limited results due to a lack of coordination among counties and other local governments (Weber, 2005). The result was an increase in spending and a shift in road building to a larger spatial scale, that of the state. In the early 20th century each state created highway departments and state highway networks, usually with the goal of connecting county seats and other large towns. These efforts, which were supported by federal money beginning in 1916, made great progress in establishing a basic rural road network for the US, albeit one that was based on connecting nearby towns rather than serving long distance travel. The creation of the US numbered highway system in 1926 provided a national numbering system, but did not change the local focus of highways.

During this time new kinds of roads were developed with features such as multilane highways, medians, restrictions on pedestrians, overpasses and interchanges, and wide banked turns for high speed travel. This development included the Merritt Parkway, Pennsylvania Turnpike, and Arroyo Seco Parkway (now the Pasadena Freeway) (Lewis, 1997). As popular as they were these highways were far too expensive for widespread construction, and their construction in cities required close coordination with other transport modes, planning for industry, commerce, housing, and parks and recreation facilities.

By the late 1930s interest developed in long distance highways built to modern standards. A 1944 report (National Interregional Highway Committee, 1944) recommended a 33,920 mi (54,589 km) system of interregional highways to connect major metropolitan areas, manufacturing, and agricultural areas with the least total mileage. Unlike earlier road building which focused on rural areas, this plan was

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based on the significance of cities as origins and/or destinations of long distance travel.

Following this report the Federal Aid Highway Act of 1944 specified a National System of Interstate Highways to comprise no more than 40,000 miles (64,374 km), which should connect metropolitan areas and provide connections to Canada and Mexico. However, there was no funding, which was not put in place until 1956 due to debates over the source of the funds. The oil and rubber industries, along with the American Automobile Association (AAA), initially lobbied for money to come from general revenues, but the federal government was strongly opposed to this (Schwartz, 1976). Tolls were proposed, but state highway departments and AAA were against this. User fees in the form of increased gas and tire taxes were the ultimate solution, but the first proposal was voted down in 1955 due to opposition from the oil, tire, trucking, and bus industries. However, these industries quickly reversed their position, apparently after rethinking the financial possibilities of the Interstate System, and in 1956 lobbied for the program, as did the construction industry (Schwartz, 1976). Urban planners were apparently supportive or indifferent, while urban politicians enthusiastically supported the program. The Bureau of Public Roads circulated maps for planned urban routes, generating greater support from Congressional representatives. The result was the Federal-Aid Highway Act of 1956, which passed by a nearly unanimous vote. The additional funding came from an increased gas tax, which provided a popular means of financing the system. The revenues from the tax were put into a new Highway Trust Fund to be used exclusively to fund Interstate construction, and therefore Interstate construction did not count as part of the regular federal budget obligations (Mohl, 2003). The more people drove, the more funds became available to build more freeways, producing what many saw as an unstoppable freeway building machine (Lewis, 1997). The 1956 Act also increased the mileage to 41,000 miles (65,983 km) and changed the name to the National System of Interstate and Defense Highways (though the role of defense in planning the system was minor).

Unlike all previous federal involvement in highway construction, it was not an open-ended construction project, but a multiyear project to be complete by 30 June 1972 (Schwartz, 1976). The highways were to be built to standards sufficient to accommodate forecasted 1975 traffic levels. The System was a partnership between (a) the federal government (the Bureau of Public Roads and later the Federal Highway Administration provided 90% of the funding for construction, and was required to approve every route and structure), (b) state highway departments (who built and maintained the routes, and provided the remaining funding), and (c) the American Association of State Highway Officials (which set design standards and specified route numbers in September 1957, along with the familiar red and blue signs displayed along the road (Weingroff, 2006)). The routes were to be jointly selected by the states and the federal government. This selection was done for the majority of the system in 1947 (Fig. 32.1), with urban routes specified in 1955 (Bureau of Public Roads, 1955). The System absorbed most existing freeways and a growing turnpike network in the northeast, including such roads as the Pennsylvania Turnpike, erasing an emerging network based on local needs with a homogenous national network.

