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Land Use and Transportation Alternatives: Constraint or Expansion of Household Choice?

Mineta Transportation Institute
San José State University
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EXECUTIVE SUMMARY

Transportation and land use research that considers such alternatives as New Urbanist development, jobs-housing balance, transit villages, or "smart growth" most typically tests the capacity of such physical forms to reduce vehicle miles traveled (VMT) or bring about other desired outcomes in the modification of travel behavior. Establishing such causality is broadly seen as a precondition for the urban planning interventions that are presumed to be necessary to bring these forms about. But such a view neglects the extent to which current interventions—notably zoning and transportation regulations—tend to preclude the development of such innovations in areas of high accessibility where they can potentially be of the greatest benefit.

Payoffs in VMT reduction, though desirable, are hardly the necessary precondition for the relaxation of such regulations. Instead, the increased land use and transportation choice that such liberalization can engender is self-justifying in that it allows households to forge a closer link between their land use and transportation preferences on the one hand and their actual choices on the other.

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CHAPTER ONE

INTRODUCTION: AN ALTERNATIVE RATIONAL FOR LAND USE TRANPORTATION POLICIES

One of the most controversial issues in transportation policy currently is the implication of alternative land use practices for transportation outcomes. A number of researchers and planning practitioners have sought to establish a connection between innovative land use development practice and a reduced demand for automotive transport that would ostensibly justify such practice (Cervero and Kockelman 1997, Cervero 1996, Frank and Pivo 1994). Others have questioned, both theoretically and empirically, the capacity of land use policy to induce changes in vehicle miles traveled (VMT), congestion, or other relevant transportation outcomes (Giuliano 1993, Gordon, Richardson and Jun 1991; see reviews at Badoe and Miller 2000, Boarnet and Crane 2001). To the extent that uncertainties remain in the relationship between provision of alternative land use forms and travel behavior outcomes, some of these observers would question the planning rationale for such policy directions as New Urbanist development, job-housing balance, transit villages, "smart growth," and related initiatives.

This study examines the transportation policy implications of alternative land use practices, but from a different perspective. Providing for broad range of alternative development forms, including rich alternatives to single family, low-density, land use-segregated, auto-oriented suburban development, is seen here as desirable not so much for a capacity to reduce automobile dependence or to moderate the growth in VMT, however sought after those outcomes may be. Instead, the primary impact of such alternatives is seen in their potential to allow households to forge a closer link between their preferences for land use and transportation environments on the one hand, and their actual choices on the other. In many growing areas of the United States, little variation in physical development is provided for, with the vast majority of housing being located in zones that were laid out with automotive accessibility dominantly in mind. In areas such as these, individuals with preferences for pedestrian- or transit-friendly neighborhoods—or those interested in affordable housing close to their work and non-work destinations—may be impeded in their ability to select the neighborhood environment that matches their preferences or needs. In contrast, where broader ranges of neighborhood types are allowed to develop, households should have a greater ability to sort themselves by their environmental preferences and needs for accessibility. One of the most desirable values in urban form is the access to choice; a choice of people, of jobs, of physical settings, of institutions such as schools or churches, of entertainment, and so forth. A diversity of behavioral and physical settings implies that it is easier for an individual or group to find one that is congenial to them, or to become enriched in new ways. An extension of this philosophy is the notion that a desirable region is one that affords a relatively close fit between the preferences of its residents on the one hand, and their actual choices on the other.

If municipal land use and transportation regulation constitutes a significant barrier to the development of accessible, transit- and pedestrian friendly alternatives, the question of whether automotive travel is reduced by these land use forms is not the logical precondition to their development. Rather, such development is to be desired where it fits the needs and preferences of its current and potential future residents, including their preferences for land use and transportation environments. Reducing barriers to development of this kind is self-justifying on the basis of expansion of households' range of effective choice, with reduction in demand for automotive travel being a desirable—if uncertain—side effect. Scientific uncertainty regarding beneficial travel behavior impacts would not seem to be a reasonable basis for excluding such developments from areas where markets for them exist. In areas where markets do not support the provision of such alternatives, one hardly needs policy involvement to exclude them, as the absence of profits will tend to accomplish this much more effectively.

This study tests this framework with three principal elements. First, the entire territory of metropolitan Boston and metropolitan Atlanta was classified into zones, five in each area, ranging from the most accessible, and transit- and pedestrian- friendly zones to the most automobile-oriented zones. Zones were designed to be as comparable as possible between the two regions. Second, detailed on-site urban design case studies, ten neighborhoods in each metropolitan region—were developed for selected neighborhoods in each of the zones in the two regions. These served both as a kind of "ground truthing" to verify the classification of neighborhoods into zone, and to explore in greater detail the urban environmental characteristics of families of neighborhood types in each of the two metropolitan areas. Finally a survey was conducted of a randomly selected eight hundred households in each region. The survey focused on people's stated preferences, regardless of where they actually lived, for residence in alternative neighborhood types. Surveys were geocoded and characteristics of survey respondents were analyzed jointly with characteristics of neighborhoods in which they live. The study suggests that while Atlanta residents were considerably less interested in transit and pedestrian oriented neighborhoods than the Bostonians, the latter achieved a closer fit between their preferences and their choices of land use and transportation environments. The study attributes this improved match to the wider distribution of neighborhood types their region offered to the residents of metropolitan Boston.

It is not suggested that this wider distribution of neighborhood types in metropolitan Boston is the product of conscious policy; rather the development the two regions in different historical periods the driving factor. But developing as it did largely in the post-World War II era, metropolitan Atlanta was subject to a number of self-imposed barriers to the development of denser, more accessible, and more mixed use alternatives. These barriers come in a number of forms, and include banks' lending practices, developers' inclinations to stay with demonstrably successful formulas, and opposition from local communities, amongst others. This study is principally interested in the barriers that regulatory policy itself may place in the way of such development. Of these, local land use regulation in the form of zoning and negotiated agreements may be the most significant. Many economists recognize that suburban zoning conflicts most frequently take the form of disagreements between residents who prefer low density land uses and developers interested in building higher density uses (Bogart 1998, Fischel 1985); minimum lot zoning as fostering metropolitan sprawl (e.g., Pasha 1996), and more exclusivity than would arise in the absence of such regulations (e.g., Wheaton 1993). Yet following Tiebout (1956), many economists frequently view these effects in a relatively positive light, as the acknowledged capacity of zoning regulations to exclude on the basis of income is seen as fostering an efficient sorting of the population in terms of demand for public goods, leading to presumably more efficient, homogenous jurisdictional units than would otherwise arise.

The casual observer might distinguish these phenomena from other cases of governmental regulation, arguing that it is simply the wishes of the neighbors that lead to the exclusion of higher density development from neighborhoods. Yet clearly regulation is at play here; the neighbors—when successful—are only able to implement their desires for a low-density environment by harnessing the regulatory power that the state confers upon the city. Direct action to accomplish exclusion is generally illegal, though hardly unheard of; threatened or actual violence against minorities relocating into white communities would be an example. Exclusion without regulatory intervention can in principle be accomplished on the basis of contract law, as in the cases of deed restrictions on land. Yet since the normal operation of contract law depends on aggrieved parties bringing their cases to court[1], it is difficult to see a non-regulatory approach that would enjoy the ubiquity of enforcement that zoning does.

This study does not examine land use regulations directly. Instead, the notion that land use regulations can constrain choice is examined through a comparison of two areas chosen for their distinctiveness one from the other—a distinctiveness that is the product of the differing historical eras in which each developed. Metropolitan Boston was selected as an area offering its households relatively rich opportunities for residence in a range of neighborhood types, including low-density automobile oriented areas and transit- and pedestrian-friendly zones. Metropolitan Atlanta was selected as an area offering many fewer opportunities for residence in transit- and pedestrian-oriented areas, with a much greater share of its territory developed according to post-World War II automobile-oriented principles. The study tests the notion, largely unexplored in the planning and transportation literature, that residents of an area offering a great variety in neighborhood types—represented here by the Boston area—will exhibit a closer fit between their neighborhood preferences and their actual neighborhood choices than will residents of an area, such as Atlanta, that is developed in a more uniformly automobile dependent manner. To the extent that this hypothesis is borne out, it would tend support efforts to overcome regulatory and other barriers to the development of alternatives to low-density automobile oriented neighborhoods independently of any proof of benefit in VMT reduction.

[1] The City of Houston has no zoning, but land there is frequently under contractual deed restrictions. The City enforces contract law administratively, thus reducing or eliminating the need to resort to the courts. But in deviating from the normal operation of contract law by acting as an administrative enforcer, it effectively puts itself back in the role of land use regulator. It accomplishes this on the basis of a State law that enables it—not only private aggrieved parties—to sue for contract enforcement.

CHAPTER TWO

ACCESSIBILITY BASED LAND USE FORMS

A fundamental understanding in the field of transportation demand analysis is the notion that the demand for travel is *derived* (Meyer and Miller 1984); that is, with few exceptions, people travel not for the pleasure of motion per se, but in order to access opportunities available at their destinations. This understanding was developed in order to establish the formal link between land use and transportation in order to enable modeling of transportation system characteristics on the basis of distributions of residential and non-residential land uses across the landscape, especially in metropolitan areas.

While this use of the "derived demand" concept has become well established in professional transportation practice, another implication of the framework has been routinely overlooked. The transportation professions have most traditionally seen themselves as ensuring the mobility—or often the *auto*mobility—of the populations they served. In some cases, however, policies seeking to improve mobility—such as extensive highway construction—may have induced outward movement of land uses ("sprawl") in such a way that travel distances grew. Where this happens, mobility improvements can potentially be associated with increasing total time and money costs of travel. If the "derived" nature of transportation demand is taken seriously, then a set of policies that increases the time and money cost of travel per destination would not be desirable, even if it reduced the time and money cost of travel per mile. This is because it would leave travelers with less time and money to spend at their destinations. Thus a conscientious application of the "derived" framework would lead to the conclusion that improvements in *mobility* per se—reductions in the time and money cost of transportation per mile—are not necessarily desirable. Rather it is improvements in *accessibility*—reductions in the time and money cost of travel per destination—which should be sought by transportation policy. Under this framework, mobility improvements are desired when they enhance accessibility. Efforts at improving mobility that detract from accessibility in the longer run (by inducing land use change and growing travel distances that increase the time and money cost of transportation) are to be avoided, based on the "derived demand" nature of transportation.

Clearly, measurement of accessibility improvements is more complex than gauging change in mobility (Handy and Niemeier 1997). While mobility is readily gauged with the transportation engineer's "level of service" measurements of highway flow (Transportation Research Board 1992), accessibility is observed through interactions between residences, businesses and other destinations. Thus policies relating to accessibility cannot focus on transportation system characteristics alone, but require significant attention to the distribution of land uses. The guiding notion of accessibility-based policies is that land uses can be configured—whether through directed planning, market forces, or both—in such a way as to either increase or decrease the need for transportation in general, and automotive transportation in particular.

Implications of an accessibility-based—as opposed to a mobility-based—land use policy are far reaching. Mobility-based thinking frequently leads to use of the land use regulatory power to exclude or reduce the developers' desired density of construction in an area, so as to avoid overloading the local automotive network. But when this scenario is played out many times over throughout the development of a region, it can amount to a regulatory-based recipe for low-density, automobile-oriented growth. In contrast, accessibility-based land use policies seek to facilitate denser development in areas of high accessibility. This accessibility may take a number of forms, including proximity to a high quality transit system, to areas of high job concentrations, or to shopping or cultural destinations. Proximity here is a relative and flexible concept; at one extreme, it may imply walkable distances of up to one quarter of a mile or so. At the other extreme, territory lying, say, ten miles from a major employment center may be viewed as relatively accessible if its development affords households alternatives to commuting much greater distances.

A family of accessibility-based land use approaches is described in Table 1. These approaches, which are distinct but not mutually exclusive, can be characterized by the type of travel they aspire to reduce—whether the work trip or the non-work trip—and by the scale at which they operate. A "local" scale refers to an option that can readily be portrayed through neighborhood or site plans; alternatives operating at a regional scale are those for which the dimension of regional accessibility—not readily observable at a strictly local scale—is paramount.

Local scale, non-work travel: "New urbanism" is a planning and development concept that draws inspiration from traditions of American town planning of the early 20th century (Calthorpe 1993). Village scale, mixed uses and walkability are central elements of this approach, which tends to be local in scale (it can be readily represented as a neighborhood plan), and oriented towards reducing the need for non-work travel. That is, New Urbanist developments are not necessarily located in the immediate vicinity of major job centers, but seek to offer residents, among other benefits, opportunities to reduce the need for automotive travel for shopping, social and cultural destinations.

Local scale, work travel: Inspired by higher density development in Europe that clusters around transit stations, "transit villages" seek to offer mixed used environments within easy walking distance of high quality public transit (Bernick and Cervero 1997). Where New Urbanist densities tend to range between eight and fifteen residential units per acre, transit villages may reach twice those densities or more in a city-like environment. In contrast to New Urbanist development, their primary transportation orientation, based on their proximity to regional transit, is towards facilitating non-automotive commuting by their residents.

Regional scale, work travel: Job-housing balance is a concept with a long planning pedigree: the notion of co-location of jobs and affordable residences to facilitate commute reducing choices by households (Cervero 1996, Levine 1998). Under this analysis, the problem is that as a consequence of municipal regulatory practices such as fiscal or exclusionary zoning, certain subregions of metropolitan areas are systematically rich in jobs but poor in affordable housing. These areas become magnets for commute trips that are presumably longer than those that would have held had ample supplies of housing not been zoned out.

Regional scale, non-work travel: In the United States, the principle of using accessibility—and particularly transit accessibility to guide the location of major regional facilities—is more observed in the breach than in practice. Other countries have developed this approach more fully. For example, under the Dutch ABC system of land use planning, the central government can withhold funding from developments that do not meet guidelines under which shops and offices are concentrated in "A" areas easily accessible to public transport. Areas accessible by car and transit are designated "B" and are earmarked for office development. Areas with only automotive access are designated "C"; their uses are restricted to transport- or land-intensive activities, such as agriculture, leisure parks, etc. (Monzon and Echeverria 1997).

