

# Continuity and change in American urban freeway networks



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## ABSTRACT

The American Interstate Highway System was created in 1944, though construction did not commence until 1956. During the planning process for this network the blueprint for American urban freeway systems was set in 1955 by a federal document called the Yellow Book. This provided about 100 maps of cities with planned urban freeway locations for the Interstate Highway System. A set of three basic network patterns were applied to these cities based on their size and location. In the half century since 1955 urban freeways in the Interstate System have expanded from a planned 2000 miles to over 16,600 miles, along with another 11,500 miles of non-Interstate freeways. The number of large metropolitan areas has increased tremendously while the monocentric commuting patterns of have been transformed. This paper explores how these urban freeway systems were applied to the country's urban geography of the 1950s and how they have adapted to changing populations and other transformations in American metropolitan areas in the last half century.

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## 1. Introduction

The Interstate Highway System (IHS) remains the world's largest freeway network. In addition to spanning the nation and transforming American life in countless ways (Moon, 1994; Lewis, 1997; McNichol, 2006; Weber, 2011) it also includes hundreds of urban freeway networks mainly utilized for local travel. These networks were first specified in 1955 using three basic network patterns based in part on city size. However, the country's urban geography of the 1950s was vastly different from that of the early twenty-first century. The entire Los Angeles metropolitan area had only 4,819,599 people, less than ¼ of its 2010 population and fewer people than live currently in the Atlanta metro area. Atlanta in turn had only 726,789 people in 1950, about the size of Greensboro, North Carolina, the 71st largest metro area in 2010. Many of the largest cities in the United States at the start of the twenty-first century did not even show up in the 1955 freeway planning document due to their small size; Las Vegas, Nevada, was not yet metropolitan in 1950 as it was a small town of about 25,000 people, while in 2010 it had close to two million people. In the half century since 1955 urban freeways in the Interstate System have expanded from a planned 2000 miles to over 16,600 miles, along with another 11,500 miles of non-Interstate freeways. The urban portion of the Interstate System has clearly grown, but has it kept pace with tremendous changes in population and travel patterns?

Many studies have examined transport network change and related it to changing urban population patterns, either to show the effects of a new network or to predict potential impacts (for example, Gauthier,

1968; Linneker and Spence, 1992; Dupuy and Stransky, 1996; Gutiérrez and Gómez, 1999; Li and Shum, 2001; Holl, 2007; Ribeiro et al., 2010; Weber, 2012). Like these studies this paper will examine the relationship between transportation networks and population; unlike these it will assume that population patterns are the cause of specific transport network configurations. In particular, it will test the fit of several different urban Interstate freeway patterns to 1950s urban populations, and whether that fit has changed since then. The goal is to better understand the spatial planning for the Interstate System and to investigate how well the urban portion of the IHS has adjusted to the changing urban populations and traffic patterns in the last half century.

## 2. The design of urban freeway networks

The blueprint for the Interstate Highway System was laid out in January 1944 in a report titled *Interregional Highway* (National Interregional Highway Committee, 1944). This called for a 33,920 mile national highway network connecting the majority of large cities and other strategic locations across the country. At the end of 1944 the Interstate Highway System was created based on the principles in this report, though now with a 40,000 mile limit. A national network for the system was soon mapped out, but the identification of routes within cities took longer.

Because traffic studies found that most highway traffic was bound for or from a city, it was decided that the routes should pass through rather than avoid cities, and in fact should pass near to the central business district (CBD), the principal origin and destination of traffic and center of employment. However, given the increasing importance of long-distance highway travel, it was found that a certain amount of

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traffic would always be passing through a city, the construction of bypass routes to carry traffic around the city with a substantial time savings was justified. Geography was important, as a small town between two nearby large cities would experience a much greater need for a bypass than a similarly sized town far from larger places.

In order to handle these conflicting needs for travel into and around cities, the committee suggested different route patterns for cities of different size (Fig. 1). For small cities (no populations were specified) the new highway should bypass the city completely, with lesser roads providing access in the form of a spur. In medium sized cities the Interregional Highway might pass through the city near downtown, but with a circumferential route passing around the edge of the city. This route was to serve traffic not originating or terminating within the city as well as serving the periphery of the city. In large cities a more complex and variable pattern was called for. In such a city several Interregional highways would pass through in several directions, providing a set of arterial highways converging near downtown. In the example given (Fig. 1), three highways pass through the city, intersecting to form an inner loop around downtown. Cross highways, or circumferential routes, would be necessary to connect these main routes and allow the city to be bypassed. Larger cities might require complete circumferential routes around the entire city, and perhaps even multiple circumferential routes, such as an outer belt around the edge of the city and an inner belt around the CBD.

No attempt was made to map these routes for individual cities, and “their proper location and mileage can be determined only by detailed study of the needs and conditions of each city involved” (National

Interregional Highway Committee, 1944, 32). The committee called for the creation of metropolitan authorities to organize the planning activities of cities with multiple municipalities, and route selections “should be made cooperatively by the State highway department and appropriate local planning and highway authorities” (National Interregional Highway Committee, 1944, 36).