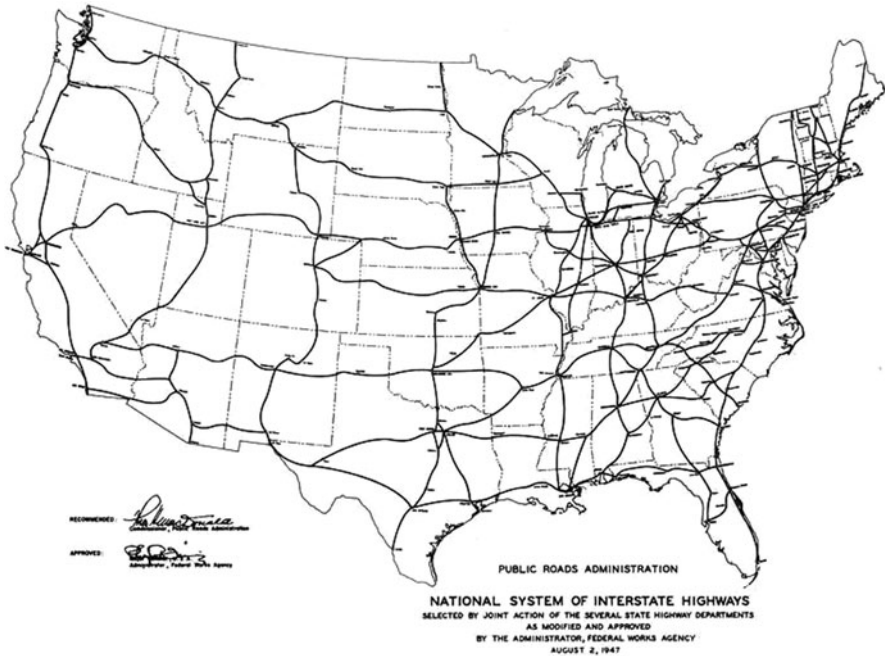


Fig. 32.1 The interstate highway system in 1947. (Source: Bureau of Public Roads, 1955)

In 1957 a Bureau of Public Roads official referred to the Interstates as “America’s new design for living” (Weingroff, 2006: 6). It has proven a remarkably accurate statement, though it appears that many at the time were uncertain as to exactly what that design would be.

32.2 Spatial Extent of the System

The Interstate Highway System was only about 80% complete by the original completion date of 1972 and is technically still not complete due to continual additions. However, the 1992 completion of I-70 in Colorado marked the last main Interstate route to be finished (Colorado Department of Transportation, 2008). At that time the total cost of the System was set at \$128.9 billion (Federal Highway Administration, 2008a). The total mileage of the system depends on exactly what is being counted. As of 2002 the authorized route mileage was 42,793 mi (68,869 km), of which all but 5.6 mi (9 km) had been completed. However, there is an additional 3,883 mi (6,249 km) that are signed with Interstate numbers but were funded separately from the rest of the System. In 1959 the System was extended to the new states of Alaska and Hawaii and to Puerto Rico. Hawaii’s routes meet Interstate design standards, but those in Alaska and Puerto Rico are not required to comply. While Alaska and Hawaii’s routes are generally counted with System mileage, Puerto Rico’s do not.



Fig. 32.2 The interstate highway system in 2008. Metropolitan areas are shaded

A total mileage between 46,000 and 47,000 mi (74,030 and 75,639 km) may therefore be seen. Most states have built additional freeways that are not part of the System, but generally built to the same design standards and functionally remain part of the system. As a result, there are 59,563 mi (95,857 km) of fully access controlled highways in the US (Federal Highway Administration, 2006).

The Interstate Highway System consists of a grid of freeways, denser in areas of higher population density in the Midwest and Northeast, connecting the majority of metropolitan areas and extending to Canada and Mexico, as required by the 1944 act (Fig. 32.2). Routes running north-south were given odd numbers, beginning with I-5 on the West coast and increasing numbers eastwards, while even numbers were given to east-west routes, beginning with I-4 (in Florida from Daytona Beach to Tampa). In addition to the national grid, each major city was assigned additional routes, such as spurs, bypasses, or a full beltway, which are generally numbered with three digits. The System was predominantly a rural intercity network when created, with urban routes taking up about 15% of the mileage. The urban component has taken up much of the added mileage; today the Interstates are about 34% urban.