Table 1: Examples of Accessibility-Based Land Use Innovations

		Geographic Scale	
		Local	**Regional**
Travel Reductions Targeted	**Non-Work Travel**	New urbanism	Accessibility-based location of regional facilities
	Work Travel	Transit villages	Jobs housing balance

These families of approaches are referred to in this study as the "accessibility-based" land use forms. Despite their obvious differences, in transportation terms, they share a common underpinning: seeking to reduce the need for some automotive travel, rather than accommodating car use alone. While in some planning and transportation circles development of these options appears to be self-evidently desirable, they remain controversial in the broader research and policy communities. A number of observers have questioned the capacity of these options to produce the desired transportation outcomes, such as reduction in VMT or congestion. As a consequence, the planning interventions into market processes that are presumed to be required to bring these options to fruition are seen by some as lacking sufficient scientific basis. Where such uncertainty remains, many would argue, planning should leave outcomes to the market, and not focus on imposing accessibility-based development forms.

The Controversy over Accessibility-Based Land Use Forms

Those who have advocated accessibility-based development forms as a key element of transportation policy have generally accepted similar terms of debate. Like observers more skeptical of reliance on these land use approaches (e.g. Crane 1996, Giuliano and Small 1993), proponents (e.g., Cervero 1996, Frank, Stone and Bachman, 2000) have explored whether benefits in modification of people's travel behavior are established with sufficient scientific confidence to justify the planning interventions presumed to be required to bring these development forms about. The difference lies in the conclusion reached, not especially in the question asked. The divergent policy conclusions stem either from differing perceptions of the quality of the scientific evidence of the travel-reducing capacity of these development forms, or from normative differences in the evidentiary threshold required justifying planning interventions. The fundamental question of whether the transportation payoffs justify the planning interventions is shared by many of the parties of this debate.

In contrast, this study does not seek to resolve claims regarding travel behavior impacts of the accessibility-based development forms. Instead, we suggest that scientific evidence regarding a complex phenomenon that is not amenable to controlled experimentation, such as that of travel behavior impacts of alternative land use forms, is likely to remain mixed, and subject to conflicting interpretations. But this scientific uncertainty hardly precludes the alteration of exclusionary policies that maintain the status quo in terms of metropolitan development.

The perspective of the transportation and land use analysts contrasts markedly with the views of the economists described above. The former seem to be asking whether or not there is enough science to justify interventions into the land use market to bring about innovations including increased residential densities. The latter tend to accept that existing interventions, in the form of land use regulation, have the effect of keeping densities below market levels—but view that outcome positively on the basis of efficiencies of public good provision. This study seeks to merge the perspectives by acknowledging the limitations on denser (and by extension, transit- and pedestrian friendly) development that current regulatory practices impose, but by questioning the fundamental desirability of that regulatory outcome.

<u>The Role of Land Use and Transportation Practices</u>

At first blush, the notion of policy and planning being employed to exclude accessibility-based alternatives may appear surprising. A conventional view seems to equate sprawling metropolitan forms with uncontrolled market forces, with the planning function seeking to encourage alternatives to sprawl. But anecdotal observations of the workings of the municipal planning function appear inconsistent with this view. In general, zoning ordinances limit densities or floor-area ratios to a given maximum, rather than setting a floor. In most areas, land use regulation still seeks to separate land uses, limiting mixing of housing with commercial uses, or even housing of different income levels or physical forms. Minimum lot size requirements are a particularly pervasive form of regulatory control in newly developing areas. Transportation regulations frequently specify wide street widths and minimum parking requirements. In other words, embedded in the regulations of scores of thousands of units of local government is a design template that is largely inimical to the accessibility-based innovations described above. Only when that regulatory template is *relaxed* can innovative development appear.

Examples of this phenomenon can be found in numerous reports from around the United States of developers seeking to build in a more compact, accessible or mixed use fashion than regulations allow. Then having their designs rejected or modified through the planning process to conform to locally desired low-density patterns. Frequently the prescription from the planning authorities is to return with a plan for conventional single family development on the site in question. Several examples follow:

From *The Tennessean*, October 8, 1999

> An unusual proposal to plant a mini-village on a country road west of Murfreesboro is dead. Murfreesboro planning commissioners voted Wednesday night to deny a zoning plan that would mix stores, offices and homes on 250 country acres off Florence Road…. Commissioners asked developer Roy Waldron to return with a zoning plan for single-family homes, city-planning commissioner Chris Bratcher said… The commission's decision effectively kills a proposal reminiscent of an increasingly popular form of planning. In this kind of planning, the developer creates a village by mixing stores with apartments and homes of various sizes on variously sized lots. Sometimes the village has a school, or a village green. For example, Walt Disney Co. built such a town in Florida in which every detail was meant to foster a sense of community….

From *The Atlanta Constitution*, October 8, 1999

> "Smart growth"… means building higher density, mixed use developments closer into town and easily accessible by transit. So MARTA and BellSouth tried to do just that, planning a 50-acre complex of offices, residences and shops that would surround the Lindbergh MARTA station. Is everybody happy then? Nope… the Buckhead Neighborhood Planning Unit has voted 19-7 to reject the plan." *(Authors' note: a scaled back version of the transit village was ultimately approved, but a 39-story condominium complex was eliminated from it).*

From the *Albuquerque Journal*, December 14, 1999:

> Councilors rejected a plan Monday that would have allowed a high-density housing development, despite arguments the project fulfills a new city growth policy…. Much of the discussion Monday centered on Resolution 70, a growth plan approved by the council in September that emphasizes infill development in established areas as a

> way of discouraging sprawl. The plan also calls for encouraging higher-density housing along transportation corridors… Ronald Bohannan, a consultant to project developer Sean Gilligan, said the project fulfills the intent of R-70 by providing new high-density housing in an established area of the city along bustling Tramway Boulevard. Councilor Alan Armijo, the only councilor to express support for the development, said the city needs to begin approving decisions that promote infill development. "We're never going to solve the infill problem if we don't start somewhere," Armijo said… After the vote, Planning Commissioner Susan Johnson said the proposal's defeat shows the difficulties the city faces in implementing infill policies.

These stories describe the planning function being used to reject or limit New Urbanist-inspired development (in the Tennessee case), transit village construction (Atlanta), and conventional infill development (Albuquerque). In all cases, the agents of densification were not public planners, but developers seeking profits from a market they judged to support such dense construction. If these stories are representative, they suggest that the debate on the accessibility-based development forms has unwittingly turned the planning–versus–the market argument on its ear. In growing, highly accessible areas, it may be that the land development market tends towards greater density, accessibility and mixed-use development than planning regulations and practice allow. If this were the case, then analysis of the impact of urban form on travel behavior—while an interesting and valid scientific endeavor—would not be especially relevant as justification for the allowance of such alternatives.

None of this is to suggest that planning take a hands-off approach to development of the accessibility based alternatives. Clearly, the planning function can be employed to designate and reserve areas for higher density or transit-oriented development. This function can be particularly useful in order to achieve critical mass in such areas; a laissez-faire approach would subject territory that might be appropriate for accessibility-based development to the vagaries of business cycles and the habits of a particular developer. But while planning can designate and enable such development, it requires private developers who see profits to be made to actually carry out the development. Planning can facilitate market forces that tend towards accessible development, but can hardly create such development when no market exists for it. An example is found in the following story:

From the *Denver Rocky Mountain News*, October 4, 1999

> The city wants to build a "test" development project that includes a mix of residential housing with retail and commercial uses. The idea is called "new urbanism" because it harkens back to the old mixed use neighborhood… On Monday the city council gave the go-ahead to seek proposals from developers for a mixed use project. One developer has expressed an interest to do such a project.

Thus, the city can signal its interest, but then requires private developers who see profits to be made before the concept can be implemented. In this sense, the actions of the planning authorities are permissive in nature rather than command-and-control; if such development offered developers only subnormal profits, they would seek greener, and more profitable, pastures elsewhere. Where a city misjudges and designates a transit village or New Urbanist zone for which there is insufficient market, the land would presumably remain vacant until the profit situation changed, or the city relented with its designation.

In this case, the city apparently judged the potential for New Urbanist development correctly, based on a report a year and a half after the original:

From the *Denver Post*, June 10, 2001

> Continuum Partners starts construction this week on a $220 million urban village in an unlikely place: an undeveloped field in Westminster. The Denver real estate developer hopes to carve a new pattern in the land of suburban sprawl. With its narrow streets, front porches, back alleys and urban-style townhouses, the 120-acre Bradburn development will bring a new look to suburban development. … In late April, the Westminster City Council agreed to revamp its zoning rules to let Continuum build its brand of denser, more urban-style development at West 120th Avenue between Interstate 25 and U.S. 36.

It is notable that in order to implement its 1999 decision supporting such development in principle, the Westminister City Council needed in 2001 to relax restrictive zoning that would have prevented the development firm from building to its desired densities. In other words, successful development of a new urbanist neighborhood was contingent on liberalization, not tightening, of land use regulations.

> The argument about planning regulations limiting innovation in land use development is hardly a new one. But it seems barely to have infiltrated the debate surrounding the accessibility-based development forms, whose legitimacy is still broadly construed to hinge on demonstrable travel behavior impacts. Only when the two issues are juxtaposed does the alternative rationale for accessibility-based development—one based in household choice, rather than in VMT reduction per se—become apparent.

HOUSEHOLD CHOICE: FROM DEVELOPERS AND PLANNERS TO (MISSING) RESIDENTS

When planning regulations exclude or limit accessibility-based development forms, they restrict the ability of those households that would have occupied such neighborhoods from getting what they want in a transportation and land use environment. Developers become successful by accurately judging markets; those who fail at this task too often will go out of business. Thus one can conceive of an action excluding a high-density transit village, for example, as the equivalent of denying several hundred households the opportunity to reside in what would have been their preferred residential environment. In municipal political processes, these households hardly constitute a potent political force, as they are likely not to be current residents of the community in question. This force is routinely overlooked in local debate with (usually long-time) residents over new types of residential development and in discussion about appropriate land use policies, geared as they are towards past patterns rather than future trends.

Moreover, these households are not likely to understand the process by which they had been excluded or even to identify themselves as excluded by governmental regulation. Instead, these households' perception of the processes involved will be filtered through the market and translated into unaffordable prices or rents for the kind of housing they might prefer. Households that would have occupied dense housing near a transit station—for example near the 39 story condominium tower that was excluded by regulation from the area of the Lindbergh MARTA station in Atlanta—might find its desired neighborhood unaffordable, but would probably not understand the process by which it was excluded from its first choice. Such a household, in all likelihood, would quietly opt instead for lower cost housing elsewhere; given the paucity of transit-oriented development, such location would probably be in automobile oriented districts. (Having now located in such an area, households may well find themselves opposing proposals for higher density development in their neighborhood, thus completing the systematic cycle of exclusion of denser, more accessible development forms.) If the processes hypothesized here are highly influential, then households' choices could be constrained to the point that choices become a deteriorated indicator of actual preferences. This would limit the capacity of studies of revealed preference to impute the motivation of households for choosing between given zones or housing types from their actual choices.

However, the phenomenon of constrained residential choices would be observable as a weak connection between households' preferences for transportation and land use environments and their actual residence in such environments. Where choices are less constrained, households should be able to forge a better "fit" between their preferences and their choices. Thus the relative impact of choice-reducing constraints on development of alternative neighborhood forms may be observed as a weaker linkage between preferences and choices in the more constrained area as compared with the less constrained. In other words, where a range of choices of neighborhood types is readily available, households can be expected to sort themselves out according to their preference; where constraints limit the availability of alternative choices, less of this self-directed sorting would go on. This perspective can partially overcome the limitation of revealed preference studies that are restricted by constrained choice sets.

In order to assess the degree of fit between household preferences and neighborhood choices, it was necessary to classify different urban forms at the neighborhood level, and the physical characteristics that typify them. This question is explored in the next section.

CHAPTER THREE

NEIGHBORHOOD FORMS AND CHARACTERISTICS

A metropolitan-wide classification of neighborhoods according to their transit/pedestrian or automobile orientation will necessarily rely on spatial data that are available consistently across the regions under study. This project seeks, however, to base its use of such data on current thinking in urban design. Brower (2000) proposes a classification of neighborhoods based primarily on qualities perceived by residents and tested through surveys. The four types which emerge from this research are: center—a cosmopolitan, active, lively type of neighborhood; small town—a settled, familiar, friendly type of neighborhood; residential partnership—an exclusive, homogeneous, family-directed type of neighborhood; and retreat—a type of place where one can find respite from people and pressures. While these neighborhoods describe the general correlation between physical characteristics and lifestyle patterns, our focus in this study is to examine the physical characteristics, or variables, that distinguish the nature of neighborhoods (e.g., pedestrian-oriented, transit-oriented, automobile-oriented, or a mix of orientations).

By dissecting classifications of neighborhood types (e.g., in Brower 2000), we focus more specifically on several aspects, such as density, land use, layout, and amenities. The bases for neighborhood types by physical characteristics, then, are combinations of these aspects. However, neighborhood types are neither clear nor absolute; rather they are combinations of aspects that serve to highlight major physical characteristics and the differences amongst those combinations. In developing a cluster of significant and relevant neighborhood typologies, one has to acknowledge physical characteristics that residents recognize explicitly (e.g., whether they have to cross a busy arterial or walk through parking lots), or those found to be implicit that serve as proxies (e.g., higher density as a proxy for potentially higher social interaction, and abundance of sidewalks and footpaths as a proxy for potentially higher walkability). We also have to go beyond standard, empirical-yet narrow-measures such as degree of density and number of different uses, and incorporate variables such as distance to major destinations, and variety of transportation modes in order to more fully grasp the richness and complexity of neighborhoods. With these qualifications in mind, we can now examine some of the major physical characteristics of residential neighborhoods that are most relevant to the study at hand—especially those which create pedestrian-oriented, transit-oriented, and/or automobile-oriented neighborhood forms.

DENSITY

Objective density in residential neighborhoods refers to gross residential density as measured by people per acre and housing units per acre, and provides an overall sense of density in terms of proximity to neighbors, but also to work, school, retail, and other services. Other common measures of objective density includes: net residential density, which is total households per residential acre; gross population density, which is the total population per total acres; net population density, which is the total population per residential acre; gross employment density, which is the total employment per total acre; and net employment density, which is the total employment per commercial and industrial acre.