By 1955 plans for many cities had been drawn up using these concepts (Bureau of Public Roads, 1955) in a publication sometimes called the Yellow Book due to its cover. 102 cities were shown with spur (Fig. 2), bypass (Fig. 3), or circumferential beltway (Fig. 4) freeway patterns. Although not shown, there were of course many other cities along the Interstate system not assigned any additional urban routes. Despite earlier comments the routes in this book were assigned by state highway department officials, who were responsible for designing and building the Interstate System, with little or no input by urban officials or planners. These differed considerably from the dense networks of small freeways that urban planners had favored, each custom tailored to the needs and situations of a city (Schwartz, 1976; Seely, 1987; Ellis, 2001). Rather than being integrated with community plans the engineers sought to maximize traffic flow (Rose, 2003; Brown, Morris, and Taylor, 2009). They did however incorporate freeway plans that had already been developed for a number of cities.

The purpose and impact of the Yellow Book is open to debate. There is some evidence that the Yellow Book was created to (successfully) increase the level of support for the Interstate System among Congress members from urban districts following a failed attempt to approve funding in 1955 (Schwartz, 1976). However, others have argued that

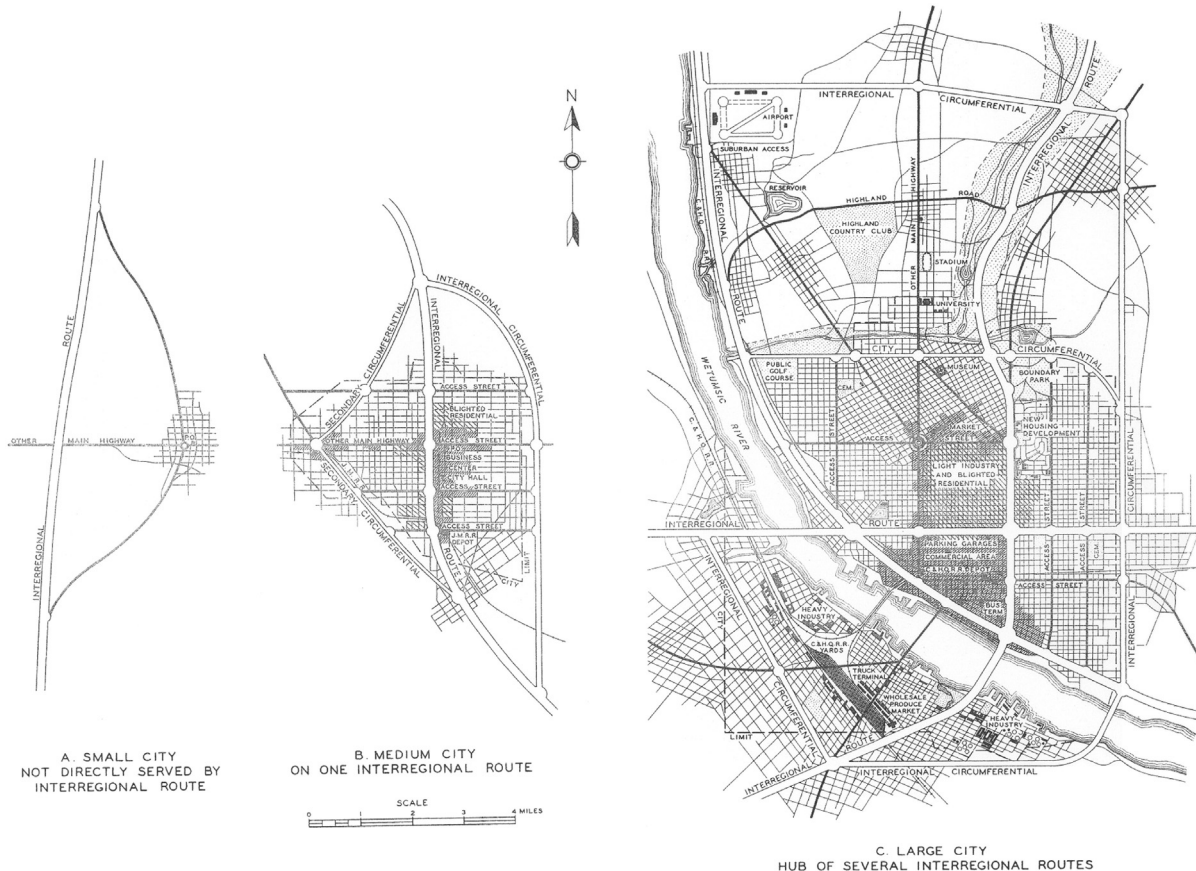


Fig. 31.—Schematic layouts illustrating various combinations of main interregional routes required for the adequate service of traffic at cities of various sizes.

Fig. 1. Three different possibilities for urban routes in *Interregional Highways*. (Source: National Interregional Highway Committee, 1944)

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