Traffic levels are highest in large metropolitan areas and in areas of dense urban settlement in the eastern half of the country (Fig. 32.3). The notion of the System as a national intercity network has clearly been overwhelmed by its significance to urban transportation. In 2006 the System carried 24.4% of U.S. highway traffic but comprised only 1.2% of US road mileage. The Interstates have firmly become a part of daily life for most Americans, and contain many places familiar to them, including landmarks, interchanges, areas of congestion, landmarks, sites of tragedies, and even spectacular views (Weber, 2004). They are far from being a homogenous, placeless environment.

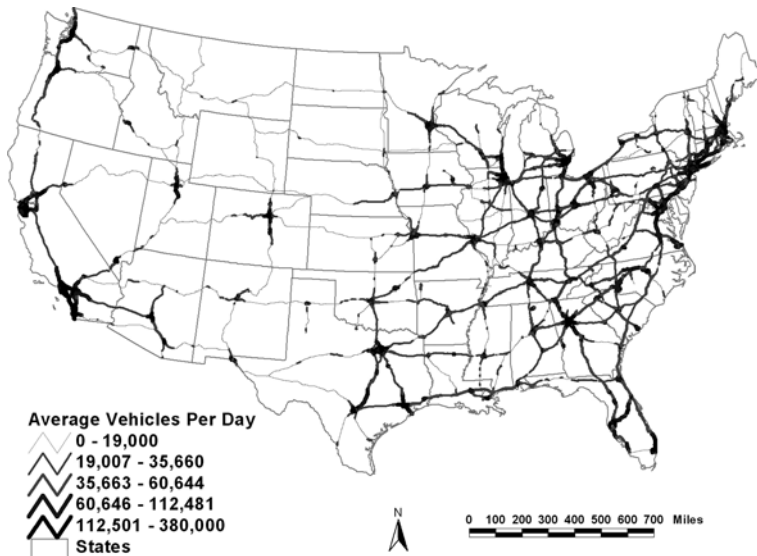


Fig. 32.3 Traffic levels on the interstate highway system, 2006. (Source: Federal Highway Administration, 2006)

32.3 Impacts of the System

The Interstate Highway System greatly reduced travel times and costs, resulting in significant space-time convergence (Moon, 1994; Warf, 2008). It has had the effect of leveling the accessibility surface of the country and reducing the transport advantage previously held by cities well connected by railroads in the Northeast and Midwest. The System is also associated with the postwar growth of the trucking industry and the loss of short and medium haul freight by railroads. The Interstates have resulted in a large economic savings, estimated at \$737 billion annually in reduced fuel costs, reduced transport costs in food and retail costs, and accident costs, as well as an average of 70 hours of travel time saved per person (TRIP, 2006).

The System created a new geography that favored certain locations, but bypassed others. The few metropolitan areas left off the network, such as Johnstown and Altoona, Pennsylvania, Huntsville, Alabama, or Lubbock, Texas, struggled to get on it. A location on the Interstates was seen as crucial for continued growth, while officials in cities such as Johnstown, which were not successful in getting an Interstate, blamed its absence for the city's decline (Mellott, 2007). Many small towns were bypassed, and the expanded market area of cities contributed to their commercial decline. Interstates allowed for longer commuting, increasing employment opportunities for many rural people. Rural interchanges often became important commercial centers, depending on a complex interplay of local factors, including proximity to nearby towns and adjacent interchanges, traffic levels, and availability of water

and sewer infrastructure (Moon, 1989, 1994; Hartgen, O'Callaghan, Walcott, & Opgenorth, 1992).

Within cities freeway construction was closely bound up with the processes of suburbanization and the decline of downtown as a commercial center (Moon, 1994). The automobile became the principal means of travel, and privately operated mass transit companies lost most of their remaining customers. Freeway networks have been credited with leveling urban accessibility surfaces, making any location as easily reached as any other, and thereby reducing the significance of downtowns as business locations (Giuliano, 1989). Beginning in the 1970s shopping malls and office parks grew at suburban interchanges, sometimes reaching the status of suburban downtowns, and commuting within suburbs has replaced the traditional suburb to central city commuting pattern (Baerwald, 1978; Moon, 1994).

It is likely that the greatest impacts took place before the 1970s. The rate of return on major highway investment (including the Interstates and other primary roads) was above 40% in the 1950s and 1960s, and fell considerably since that time to 16% in the 1980s (Nadiri & Mamuneas, 1996). Given the high level of mobility that already exists, building new freeways is unlikely to have significant economic impacts, and economic growth increasingly relies on a variety of infrastructural, labor, and education issues (Bannister & Berechman, 2001).