Subjective density refers to residents' experience of density; measured, for example as percentage of neighborhood area as open space, percentage of neighborhood area as green space such as parks and gardens, a sense of scale such as absolute dimensions of open spaces where 40' in any single direction is intimate, 80' is human, and a maximum of 450' constitutes a successful urban square, and a sense of proportion via height/width proportions of enclosures such as buildings and streets (Lynch and Hack 1984). The quality of density may be measured by the amount of vegetation and cover (as seen from aerial photographs and plans which indicate green spaces, greenways and landscape treatments); the grain or density of street network (e.g., average block size); land subdivision: pattern of lots (average parcel size); lot coverage: percentage of lots covered by built objects; size of land parcels: smallest, median, largest acres or square foot areas; and street-widths as measured by right-of-way dimension (property line to property line on either side of the street) and number of lanes.

LAND USE

The types of land uses most significant for neighborhoods are residential and those closely related to it, such as public buildings, institutional (e.g., school or civic), and retail businesses. The number and variety of land uses in and near a particular neighborhood are also important. The most relevant uses to residential areas are employment (e.g., offices and commercial), retail (e.g., grocery and convenience stores, pharmacies, laundries, barbers, restaurants, shopping malls, banks), recreation (e.g., parks and recreation centers such as gymnasiums), education (e.g., day care centers, schools, universities), and services (e.g., libraries, health clinics).

According to a survey in Florida (Audriac 1999), the order of importance for residents to access other land uses is as follows: (1) parks, (2) shopping (e.g., grocery and convenience stores, pharmacies, laundry and dry cleaning), (3) community services (e.g., post office, church, library), (4) employment, (5) cafes and restaurants, and (6) entertainment (e.g., movies, theatres). Accessibility to such uses can be measured by walking distance (average 5 minutes or 1/4 mile and maximum 10 minutes or 1/2 mile), within walking and transit distance (30 minutes or so), and within automobile reach (10-15 minutes driving time, which equals 5-8 miles driving distance at 30 miles per hour). A variety of land uses can also reflect the diversity of a community; for example, heterogeneous lifestyles as reflected in housing types (e.g., income levels, marital status reflected in housing size and tenure such as rental versus ownership); and heterogeneous life cycle stages as reflected in housing types (e.g., singles, families with children, empty-nesters as reflected in small apartments, single-family detached homes, or assisted living complexes).

LAYOUT

The layout of a neighborhood includes (a) spread (e.g., distance between destinations, distance between buildings); (b) grain (e.g., average lot sizes and average house sizes including smallest, median, and largest); (c) origin/destination travel patterns (e.g., diffused or concentrated; concentration/dispersal of employment); (d) grid pattern of streets (e.g., easier pedestrian and car access, but also higher traffic and thus less attractive for families with children); (e) spatial quality (e.g., looseness such as free-form and objects floating in space versus tightness such as defining streets, providing definition to open spaces, establishing edges); and (f) road system orientation (e.g., feeding onto limited arteries and freeways, or shuttling vehicles within the area, or a combination thereof).

Other aspects of layout include (g) geometric pattern (e.g., linear, radial, grid, cluster); (h) legibility in terms of orientation (e.g., principal entries and exits, relationship to surrounding areas, location within neighborhood); (i) identity (e.g., distinct character of neighborhood, social and historical associations with physical place); (j) grain (e.g., intersections per square mile, blocks per square mile or average block size, building coverage—figure-ground, and number of lots of land or average lot size). In the book, *Great Streets* (Jacobs 1993), the grain of urban fabric is demonstrated by intersections per square mile, where fine grain is 200 and above (e.g., Portland 351, central San Francisco 274, Boston 261, downtown Manhattan 218, central Oakland 208); medium grain is

150 to 200 (e.g., Santa Monica 185, central Los Angeles 171, midtown Manhattan 159, Washington DC 155); and a coarse grain urban fabric is 150 and below (e.g., residential areas of Irvine 119, central Walnut Creek 116, suburban Los Angeles 81, business complex at Irvine 15). The looseness or tightness of the built fabric can also determine grain, such as that of free form objects floating in space versus defined edges in a continuous fabric. A sense of scale refers to: (a) dimensions, (b) definition (e.g., sense of enclosure determined by height/width proportions, and edge as determined by tangible boundaries), and (c) proportion (e.g., width of streets and open spaces to height of surrounding buildings).

AMENITIES

Amenities—such as prominence of natural features, type of landscaping, and style of architecture—are crucial to the qualitative, and often hard to quantify, aspects of neighborhoods. Landscaped features may be determined by examining number of open spaces per square mile; open space coverage as percentage of total neighborhood area; and amount of as well as types of vegetation. Often, neighborhoods are dominated by or designed around major natural features, such as a lake, river, hill, or woods. At a smaller scale, one can examine the type of landscaping which is prominent in a neighborhood, such as a lush and green type or a paved hardscape with street furniture. However, landscaping is most effective when serving both a utilitarian and an aesthetic purpose; for example, mitigating high vehicular traffic areas via visual and noise barriers of dense plantings. The quality of architecture impacts the overall feel of a neighborhood by the degree of prestige associated with architectural style, richness of materials and details (i.e. durability and variety), and designated historic district. However, amenities can also influence accessibility—a major focus of this study—by supporting or detracting from choices of modes of travel (e.g., walking, bicycling, automobile, bus, train, van, etc.). Thus, bicycle paths may be absent or present, limited or extensive. In the following paragraphs, we discuss amenities that are pedestrian-oriented, transit-oriented, and automobile-oriented.

Pedestrian-oriented amenities include: (a) design of separate lanes for slow and fast traffic, slowing traffic and pedestrian safety via curbside parking, landscaped medians and sidewalk, necking of intersections, special paving or creation of pedestrian tables at street crossing, etc.; (b) absence, presence or abundance of activities in public spaces such as walking, talking, sitting, jogging, bike riding, walking pets, rollerblading, and children playing; (c) traffic mitigation: absence or presence of landscaping (trees, shrubs, planters, grass) as buffer between traffic and pedestrians for screening visual impact, noise, and providing privacy to housing units facing road; (d) quality of experience (visual stimulation: landscaping, views, pavement design); sidewalk length in proportion to roadway length; and (e) nine percent parking; that is, when more than 9% of a 10 acre area is devoted to surface and garage parking, people feel that it is no longer pedestrian oriented—an environment for people versus one for cars (Alexander et al. 1977). An example of a pedestrian-oriented amenity which contributes to the character of a neighborhood is an accessible green, which is a public open green space (e.g., park, garden, trail) about 3-5 minutes from every house (Alexander et al. 1977). Pedestrian orientation is also reflected in the adequate design of paths, where they are 3 feet wide for one-way walk, 3 feet for bench, 4 feet for two-way walk, 8 feet for two-way walk for 4 pedestrians, and 2 feet 6 inches for planter or curb next to road (Hoke Jr., 2000).

Transit-oriented amenities can be measured by the number of bus routes, number of bus stops, number of subway/light rail routes, number of subway/light rail stations; and the quality of transit stops—for example, simply a sign attached to a pole planted in the ground as a bus stop, or a bus shelter with a bench, lighting, garbage can, newspaper kiosk, public telephone and paved (rather than dirt or gravel) ground. A public transit interchanges can be surrounded by housing and workplaces which cater to those who need public transit, be continuous with the pedestrian network of sidewalks and paths, and not interrupted by large parking lots or other barriers, and with a transfer distance of 300 feet if possible and a maximum of 600 feet (Alexander et al. 1977). At a larger scale, an entire transit village (Bernick and Cervero 1997) includes physical characteristics such as the congregation of housing, retail, and employment around transit stations, pedestrian-oriented amenities such as ample sidewalks and walkable destinations from the transit station, a mix of housing types which includes affordable housing, and places for public gathering, celebrations, parades, performances, and protests.

Automobile-oriented amenities include: (a) parking: percentage of parking in terms of open space and in terms of total neighborhood area, and quality of parking in terms of preponderance of large empty parking lots or small landscaped ones; (b) automobile surface areas: percentage of total neighborhood area and total open space area as roads and parking; (c) proximity: to major roads and regional arteries; (d) traffic flow: presence of high volume roads—cars per day, average speed or speed limit; and (e) presence and/or dominance of roads: average street widths/right of way.

A good qualitative measure of the relative automobile-, transit-, or pedestrian-orientation of a neighborhood is to observe not only the physical character, but also the activity at major intersections of a neighborhood. For example, it is not uncommon to observe wide roads, long crossing times, and few sidewalks in the suburban areas of American cities. Furthermore, one can sense the trepidation of pedestrians—especially the elderly—in attempting to cross wide arteries with fast moving traffic, even with crosswalks and signals. Similarly, a transit stop at an intersection which consists of just a pole and a sign, versus one which includes a shelter, bench, lighting, trash can, newspaper vending machine, and a public telephone communicates vast differences in the priorities of that neighborhood towards transit.

We examined some of the characteristics listed above in the clustering of the different types of areas using geographic information systems (e.g., population and employment densities) as well as the on-the-ground photographic documentation and analysis of case study neighborhoods within each type of cluster (e.g., presence of pedestrian-, transit-, and automobile-oriented amenities), as will be seen in the following sections.

CHAPTER FOUR

STUDY METHODOLOGY

DEVELOPMENT OF NEIGHBORHOOD TYPOLOGIES

In order to analyze the closeness of fit between households' preferences for land use and transportation environments on the one hand and their choices on the other, a scheme needed to be developed by which the territory of metropolitan Atlanta and metropolitan Boston would be divided into neighborhood types. Ideally the transportation and land use meaning of a given neighborhood type would be as close as possible between the two regions. This process was implemented through a cluster analysis that defined five neighborhood types in each of the two regions—corresponding roughly to "Central Business District," "other central city," "inner suburban," "middle suburban," and "outer suburban/exurban"—and assigned all neighborhoods to one of the five types.

DATA SOURCES AND VARIABLES

Development of such neighborhood typologies was based on geo-referenced data that were available throughout the two metropolitan areas. These did not include all data that would assist in such neighborhood characterization; some desired items, such as sidewalk presence and continuity were not available on a metropolitan-wide scale. Thus while this study has the advantage of analyzing all neighborhoods throughout two metropolitan areas (as opposed to neighborhood specific studies), it is more limited in the site-specific data that it can employ. Spatially referenced geographic information system (GIS) base coverages and sources for each metropolitan area is detailed in Table 2.

Table 2: Sources for Geo-Referenced Data

Coverages	***Atlanta***	***Boston***
Street Network	ESRI	ESRI
Transportation Modeling Network	ARC	CTPS
Land Use Coverage	ARC	www.magnet.state.ma.us.
Rail/Subway	Dogwood.gis.gatech.edu	CTPS
TAZ boundary	Dogwood.gis.gatech.edu	CTPS/Department of Urban Studies and Planning, MIT
MCD/Town/County Boundary	ESRI	ESRI
Block Group Boundary	ESRI	ESRI

Notes:

ARC: Atlanta Regional Council (Atlanta MPO)

CTPS: Central Transportation Planning Staff (Boston MPO)

ESRI: Environmental Systems Research Institute Data & Maps CD set dogwood.gis.gatech.edu: a web site maintained by Dr. William Backman of the Georgia Institute of Technology.

www.magnet.state.ma.us: Massachusetts state GIS web site

Tabular data assembled for the study included: 1995 population, household and employment by travel analysis zone; congested speed (estimates) and number of lanes for the transportation modeling network; zone-to-zone travel time by automobile and public transportation; and transportation friction factors by travel time. The sources for all these data items were the respective Metropolitan Planning Organizations (MPOs) for the two regions.

The study area is defined as the ten-county area of the Atlanta Regional Council and the 101-town region of Metropolitan Boston, the area of the

Boston MPO. The two areas are roughly comparable in population, with 1.1 million households in metropolitan Atlanta, and 930,000 in the Boston region, though the land area of the much more densely built Boston is considerably less: 1400 square miles as opposed to 3000 for metropolitan Atlanta. The geographical unit of analysis is the travel analysis zone (TAZ). TAZs are geographical units developed for transportation modeling purposes; they are sized to contain roughly 2000 residents and/or employees, and to serve as a logical neighborhood unit for purposes of transportation analysis. The Atlanta study area is divided into 928 TAZs, while the Boston region contains 613 such zones.

Based on the urban design concepts described above, variables used to characterize the neighborhoods are listed in Table 4. Three classes of variables were employed: density variables, road network characteristics, and regional and local accessibility indicators.

DENSITY VARIABLES

Population and employment densities are the primary gauges of concentration of activity within a TAZ. The two were computed differently; whereas the denominator for population density was total residential land in a TAZ, employment was counted on the basis of total area. This was because of the differing meaning of the two types of density. A clustered village surrounded by open space is considered here to be a relatively dense living environment; hence the nonresidential land was netted out of the residential density calculations. In contrast, a small island of dense employment does not render the neighborhood a significant job center; for this reason, employment divided by total land area was used.

ROAD NETWORK CHARACTERISTICS

As described above, urban form is significantly shaped by the characteristics of a neighborhood's street network. Walkable neighborhoods tend to be characterized by a fine-grained street network, indicated here by intersection density and street length density. Greater connectedness of a street network can shorten walking distances; thus the percentage of "T" intersections can distinguish more connected grid or grid like networks from those dominated by cul-de-sacs or other partially connected forms.

For transportation-modeling purposes, both MPOs maintain a transportation-modeling network that contains all major roadways in the region. These modeling networks include average number of lanes and estimated peak hour speeds as two basic link attributes. This study takes advantage of these modeling network attributes to calculate average speed and number of lanes by TAZ. Walkable neighborhoods tend to be characterized by relatively narrow and slow speed streets, which are easier and more inviting for pedestrians to cross than fast, wide arterials. For this reason, the travel speeds and number of lanes on links within the region's transportation modeling network were included as characteristics of the neighborhood these main routes border or traverse.

Regional and Local Accessibility

Metrics was developed to characterize the ease with which residents in a given TAZ could access destinations locally and regionally. Three scales were considered here: the walking scale of destinations within one quarter mile; the cycling or very short transit or auto trip of destinations within two miles, and the regional scale, incorporating accessibility to employment destinations throughout the respective regions.

Local Accessibility: Quarter Mile and Two Mile Scales

At the very local scale, accessibility is viewed here as a function of land use mixing, or the coarseness or fineness of the "grain" with which an area is developed. For example, strictly land use separated residential areas that offer few nonresidential destinations within a short distance (defined here alternatively as one-quarter mile and two miles) are viewed here as offering poor local accessibility. Two dimensions, the intensity and the variety of land use mixing are captured here. "Intensity" refers to the extent to which a land use referred to in is proximate to different land uses in Table 3. That is, the intensity measure for a grid cell—both the quarter mile and two mile cells—is the total number of cells surrounding it with different land uses. Thus a residential island in the midst of a business district would score very highly on this measure. However, the measure does not capture the variety of opportunities available from a particular locale; for example it fails to distinguish the residential zone surrounded by commercial land uses from a similar zone adjacent to, say, commercial, recreational and institutional uses. For this reason the "variety" measure was developed, and is equal to the number of uses in surrounding cells that are different from the use of the a cell in question. For any TAZ, the score on these measures was the average score of the cells in the zone.

Regional Accessibility: Automobile and Transit

In contrast, measures of regional accessibility require a view beyond the immediate neighborhood, and need to capture the ease with which one can access destinations throughout the entire metropolitan area. Clearly, more remote destinations contribute less to the accessibility of a zone than closer destinations; similarly, proximity to larger concentrations would contribute more than access to smaller ones. The specific tradeoff between amount of distance to a particular destination is gauged here through the use of “friction factors,” a product of travel demand modeling. People’s travel between zones is observed to increase with decreasing distance of the zones and increasing travel opportunities at the destination zone; friction factors are the empirically fitted parameters designed to describe this variability in interaction between zones as a component of the regional transportation modeling process. As such they were seen as a basis for gauging the impact that other zones throughout the region have on the accessibility of a given zone.

Numbers of jobs were used as the definition of the size of the destination zones. This was done for two considerations: (1) Despite the growth in nonwork travel, accessibility to employment has been shown to be the single most influential determinant of residential location within a one-hour commuter shed (Levine 1998); (2) Employment can also serve as an indicator for non-job related travel destinations. That is, zones containing schools, shopping or recreational destinations will also display the jobs located at those sites.

Two measures of regional accessibility are utilized within the clustering model. The first is based on highway travel time and indicates regional accessibility for people traveling by automobile. The second is the ratio of transit accessibility to automobile accessibility, which is intended as a measure of the relative position of transit for a given zone.

Table 3: Land Use Categories Used for Land Use Mix Measures

Residential, single family—high density (lot size < 0.25 acre)
Residential, single family—medium density (0.25 acre < lot size < 0.5 acre)
Residential, single family—low density (lot size > 0.5 acre)
Residential, multiple family, including mobile home parks
Commercial
Industrial
Recreational
Institutional

Table 4: Variables Used in to Characterize Neighborhoods

Variable	***Definition***	***Comments***
Density Variables		
Population Density	Total population divided by total residential land	Residential land extracted from land use GIS coverage. This variable used in natural log form for cluster analysis.
Employment Density	Jobs divided by total land area	Used in natural log form.
Road Network Characteristics		
Percentage "T" Intersections	The number of "T" intersections (as opposed to 4-way or more intersections) divided by total intersections	Indicator of connectedness of a street network
Intersection Density	Intersections per square mile of total land area	Used in natural log form.
Street Length Density	Total roadway length divided by total land area	
Average Speed	Average congested speeds of major streets in and surrounding the TAZ	"Average speed" used created polygons bordered by links of the transportation-modeling network; these polygons were overlain onto TAZs and values calculated by weighted average of land area.
Average Number of Lanes	Average number of lanes in arterials in and surrounding the TAZ	Calculated in a similar fashion to average speed

Regional and Local Accessibility		
Automobile Accessibility	Accessibility to employment via the automobile network. For zone i, one of j total zones, $access_i = \sum_{j=1}^{n} f(c_{ij}) \times employment_j$ This is the denominator of the production constrained gravity model: $T_{ij} = P_i \times \frac{A_j \times f(c_{ij})}{\sum_{z=1}^{n} A_z \times f(c_{iz})}$ Where T_{ij}=Trips between zones i and j P=Trip productions A=Trip attractions $f(c_{ij})$=The friction factor associated with travel time c between zones i and j. z=all zones	For consistency of interpretation, friction factors estimated for Boston by the Central Transportation Planning Staff were used for both areas. The choice of Boston factors has little impact on results, as Pearson correlation (r) between the Boston and Atlanta friction factors=0.98. Friction factors: $f(c_{ij})=e^{-b(cij)}$ Where e=the base of natural logarithms b=a parameter empirically and iteratively estimated to maximize the fit between predictions of the gravity model (left) and observed distribution of trip lengths, times or costs.
Transit-Auto Ratio	Ratio of employment accessibility by transit to employment accessibility by auto. Transit accessibility calculated as automobile accessibility above.	Some TAZs offer no transit access; value become zero for these zones

Land Use Intensity: Quarter Mile	A measure of land use mixing: The number of surrounding quarter mile grid cells with a different land use from the center cell, averaged over a TAZ	This captures the number of cells of different land use from the starting point—regardless of how many different land uses are represented.
Land Use Variety: Quarter Mile	A measure of land use mixing: The number of land uses in surrounding quarter mile grid cells different from the land use of the center cell, averaged over a TAZ	This captures the number of different land uses represented, regardless of the number of cells each occupies.
Land Use Intensity: Two mile	As above, with two mile grid cells used	
Land Use Variety: Two mile	As above, with two mile grid cells used	

CLUSTERING METHODOLOGY

Implementation of the research design required the characterization of neighborhoods throughout the two metropolitan areas into neighborhood classes, based on similarity of transportation and urban design characteristics. In order to accomplish this characterization, a K-Mean cluster analysis (Aldenderfer and Blashfield 1984) was performed on TAZs of the two regions, utilizing the thirteen variables listed in Table 4. Cluster analysis is a family of techniques designed to group like cases on the basis of similarity across multiple dimensions. In order to render the meaning of the clusters as consistent as possible between the two areas, clustering was done for Atlanta and Boston in the same analysis; that is, the TAZs of the two regions were combined in a single data set, and clusters created without regard to the region in which they were located. In this fashion, the statistical meaning—if not the perceived land use and transportation implications—of a given cluster is the same between the two regions.

In initial clustering trials, the variables were all entered without transformation, with the exception of the regional accessibility variable, which tended to dominate other variables in defining the clusters because of its regular and smooth distribution. These initial trials yielded highly lopsided distributions that did not serve the purpose of creating useable neighborhood classes. These lopsided clusterings were the result of the presence of three highly skewed variables: density of population, employment and roadway intersections. In order to reduce the skewness and create a more even distribution of TAZs between clusters, the natural logarithm of these variables was used as the basis for clustering. After these transformations were performed, the regional accessibility variable was re-inserted, and the final set of clusters developed.

SURVEY METHODOLOGY

A survey was developed and pretested for conducting by telephone (see Appendix A for the detailed questionnaire). The survey focused on respondents' neighborhood and transportation preferences, regardless of the neighborhood in which the respondents actually reside. Many of the key questions were phrased in tradeoff format. For example, Table 5 lists pairs of statements; respondents were asked to indicate which statement they agreed with more, and then to assign a degree of intensity regarding their selected statement. The guiding philosophy was that many people hold a set of preferences that is internally contradictory; for example, they may want walkability on the one hand, but only low density, land-use separated development forms on the other. The idea of the tradeoff-styled questions was to force them into a choice between potentially contradictory elements of their preferences in order to ascertain which was a higher priority.

Table 5: Examples of Tradeoff-Styled Survey Questions

13a. I like living in a neighborhood where people can walk to places like stores, libraries or restaurants, even if this means that the houses and commercial areas are within a block or two of each other.	13b. I like living in a neighborhood where the commercial areas are kept far from the houses, even if this means that people can't walk to places like stores, libraries or restaurants.
14a. I like living in a neighborhood with single family houses on larger lots, even if this means that public transit is not available.	14b. I like living in a neighborhood with a good bus and train system, even if this means a neighborhood with a mix of single family houses and multifamily buildings that are close together.

The survey sample was developed through a random selection of individuals from the database of Experian, the credit reporting company. An initial check was performed to ensure that the distribution of individuals in the sample matched the distribution of population by community throughout each region; a chi-square analysis confirmed the match at greater than 99 percent confidence.

Initially, samples of 5,600 individuals were drawn in each of the two metropolitan areas. Contact was attempted with approximately 3000 households in each sample (first by postcard to alert respondents, then by phone call) with about 2000 individuals actually contacted in each area (Table 6). Numbers that were unanswered were attempted at least four times at different times of the day before the phone number was abandoned. Overall, 1607 individuals completed the survey for a response rate of 38.9 percent.

Table 6: Outcome of Attempted Survey Interviews

Outcome of Interview	***Total***		***Atlanta***		***Boston***	
	Count	%	Count	%	Count	%
Refused to participate	1878	45.5%	828	43.2%	1050	47.4%
Language Problems	160	3.9%	52	2.7%	108	4.9%
Callback Scheduled but not Completed	299	7.2%	136	7.1%	163	7.4%
Terminated Interview	66	1.6%	35	1.8%	31	1.4%
Deaf Barrier	119	2.9%	60	3.1%	59	2.7%
Completed Interviews	1607	38.9%	805	42.0%	802	36.2%
Total	4129	100.0%	1916	100.0%	2213	100.0%

In order to fashion a survey sample representative of the population in each region, it was necessary for the sampling percentages in each neighborhood cluster (Table 7) to match population percentages in the same area. Because of differing response rates in different areas of the metropolitan regions, weights were applied to construct a sample that would match this outcome. Calculation of weights (the ratio of population proportion to sample proportion by neighborhood cluster) is specified in Table 7.

Table 7: Calculation of Weighting Factors

	Atlanta Percentages			***Boston Percentages***		
Cluster	**Sample**	**Population**	**Weight**	**Sample**	**Population**	**Weight**
A	0.4%	0.5%	1.36	1.6%	2.6%	1.58
B	1.4%	2.9%	2.15	6.4%	17.3%	2.72
C	4.4%	8.4%	1.89	26.5%	34.6%	1.31
D	18.3%	27.9%	1.52	40.4%	33.2%	0.82
E	75.6%	60.3%	0.80	25.1%	12.4%	0.49

CHAPTER FIVE

LAND USE AND TRANSPORTATION CHARACTERIZATION OF METRO BOSTON AND METRO ATLANTA

The figures in this section portray the variables used in characterizing neighborhoods in Boston and Atlanta, and convey some significant differences between the two regions[1]. For example, the drop off in population density from center to periphery between the two regions is considerably more gradual in Atlanta (Figure 1), with overall densities being greater in the Boston region. In employment, Boston reveals a larger central area of concentrated employment density, while Atlanta is sharply characterized by freeway corridors of high employment concentrations (Figure 2).

[1] Key maps for identifying cities and towns within the two metropolitan regions are in Appendix B.

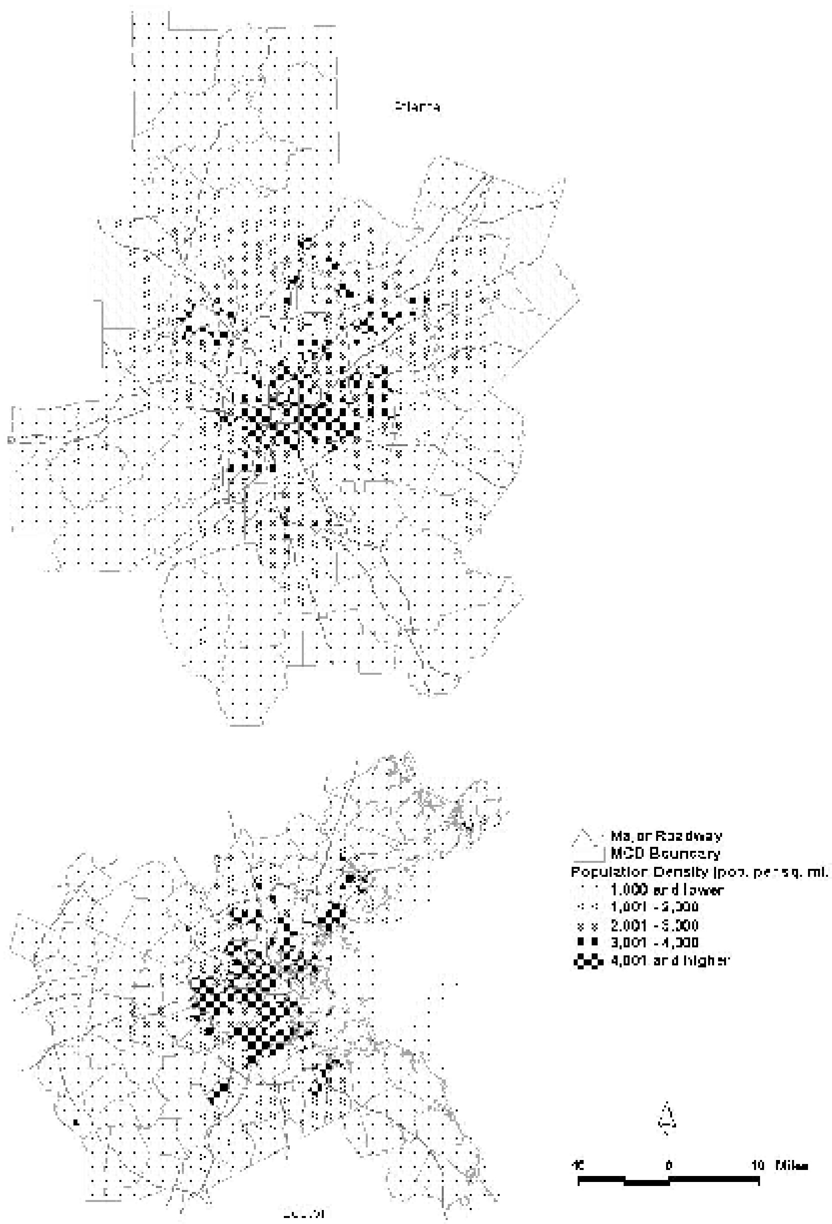


Figure 1: Population Density on Residential Land by TAZ, Atlanta and Boston, 1995