Building new Interstate routes is still justified by economic arguments, but one study suggested that building a new route would generate one new job for every \$1.56 million spent on the highway, which is at least 50 times more expensive than jobs created by other government programs (Wiewel, Persky, & Sendzik, 1999). Other evidence shows that freeways no longer possess the power to transform urban areas by their presence. Another study reported that population growth in North Carolina during the 1990s at the census tract level showed no consistent association with the location of freeways (Hartgen, 2003). The Interstate system may have been a one-time boom for the country, a dramatic episode of space-time compression that has run its course, but requires tremendous investment to maintain.

32.4 Challenging the Interstate System

A number of potential problems were inherent in the Interstate project. State highway engineers invited little input from urban planners when they set about building the System, and had a radically different notion of what an urban freeway should be (Mohl, 2003; Rose, 1990, 2003). City planners were interested in much slower and narrower roads, closely integrated with transit and serving broader urban planning goals. In contrast, the freeway networks laid out by engineers were designed solely for efficient capacity, had no connection to any city planning goals, and were often built far in advance of need due to the funding arrangements of the System (Rose & Seely, 1990; Taylor, 1995, 2000). The urban Interstates would therefore be intrusive and not well connected to the urban fabric.

Construction of urban routes was inherently far more expensive than rural routes due to higher land values and the demolition of large numbers of homes and businesses. As early as 1965 it had been estimated that 1,000,000 people may have been displaced by Interstate construction (Schwartz, 1976), while in the late 1960s it was estimated that at least 62,000 housing units were being demolished each year to make way for freeways (Mohl, 2004). However, the System did not provide money for relocating these residents or building replacement housing (Mohl, 2003). While federal officials were aware in 1956 of the number of people who would be displaced, they simply ignored the problem.

The Federal Highway Act of 1962 began to address these problems, requiring all metropolitan areas to begin an ongoing planning process, as well as requiring state highway departments to assist households displaced by construction (Mohl, 2004).

However, opposition to freeways erupted in many cities. Despite the belief of engineers that an organized conspiracy existed opposing them, the freeway revolt of the 1960s and later was made up of small groups of people resisting freeway construction in their city or neighborhood. Successful freeway resistance required a number of ingredients, including creating a large and active coalition of resisters that crossed neighborhood, class, and racial lines, support from politicians and journalists, a city with a strong planning history or background, and the resisters must take legal action to force a decision. Because freeway battles could drag on for years or decades, often a final decision to kill a project by a high-ranking politician was necessary to finally end the battle. In cases where one or more of these factors was missing, engineers could easily steamroll the opposition. For example, I-95 in Miami destroyed a black neighborhood near downtown, with one interchange demolishing the homes of 10,000 people (Mohl, 1993, 2004). Residents resisted, but found no support among the business community and larger population.

The first successful protest began in San Francisco in 1959. Widespread public opposition to freeways planned for neighborhoods throughout the city led the city government to oppose and block the construction of the Embarcadero Freeway in 1965 (Schwartz, 1976). California law allowed cities to oppose state highway plans, a provision not common elsewhere. A process of allowing substitutions of routes within a state was developed (beginning with replacing the Embarcadero freeway with the Century freeway in Los Angeles) and formalized in the Federal Highway Act of 1973 (Mohl, 2004). While this allowed the Interstate System more flexibility to respond to local conditions, it also moved away "from the original idea/ideal of a delimited System serving national rather than parochial state-by-state interests" (Schwartz, 1976: 450).

Considerable knowledge has developed on how to build freeways without causing undue disruption and also providing mitigation for disruptions (Blair & Pijawka, 2001). Unfortunately, there is apparently little effort made to test whether these mitigation efforts were actually successful. A survey of residents living near a new freeway in Phoenix suggests that residents may now be largely indifferent to freeway construction. However, little research has been directed at freeway impacts on minority communities, despite the fact that there is evidence that these impacts on these communities differs from other areas (Steptoe & Thornton, 1986).