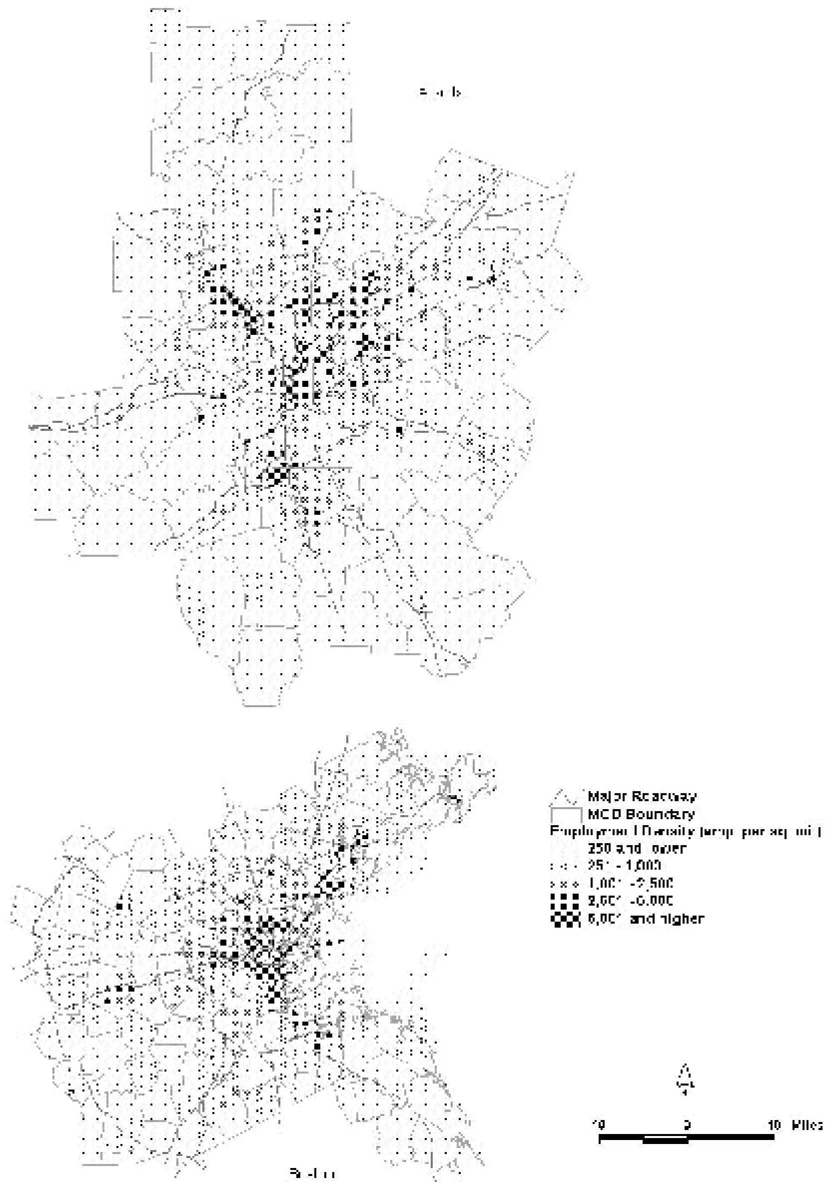


Figure 2: Employment Density by TAZ, Atlanta and Boston, 1995

Both Boston and Atlanta decrease in street connectedness from the center to the periphery, though Atlanta displays a number of zones with an extremely high percentage (95 percent and higher) of three way intersections (Figure 3). The grain of the intersections differs significantly between the two regions, with a larger area of dense street network at the Boston region's core (Figure 4). Modeled suburban peak hour travel speeds were considerably greater in Boston than in Atlanta (Figure 5) though arterial and highway widths, gauged here by number of lanes, tended to be considerably greater in Atlanta (Figure 6).

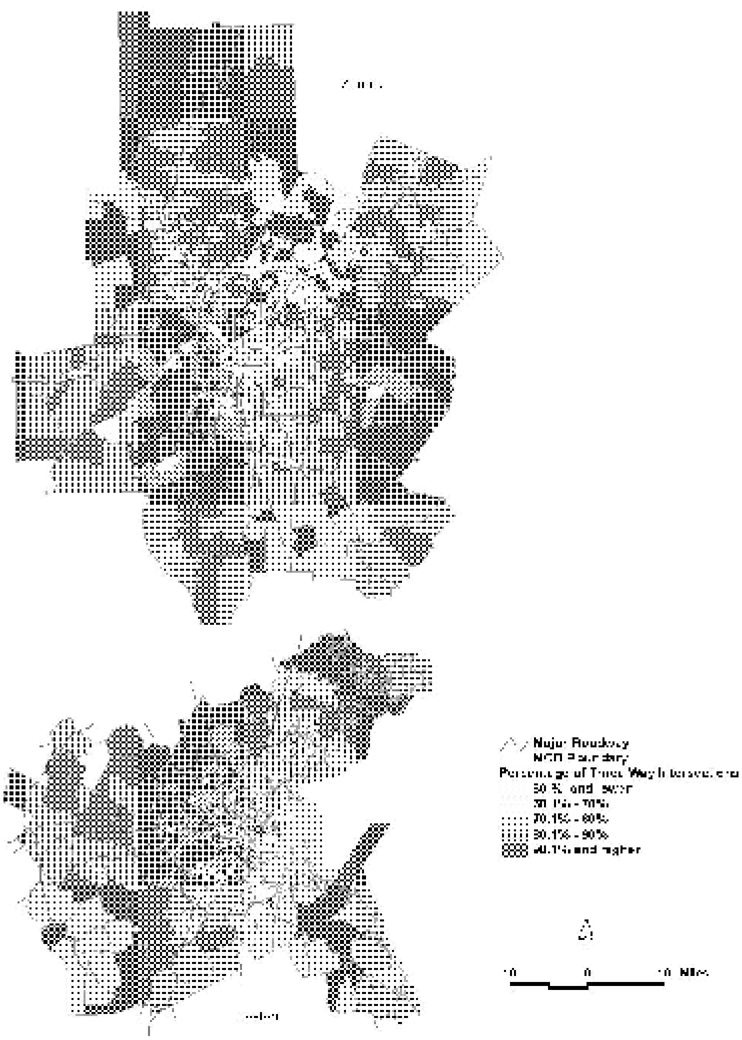


Figure 3: Percent of Three Way Intersections, Atlanta and Boston

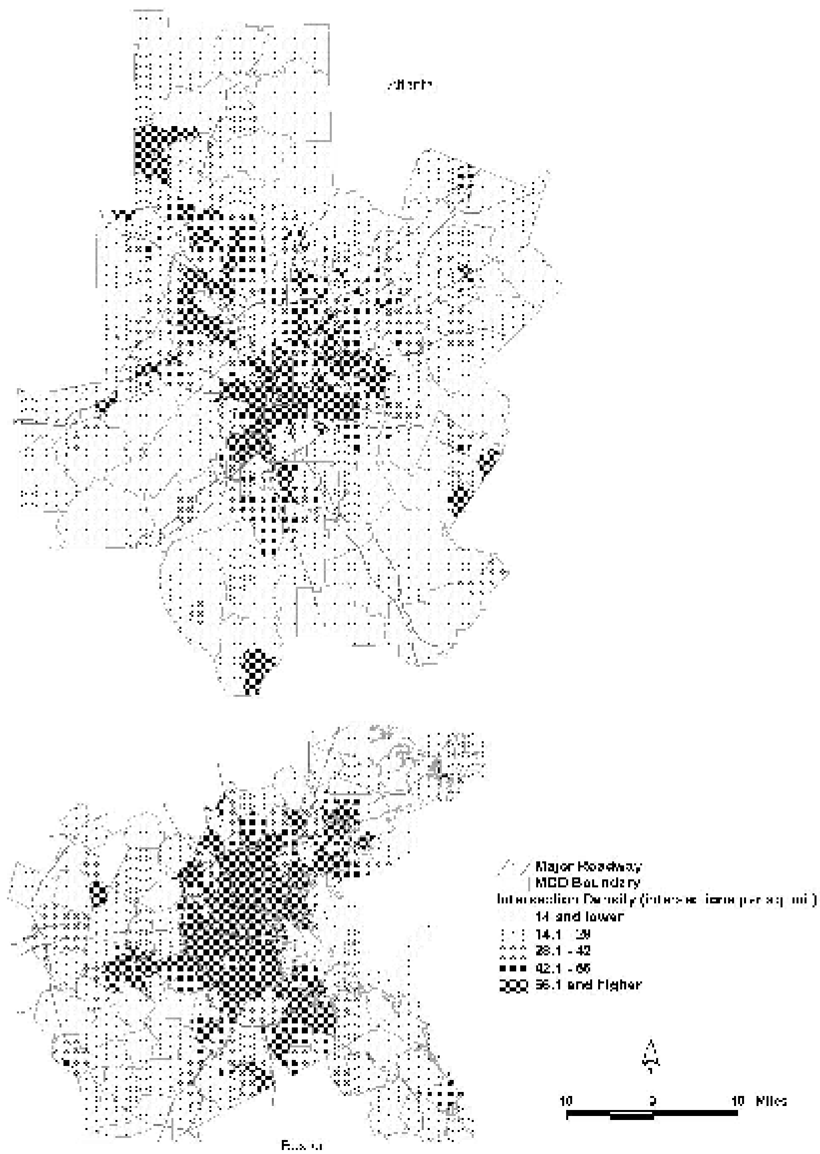


Figure 4: Intersection Density by TAZ, Atlanta and Boston

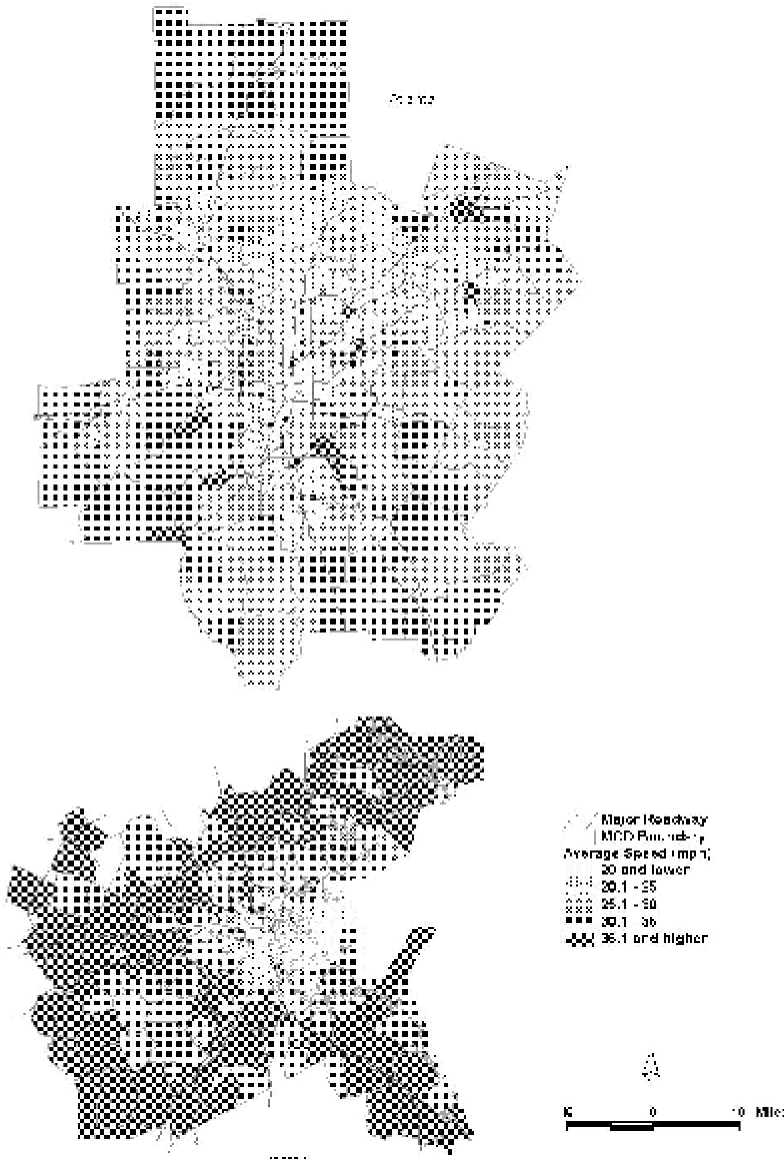


Figure 5: Average Peak Hour Speeds of Major Roads by TAZ, Atlanta and Boston

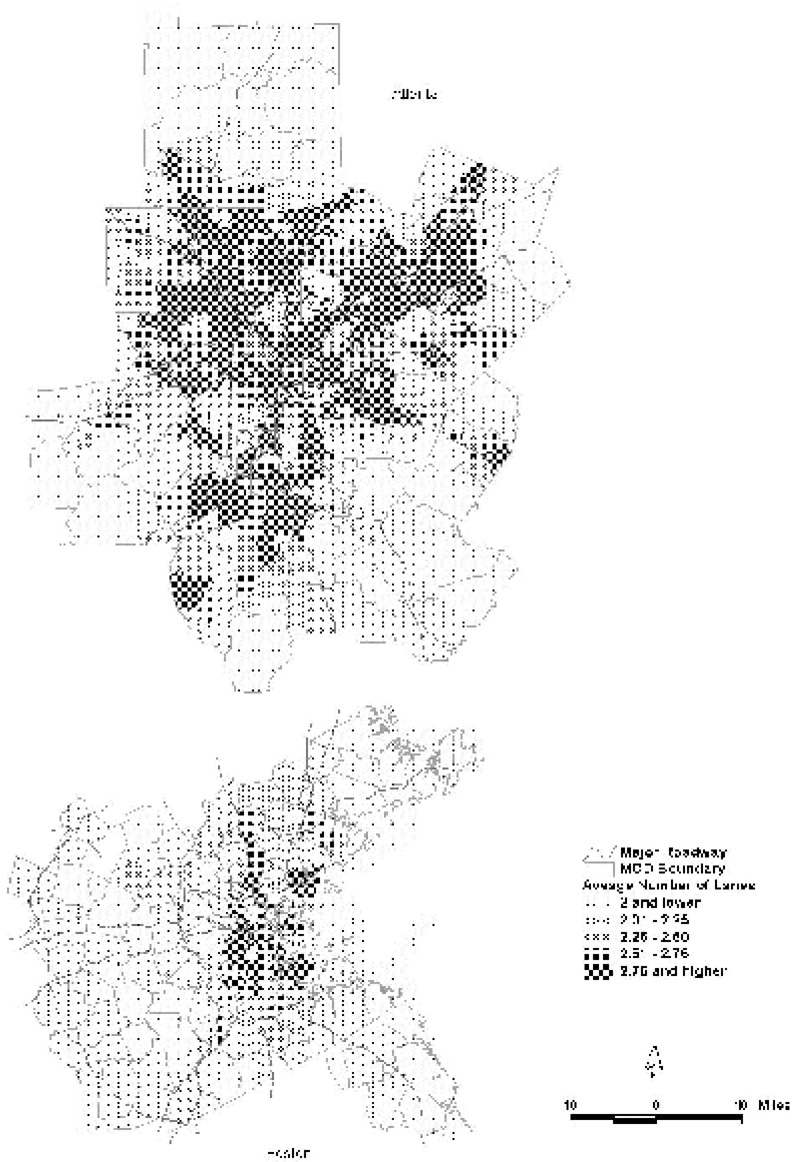


Figure 6: Average Number of Lanes on Major Roads by TAZ, Atlanta and Boston

Land use intensity patterns at the two mile scale revealed a greater degree of land use mixing in Atlanta—in terms of land uses different from those of a given central cell (Figure 7). In land use variety—based on the numbers of different uses—metropolitan Boston exhibited somewhat more mixing, (Figure 8) as a varied land use pattern tended to extend more into the Boston suburbs than in those of Atlanta. Notably, the most mixed areas in Boston tended to be a belt of neighborhoods in zones of clusters "B" and "C", which serve transition zones from urban to suburban uses.

Similarly, maps of employment accessibility via automobile indicate overall higher accessibility of territory in Boston than in Atlanta (Figure 9), with the higher automotive accessibility categories occupying a greater share of metropolitan Boston. But the picture that is presented in these figures is in fact an underestimate of the employment accessibility differences between the two regions, since the picture is one of territory, not of residents. Since population densities in the most accessible areas are considerably higher in Boston than in Atlanta, a separate analysis is needed to determine differences in the employment accessibility of people between the two regions.

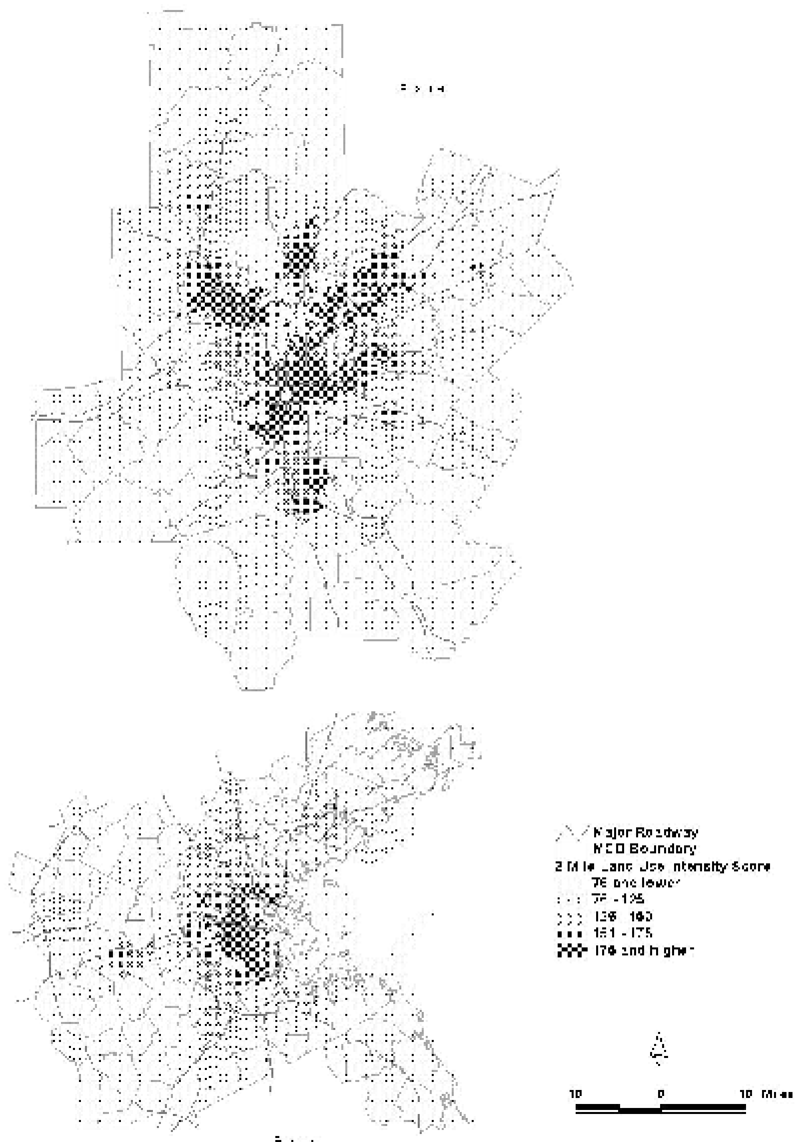


Figure 7: Two-Mile Land Use Intensity, Boston and Atlanta

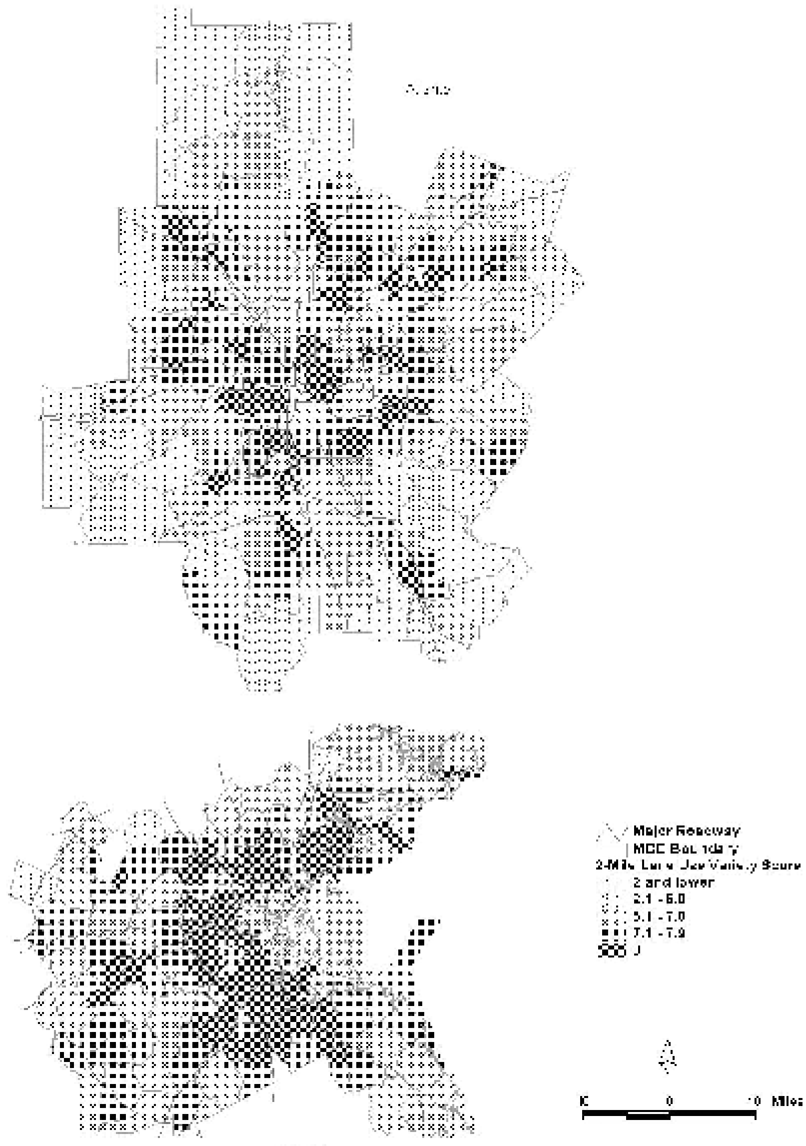


Figure 8: Two-Mile Land Use Variety, Boston and Atlanta

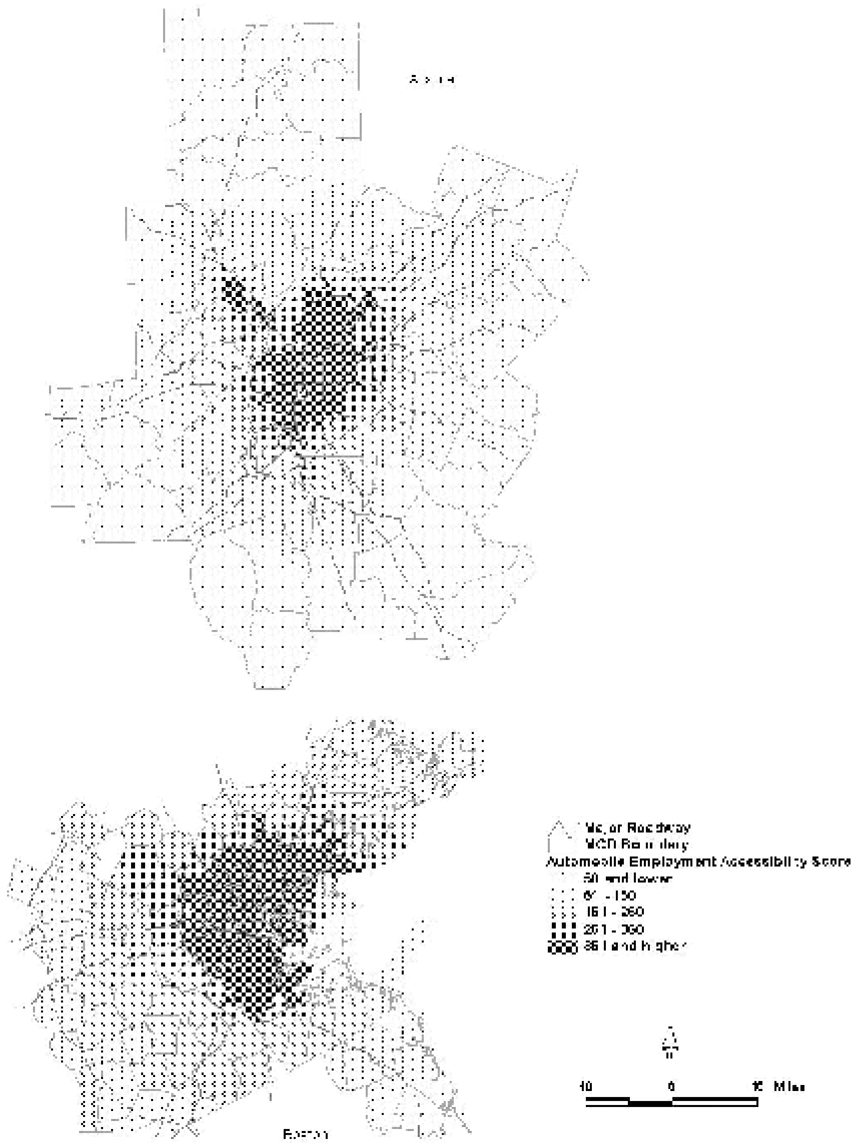


Figure 9: Employment Accessibility by Automobile, Boston and Atlanta

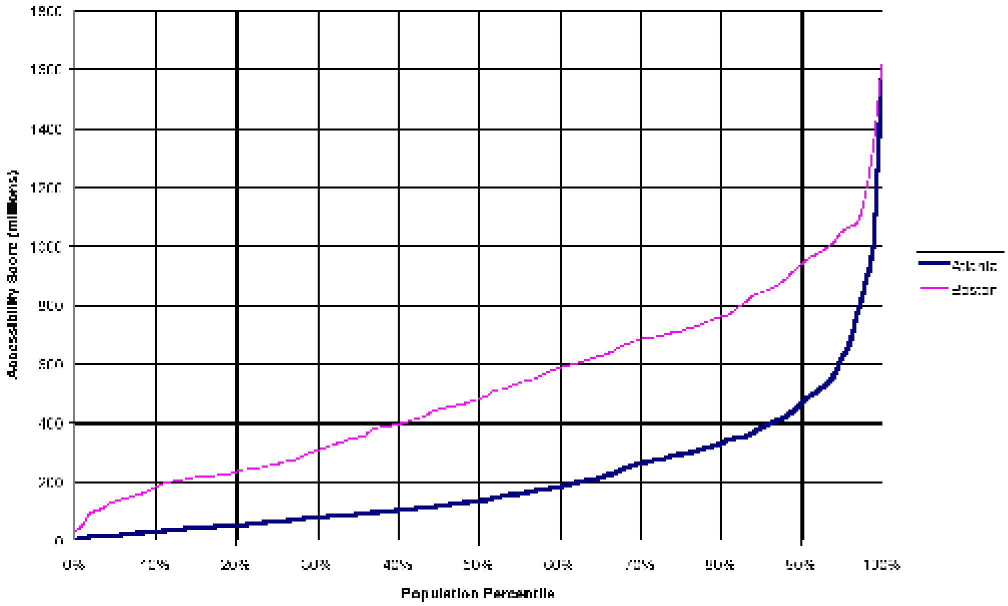


Figure 10: Population Distribution of Employment Accessibility via Automobile, Atlanta and Boston

This analysis is presented in Figure 10, with striking results. The employment accessibility of the least accessible, or 0^{th} percentile individuals located in the most remote corners of the region is quite close between Boston and Atlanta. Similarly, the employment accessibility of the most accessible, 100^{th} percentile individuals—located at the hub of their respective regions—is close between the two metropolitan areas. But for all individuals in between, Boston affords considerably greater employment accessibility via automobile, despite the generally more narrow roads (Figure 6) with which Boston is built. In fact, for residents lower than the 90^{th} percentile in accessibility, Boston offered at least twice as much time-weighted job access as did metropolitan Atlanta. This form of analysis, readily replicable over a number of metropolitan areas can be used to assess the relative accessibility of lower density and more compact metropolitan forms. In the case of the two metropolitan areas described here, the results appear to support the view that links sprawling development with poor accessibility outcomes overall[2] (Ewing 1994). The somewhat smaller

[2] The accessibility statistic used was based on the Boston friction factors, since a single set of friction factors were needed for consistency of interpretation. In order to confirm that the result was not an artifact of the choice of friction factors, the data were reanalyzed using Atlanta factors (which correlate with the Boston factors at r=0.98), with substantially the same results.