32.5 The Beginning of the End of the System

Beginning in the late 1960s the financial health of the Interstate System began to decline. Construction costs began to greatly increase, and then in the 1970s the gas tax provided much less than money than predicted due to decreases in driving and greater fuel efficiency (Taylor, 1995). The unstoppable freeway building machine created by the Highway Trust Fund began to break down. Relatively little Interstate mileage has been built since that time, with the completion of the System stretching out into the 1990s. The System clearly remains vulnerable to reduced fuel use, as high gas prices in 2008 caused the Trust Fund revenue to fall \$3 billion following a 4.4% reduction in travel by Americans (Federal Highway Administration, 2008b). Annual vehicle miles traveled has grown tremendously since 1956, but actually leveled off in 2004 and has decreased in most states since then (Puentes & Tomer, 2008). While the Interstates stimulated tremendous economic development, the increased land values it helped generate in urban areas (as farmlands were transformed into subdivisions and shopping centers) in no way contributed to the Trust Fund, though it did obviously greatly increase the cost of buying land for freeways.

One consequence is that many jurisdictions began finding new revenue sources to fund freeways and other transportation projects. These include a sales tax increase to pay for the Phoenix freeway system (Arizona Department of Transportation, 1998), property taxes in Mobile County, Alabama (Murtaugh, 2005), or the sale of bonds in Virginia (Bowman, 2003). Toll roads have also seen resurgence in popularity, and a substantial freeway mileage in Florida and Oklahoma has been built this way. However, these revenue sources are also vulnerable, as retail sales, housing values, toll revenues, and the ability to sell bonds have plummeted in late 2008 due to the housing crises and recession.

In 1973 small amounts of money in the Highway Trust Fund began to be shifted away from highway building and towards transit (Rose, 2003), marking the beginnings of a more multimodal transport policy. The passage of ISTEA (Intermodal Surface Transportation Efficiency Act) in 1991 represented a greater shift towards a more multimodal transport system as well as a shift in decision making from state highway departments to metropolitan planners (Rose, 2003). Many non-Interstate freeways are increasingly being built, and the near-monopoly of highway departments has been broken. Las Vegas provides an excellent example, as in addition to several Interstate routes, two freeways are county highways (though one is signed as an Interstate) and another was built by a homeowner association (Clark County, 2008).

32.6 The Interstate Highway System in Birmingham

Birmingham, Alabama, was founded in 1871 at the junction of two railroad lines, near deposits of coal, iron, and limestone. It grew rapidly into a decentralized collection of industrial towns, each with its own commercial and residential areas,

connected together with a large streetcar network (Wilson, 2000). Several Interstate routes were planned for Birmingham in 1955, including a partial beltway. A 1965 study (Moore, 1965) expected that downtown Birmingham, the center of retail trade in the city, would continue its primacy, though losing some business to outlying areas. The trade area of Birmingham would increase due to faster travel speeds, attracting shoppers from nearby cities. Access to industrial areas would be greatly improved, allowing for increased production. Considerable suburbanization was expected. Construction of I-59 in Ensley, the first route to be completed, was seen as an experiment in saving a declining neighborhood.

In addition to these expectations about economic impacts, there were also expectations about social changes (or preventing them). The Birmingham freeway system was initiated at a time when planning was based on racial segregation, and the 1955 plan was manipulated to maintain that pattern (Connerly, 2005). Several routes near downtown were located to preserve boundaries between black and white neighborhoods. East of downtown the original straight route planned for I-20/59 approved by the federal government was replaced with a longer one that curved to the north to spare a white neighborhood at the expense of a black neighborhood, creating a sharp curve in I-59 (Fig. 32.4). Ironically, the result was a huge loss of housing in black areas and mass movement of blacks into white neighborhoods during the 1960s. Whites moved into newly developing suburbs and the city lost population. However, while 75% of the city's population loss was made up of whites, the Birmingham neighborhoods experiencing the greatest total population loss since

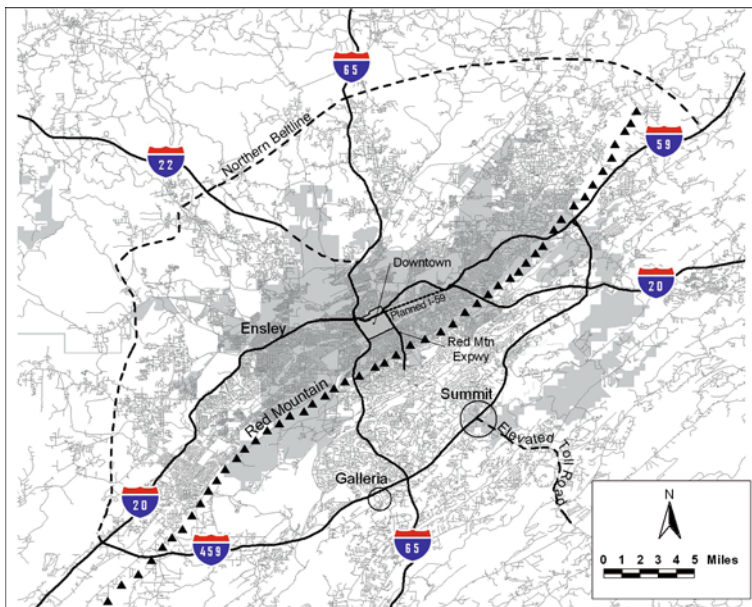


Fig. 32.4 The interstate highway system in Birmingham, Alabama

1960 were almost all black and in the path of freeway construction (Connerly, 2002). The effects of Interstate construction on minority owned businesses elsewhere suggest that black-owned businesses lost in Birmingham were unlikely to have been replaced (Steptoe & Thornton, 1986).

Later freeways reflect the changing times. The Red Mountain Expressway runs from downtown into the near suburbs on the south side of Red Mountain (Connerly, 2005). After the state highway department made an unsuccessful attempt to get it added to the Interstate System, construction was started with reduced federal funding in 1963. The route created a local freeway revolt by the mostly black residents of the Central City housing project, part of which would be demolished with no relocation assistance for 400 residents. A lawsuit was filed in 1974 alleging in part that the plan did not take into account federal laws on environmental protection and relocation assistance (Connerly, 2002). Their opposition was eventually successful, a new route was selected and the freeway was completed in 1980.

The partial beltway (I-459) was constructed in the 1970s and 1980s in an area of rapid suburban growth and has attracted emerging suburban downtowns (the Galleria and Summit areas) at two interchanges, one of which has since attracted an additional exit. Two suburban municipalities are currently pushing for additional interchanges to be built in their jurisdictions to promote new development (MacDonald, 2006). In the early 2000s serious planning for a northern beltway began, apparently motivated in large part by a hope for rapid economic growth among many small moribund towns. The experience elsewhere suggests that the northern beltway would have little impact in the absence of any local growth.

A new freeway (to become I-22 when it is completed around 2012), is being built to connect Memphis and Birmingham. In 2008 about 13 miles (21 km) remain to be built to connect it to the Birmingham freeway system. This project has so far cost over \$1 billion (MacDonald, 2007), with considerable detail to environmental concerns involving closed landfills, coal mines, watersheds, and residential areas. Its funding has benefited from the support of Alabama's congressional delegation by earmarking federal money directly from the federal budget.

The accuracy of the 1965 freeway report is mixed. Nearby cities such as Tuscaloosa have struggled to resist the flow of shoppers to Birmingham, but retail activity abandoned downtown. The iron and steel industry in Birmingham declined precipitously, and recent industrial developments in Alabama have avoided the city in favor of smaller metropolitan areas, part of a general move towards Greenfield sites. Suburbanization did occur along the Interstates, though the north and east were not as favored as areas to the south. The Ensley area lost considerable housing and its industrial employment, and its commercial district is today largely vacant. The goal of using the Interstates to maintain racial separation within the city was not successful. However, by enabling the large scale suburbanization of whites it has helped effectively resegregate the entire metropolitan area, and helps provide shorter commutes for white workers compared to blacks (Sultana & Weber, 2007; Weber & Sultana, 2008). While it was possible to predict many of the effects of the

Interstate system in Birmingham, there were clearly larger and very fundamental social and economic processes unforeseen or ignored in 1965.

As in other cities Birmingham's freeway system has become an essential part of life in the city, and includes a number of landmarks, regularly congested sections, accident memorials, troublesome interchanges, and other everyday places (Weber, 2004). Suburban traffic congestion has led to discussion of an elevated toll road over a busy arterial street and addition of toll lanes along I-65. These developments have been supported by the U.S. Transportation Secretary, who explicitly called for no new gas taxes for roads and a focus on public-private partnerships to build toll roads to handle new demands (MacDonald, 2008). Downtown Birmingham has seen considerable revitalization since the 1970s, and the need to rebuild downtown freeways constructed in the 1960s has allowed discussion of relocating I-20/59 in a tunnel to facilitate the growth of downtown as an entertainment and convention area (Williams, 2008). A new generation of leaders is planning freeway development to benefit downtown, but under vastly different local and national circumstances from the early 1960s.