1995 job base in metropolitan Boston further strengthens this finding: 1.5 million jobs, as opposed to 1.6 million in Atlanta. Thus Boston residents enjoyed higher job accessibility levels despite a slightly smaller employment market overall.

The picture for job accessibility via transit is somewhat different (Figure 11). For all but the top ten percent of the population in each metropolitan area, Boston offers transit access to employment that is superior to that offered by Atlanta. Apparently as a reflection of Atlanta's investment in the Metropolitan Atlanta Rapid Transit Authority (MARTA) heavy rail transit system, the top ten percent of Atlanta residents enjoy a transit access that is superior to those of their Boston counterparts. For both these analyses it should be emphasized that the percentiles refer to distribution of job accessibility given residential locations. Thus the 90^{th} percentile individual in terms of transit accessibility, for example, is one with proximity to a centrally located transit station.

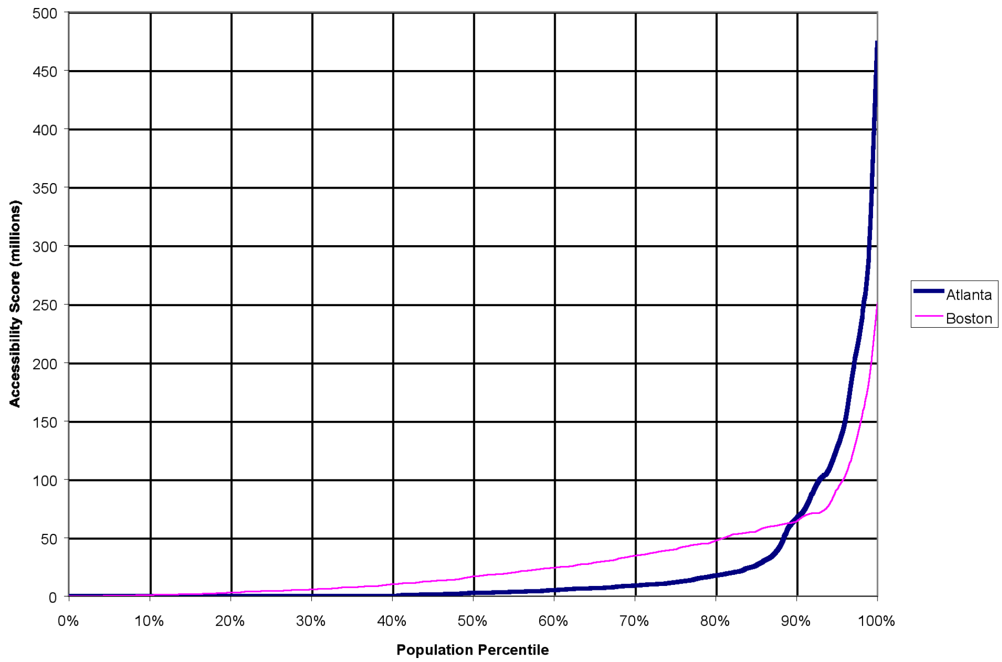


Figure 11: Population Distribution of Employment Accessibility via Transit, Atlanta and Boston

DEVELOPMENT OF NEIGHBORHOOD CLUSTERS

In order to divide up the two regions into neighborhood types based on the multidimensional data above, a set of five clusters were specified *a priori*. This number was designed to correspond roughly with five classes of areas: Central Business District, other central city, inner suburban, middle suburban, and outer suburban/exurban. Since the classification was on physical attributes rather and did not incorporate data on jurisdictional boundaries, neighborhood clusters often span the urban-suburban frontier; thus the five categories are better seen as prototypes rather than strict categories.

A summary of the clusters (Table 8) reveals considerable regularity. With the exception of the land use intensity and variety variables, all variables increase or decrease consistently as one moves from cluster A (the metropolitan center) to cluster E, the periphery. That is, as population density falls, so does density of employment, intersection and lane mile density, street connectedness, and auto and transit access. In a similar fashion, average speeds and averages lanes increase consistently as one moves from cluster “A” to cluster “E.” This observed regularity is a product of the development of the two cities through different historical eras; the drop off of intensity of development as one moves from metropolitan center to periphery; and the role of centrality in determining access characteristics. As dominant transportation technologies shifted from animal power to electric streetcars to the automobile, urban form responded dramatically with significant drops in development density; areas that developed a particular transportation technology retain many of the fundamental characteristics of their era (Muller 1986). The fact of Atlanta’s extensive development in during the post-World War II automobile era—versus Boston’s much earlier development—created the markedly different patterns that are observed in this section. Even within a single historical era, regular patterns of declining concentration are observed from the metropolitan center to the periphery, such that the regularity of patterns observed here is not a surprise. Finally, the geometry of metropolitan areas whose development patterns are fundamentally concentric determines a regular pattern of accessibility; areas at the center have the highest regional accessibility scores, and accessibility declines almost by geometric definition as one moves toward the periphery.

The only variables that rise and fall are those pertaining to land use intensity and variety. Apparently it is the seam between more central and more peripheral areas that provides the greatest land use mixing, and these variables tend to peak around inner ring clusters “B” and “C.”

Table 8: Average Values of Variables in the Five Clusters

Cluster	*A (metropolitan core)*	*B*	*C*	*D*	*E (metropolitan periphery)*
Log Population Density	10.8	10.4	9.3	8.5	7.7
Log Employment Density	10.6	9.1	8.0	6.9	5.2
Log Intersection Density	5.5	5.4	4.8	4.0	3.1
Percent 3-way Intersections	55.8	69.2	76.7	81.8	86.8
Lane Mile Density	29.5	26.8	19.0	11.4	6.6
Average Speeds	16.2	20.6	26.6	29.6	28.7
Average Lanes	3.1	2.7	2.6	2.6	2.5
Quarter Mile Intensity	2.6	3.8	3.6	2.9	1.8
Two Mile Intensity	185.2	175.8	162.0	136.6	87.4
Quarter Mile Variety	2.0	3.1	2.9	2.6	2.0
Two Mile Variety	4.5	6.5	7.5	7.5	6.6
Auto Access	1.E+09	1.E+09	6.E+08	3.E+08	9.E+07
Transit Access/Auto Access Ratio	0.147	0.122	0.086	0.057	0.021

For both Boston and Atlanta, the clusters fall into a very distinct concentric pattern, with generally increasing accessibility and transit and pedestrian orientation toward the center of the metropolitan area (

Figure 12 and Figure 13). A visual inspection of the maps reveals the very significant difference in profile between the two metropolitan areas. Cluster "E," the outermost and least pedestrian/transit friendly cluster, occupies a much greater share of metropolitan Atlanta than metropolitan Boston. Boston, in contrast, presents observably larger clusters "B" and "C," which rank much higher in the many dimensions that constitute accessibility and transit and pedestrian friendliness.

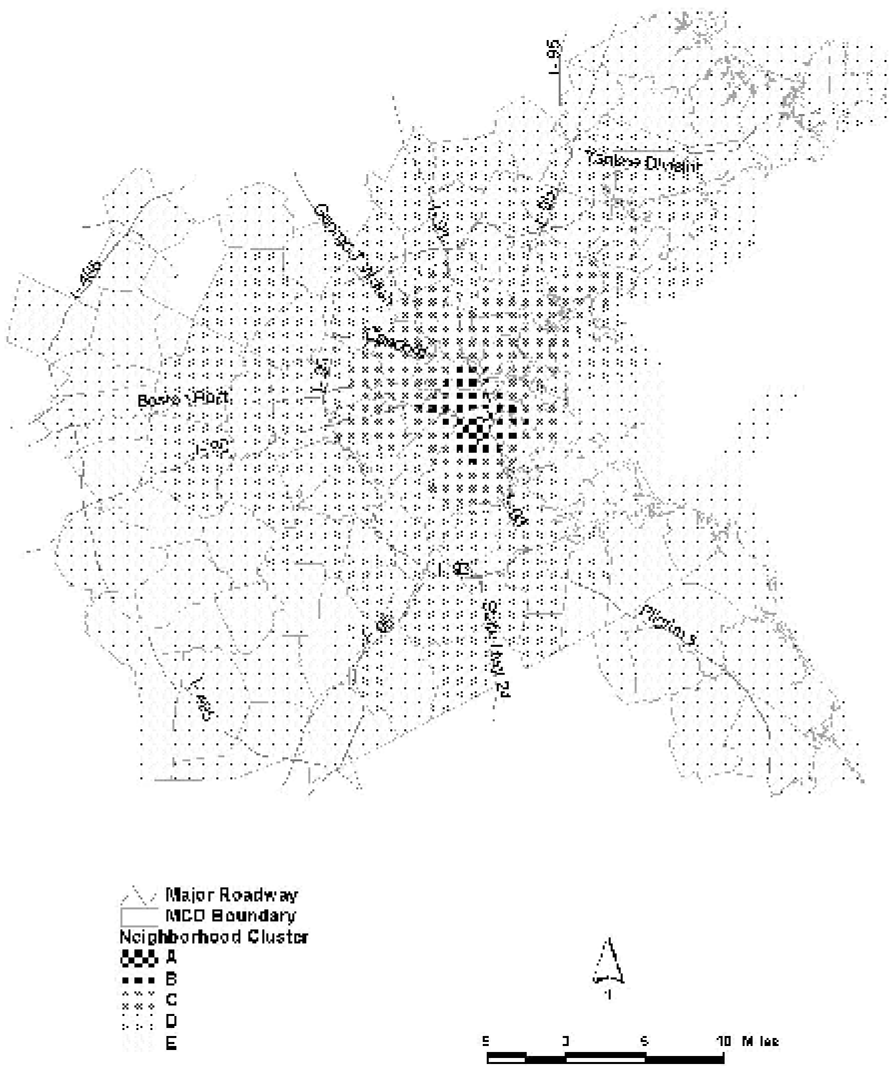


Figure 12: Clustering Results for Boston

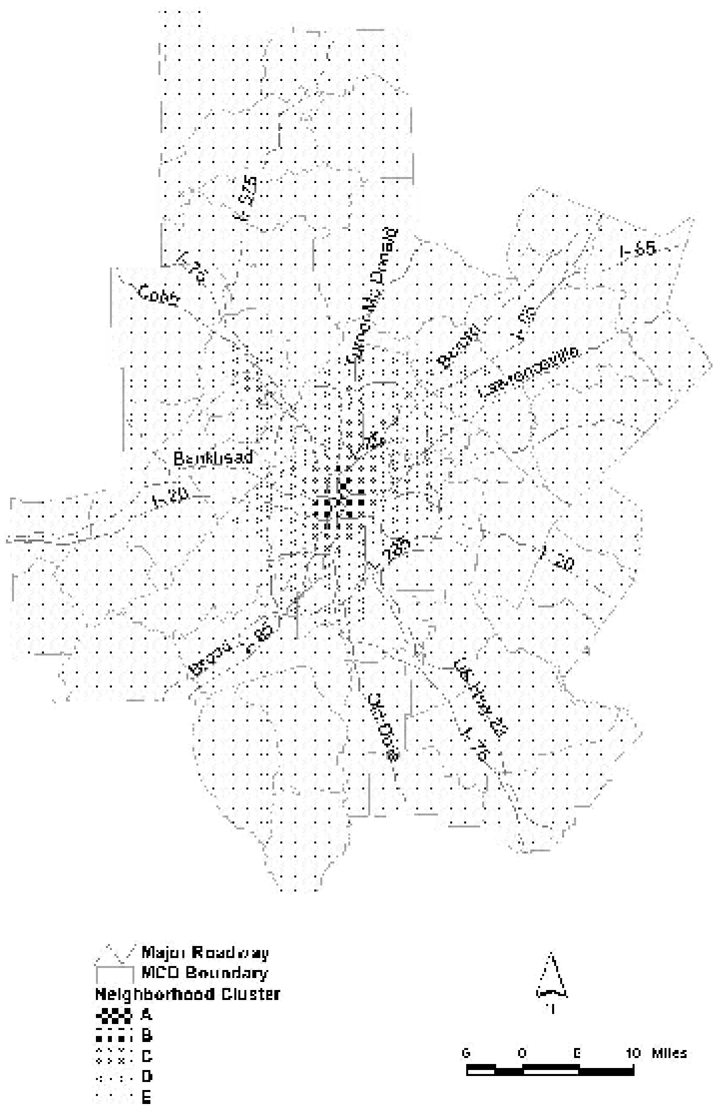


Figure 13: Clustering Results for Atlanta

In fact, the visual display of the clusters tends to understate the difference between the two regions in terms of availability of housing in different neighborhood types, because households are distributed even more differently between the two areas than territory. For example, while less than ten percent of Atlanta households were located in neighborhood type C, nearly thirty-five percent of Boston households lived in these areas.

Table 9: Households by Cluster, Atlanta and Boston, 1995

Cluster	*Percent of Atlanta Households*	*Percent of Boston Households*
A	0.5%	2.6%
B	2.9%	17.3%
C	8.4%	34.6%
D	27.9%	33.2%
E	60.3%	12.4%

Source: 1995 Estimates by Atlanta and Boston MPOs

CHAPTER SIX

CASE STUDIES OF NEIGHBORHOOD CLUSTERS

The process above divided the territory of metropolitan Boston and metropolitan Atlanta into five neighborhood clusters, ranging from the most urban (A) to the most exurban (E). Both the amount of territory and the distribution of population between neighborhood types varied considerably between the two regions. In statistical terms, however, there was considerable similarity within cluster types in the two regions. Yet despite this statistical similarity, it was suspected that significant differences remained between the clusters between the two regions. In order to explore this notion, the five neighborhood clusters described above (Table 8) in each city—types A, B, C, D, and E—were further analyzed by site visits, written observations, and visual documentation of physical characteristics. In each cluster type, we studied two different neighborhoods in each city, either in different parts of the city, or of different historical periods, or of different income levels, etc. The idea was to explore the qualitative differences of physical characteristics at the neighborhood level. These are described in the following sections, along with photographs that illustrate specific aspects of each neighborhood. The purpose of the following descriptions is to compliment the more quantitative and comparable characteristics described in the previous chapter (e.g., data on population density, land use variety and intensity, average road speeds) with more qualitative and unique descriptions of that distinguish each area studies. The names of each neighborhood have been adopted in an attempt to be as precise as possible as to its boundaries (see aerial photographs for distinct geographical areas), but do not always correspond to the official names because they are sometimes subsets of other neighborhoods.