32.7 Foreign Versions

The highway system most commonly compared to the US Interstate Highway System is the National Expressway Network Plan of China (also called the 7918 network for its 7 routes radiating from Beijing, 9 North-South routes, and 18 East-West routes). This was initiated in 2004 and will ultimately consist of 52,817 mi (85,000 km) when it is completed in 2020 (China Motorway Online, 2005). It is expected to cost \$240 billion. The roads will provide a dense network in the eastern part of the country and connect all provincial capitals, including 83% of cities with more than 500,000 people. The need is driven by a desire to increase economic growth as well as massive increases in car ownership in China. Automobile ownership has shown a 20% annual increases in recent years and is leading to economic and social transformations in life similar to those of the US. in the early 20th century (Bradsher, 2008; Conover, 2006).

The biggest difference from the Interstate System is that almost all routes are toll roads and funding for construction will come from a variety of sources, including private investment. Chinese transport development is not open to public participation or comment, has been carried out with little or no compensation or tolerance for dissent, and the organizational structure of transport planners, builders, and operators is extremely cloudy. Freeway construction is being balanced by massive investments in railroads, airports, and waterways, with the goal of creating a multi-modal transport system. However, urban bicycle use is plummeting and there is talk of restricting them and also motorcycles to make driving easier (Campanella, 2008).

India recently initiated the National Highways Development Project, which consists of the Golden Quadrilateral, North-South Connector, and the East-West Corridor, totaling 4536 miles or 7,300 km (National Highways Authority of India,

2008). It is a much sparser network than China's, and will apparently not be built to freeway standards, but still serves to connect the major metropolitan areas of the country. Like China, India is attempting a massive economic transformation with these highways and is currently dealing with social transformations as well, though with only 1/10th the level of investment (Sengupta, 2008; Waldman, 2005a, 2005b). Unlike China, the Indian network was conceived in large part to encourage and promote national unity, the government has relatively little power to do as it pleases, and local cultural and religious sensitivities must be closely addressed. The US experience suggests that China and India will be transformed by these systems, and not always in ways that the government desires or may be prepared to accept.

32.8 Conclusions

The Interstate Highway System continues to exist as a distinct category of roads within federal accounting and will continue to provide the backbone of highway transportation for some time to come. The Interstate System will also continue to grow, as new (mainly urban) routes are added, especially due to direct action by members of Congress rather than planning by system officials (as in Hamill, 2008). Given the rapid growth of non-Interstate freeways, there will perhaps be less dependence on it, and its identity will no doubt be blurred. This is especially the case as the larger and faster growing states and cities plan their own programs, tailored to their own particular needs and geography. Texas is planning up to 4,000 mi (6,437 km) of multimodal (freeway, railroad, utility and pipeline) corridors to be built over the next 50 years (Palacios, 2005). Because of the declining utility of the gas tax, these corridors would likely be toll roads. High speed trains have been discussed in many areas where large cities are found within 300 mi (483 km). There is perhaps increasing regional variability in transport planning, and it is not clear one System will be able to serve all needs.

Despite its size and seeming permanence, the Interstate System is vulnerable to many natural hazards. On the West coast earthquakes in 1972, 1989, and 1994 have destroyed a number of freeways and required massive reconstruction for others (McNichol 2006). Likewise, a series of hurricanes in 2004–2005 in the Gulf of Mexico resulted in considerable damage to the Interstate System, destroying many bridges in Escambia Bay (Pensacola, Florida), Mobile Bay in Alabama, Pascagoula Bay in Mississippi, and the New Orleans area. Pictures of I-10 emerging from underneath Hurricane Katrina's floodwaters are important reminders both for highlighting the vulnerability of these highways as well as the continuing presence of large numbers of people not able to derive the full benefit of these highways. In this sense the changes to the System made in the 1960s and 1970s have not yet fully succeeded in reconciling the system to the needs of the country. America's new design for living is still under development.

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