CLUSTER A: ATLANTA

Gated Communities and Empty Commercial Center Neighborhood: Located close to downtown, the neighborhood includes a non-working commercial center (as of the year 2000) and newer gated residential developments. In terms of accessibility, the location is close to centers of employment. Abundant sidewalks and ‘share the road’ bicycle signs appear to provide easy access and multiple modes of transportation. However, the residential developments are all fenced and gated, with extremely limited connections to the surrounding areas.

Aerial photograph of the Gated Communities and Empty Commercial Center Neighborhood near downtown Atlanta, showing a mixed urban fabric with multiple family housing, commercial centers, large parking lots, and a few landscaped areas.

Georgia State University and Grady Memorial Hospital Neighborhood: Located in downtown Atlanta in proximity to highways Interstate 75 and Interstate 85, the neighborhood contains a plethora of parking garages, a large hospital complex, university buildings, a Metropolitan Atlanta Rapid Transit Authority (MARTA) train station, a small park, several bus stops, and retail on the first floor of office buildings.

Aerial photograph of the Georgia State University and Grady Memorial Hospital Neighborhood in downtown Atlanta shows an urban fabric consisting of large built-up blocks, a large highway, and large parking lots, creating a neighborhood that is pedestrian- and transit-oriented due to its density and easy accessibility. However, . . .

. . . at the street level, one notices the hard edges of the asphalt, concrete and steel that detract from a pedestrian friendly character.

CLUSTER A: BOSTON

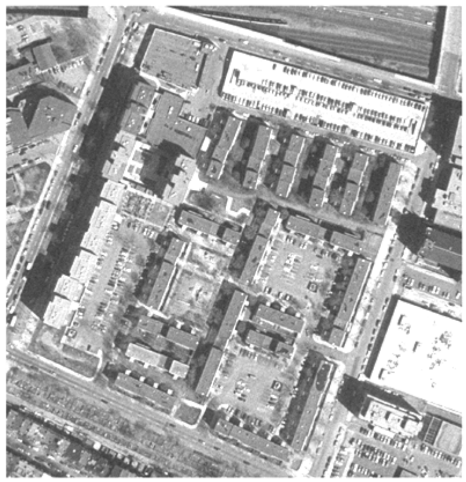
Northeastern University and Prudential Center Neighborhood: The neighborhood is located close to downtown Boston with a mix of land uses (including retail such as dry cleaners and restaurants on the first floor and walk-up apartments on the upper floors of buildings), and a mix of transportation modes, including easy pedestrian, transit, and automobile access. Pedestrian orientation is facilitated by physical characteristics such as wide sidewalks, streetlights, pedestrian crossing signs and walk signals, special paving at crosswalks, and the fact that there exist numerous institutional, commercial, and residential destinations within walking distance. Transit orientation is provided through a light rail line in the middle of the major artery—Huntington Avenue—and transit stops in the heart of the neighborhood (e.g., next to the Student Union and the Physical Education Center). The tight urban fabric is dominated by Northeastern University campus facilities situated next to student housing.

The aerial photograph of the Northeastern University and Prudential Center Neighborhood shows an urban fabric consisting of both large-scale elements such as institutional facilities and finer grain ones such as multi-family housing. They both adhere to a tight urban fabric created by well-defined street edges, a modified street grid system, and an emphasis on the street as the primary public realm for pedestrian and transit activities.

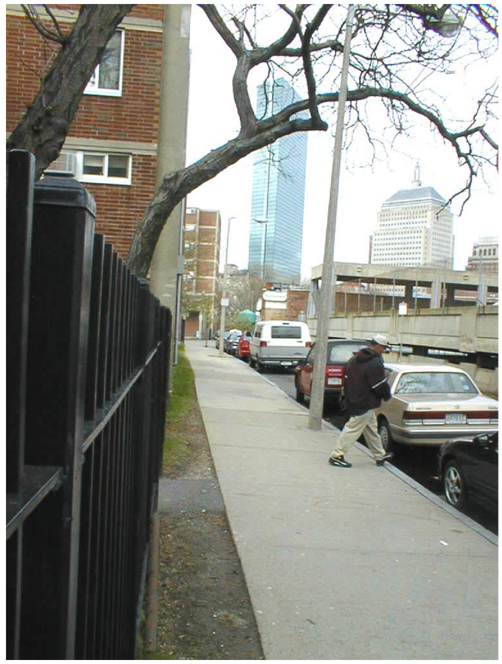
The pedestrian-friendly character of Westland Avenue, as shown in this image of a pedestrian crosswalk, consists of wide sidewalks, a prominent crosswalk with a sign, street lighting, and special paving.

Transit line in the middle of Huntington Avenue, in close proximity to the YMCA, the Physical Education Building of Northeastern University, and high-density residential development.

Castle Square Project Neighborhood: Located in close proximity to downtown Boston at the edge of highway I-90, the Castle Square Neighborhood is a mixed-use project consisting of walk-up and high-rise apartments, neighborhood retail (e.g., Chinese grocery store, bicycle shop), institutional facilities (e.g., church), and recreational facilities (e.g., children's playground). The neighborhood is oriented towards the automobile thanks to access via major arteries such as Tremont Street and Herald Street and parking facilities such as a parking garage, towards transit through bus routes and stops, and towards pedestrians through pedestrian facilities such as walk able destinations (e.g., grocery stores) and amenities (e.g., sidewalks, arcades).



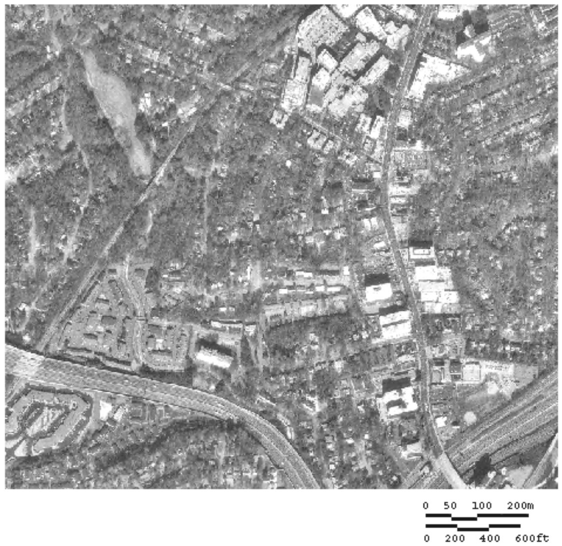
The aerial photograph shows the Castle Square Neighborhood bounded clearly and tightly on the north by the I-90 highway, on the east by Shawmut Avenue, on the south by Berkeley Street and on the west by Tremont Street. The open spaces in the middle of the apartment buildings are either parking lots or children's playgrounds.



A view of Paul Place in the Castle Square Neighborhood, showing apartment buildings and the grocery store, as well as its proximity to downtown and its skyscrapers.

CLUSTER B: ATLANTA

Neighborhood Between Highways I-75 and I-85, with Collier Road to the North and Peachtree Street to the East: The neighborhood is primarily single-family housing, but includes a mix of land uses, such as parks, some apartment buildings, condominiums; and a hospital. In terms of its physical character, the neighborhood has plenty of sidewalks, lush landscaping, curbside parking, a defined street edge, and a gridded street network. Transportation amenities include bus shelters, an Amtrak station, automobile-oriented major arteries including a 3-lane road with heavy vehicular traffic, and sidewalks that accommodate a fair bit of pedestrian traffic.



Aerial photograph of the neighborhood between highways I-75 and I-85, with Collier Road to the north and Peachtree Street to the east, showing a mix of land use and easy accessibility due to proximity to two highways.

Seen on Wycliff Road is a single-family home on the left, and a three-story walk-up apartment building on the right. Both buildings contribute to a well-defined urban fabric through the use of similar building materials (e.g., brick) and the softening of edges through landscaping. Furthermore, the sidewalks, narrow streets and curbside parking create a pedestrian-friendly atmosphere.

The mix of land uses and diversity of the neighborhood between I-75 and I-85 is demonstrated by the Yorke Downs Apartment Homes, with their higher density, yet isolated (e.g., located at the edge, with no sidewalks connecting it to the rest of the neighborhood) character, in contrast to Wycliff Road, above.

Virginia Avenue and Ponce de Leon Avenue Neighborhood: Located to the east of downtown Atlanta, the neighborhood's residential developments include small, simple single-family houses on wide streets with curbside parking, renovated townhouses, a gated townhouse complex, walk-up apartments, and condominiums. In addition to a mix of housing types, there is a mix of land uses, including commercial such as motels, grocery stores, banks, electricity office and a large maintenance garage. The commercial tends to be located on the major roads. In terms of pedestrian orientation, the sidewalks are of mixed quality, but there are crosswalks and traffic signals and light pedestrian traffic, including joggers. One also sees bicyclists, even though vehicular traffic moves at a high speed on wide roads. The street pattern is a grid.

Walk-up apartments, sidewalks, wide roads, and landscaping in the Virginia Avenue and Ponce de Leon Avenue neighborhood of Atlanta.

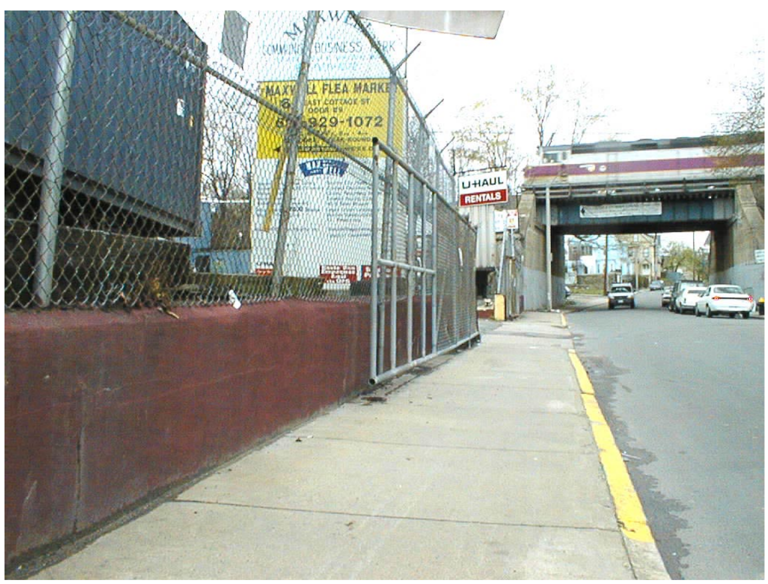
The major artery in the neighborhood is Ponce de Leon Avenue, on which is located the commercial development as well as the MARTA bus stops.

CLUSTER B: BOSTON

Columbia Road and Massachusetts Avenue Neighborhood: The neighborhood is located south of downtown Boston, just off the I-93 highway. The land use is mixed including residential (e.g., walk-up apartments with front yard on Columbia Road, small single-family houses on small lots on East Cottage Street, cooperative duplex housing on Alexander Street), commercial (e.g., gas station and auto repair near the intersection of Columbia Road and Massachusetts Avenue), industrial (e.g., gritty flea market, U-Haul vehicle rental facility), and institutional (e.g., church, community development center on Dudley Street). Pedestrian amenities include sidewalks, streetlights, small trees, curbside parking (which helps slow traffic down and provides a physical buffer for pedestrian traffic on the sidewalk), painted crosswalks, walk signal, and medians. There is a train line that passes through the neighborhood, but no station; thus it appears to contribute mostly noise to the area.

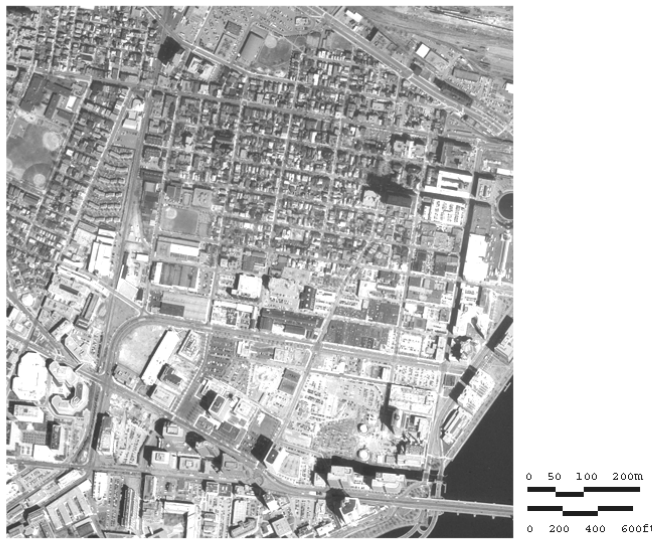
Aerial photograph of the neighborhood showing the confluence of major arteries, including Columbia Road and Massachusetts Avenue, at the center of the image, and highway I-93 on the right. The wide, angular, and curvilinear commercial and industrial arteries interrupt the tighter and gridded urban fabric of the residential areas.

Edward Everett Square at the intersection of Columbia Road, Massachusetts Avenue, and Boston Street with its automobile oriented character: wide road pavement, loose street edge, hard-edged median, and higher-speed vehicular traffic.



Industrial (e.g., flea market, rental facility, barbed wire fences and gates) development along with the train bridge on East Cottage Street.

Neighborhood in Cambridge: Located northwest of downtown Boston across the Charles River, the neighborhood is rich in its mix of land uses: institutional (e.g., university campuses of Harvard University and the Massachusetts Institute of Technology), offices (e.g., along Binney Street), residential (e.g., walk-up apartments and student housing), industrial (e.g., Kaufman Industrial Supplies on Second Street), and neighborhood commercial (e.g., cafe, notary public).



An aerial photograph of a Cambridge neighborhood in the Boston metropolitan region with the Charles River on the right (east), Main Street on the bottom (south), and Portland Street/Medeiros Avenue on the left (west). Note the mix of the urban fabric, including fine-grain residential and larger grain industrial and institutional.

Intersection of Second Street and Charles Street in Cambridge, with curbside parking, sidewalks and cross walks, and a defined street edge—all of which facilitate the pedestrian-oriented character of this part of the neighborhood.

CLUSTER C: ATLANTA

Turner Stadium Neighborhood: An older neighborhood located to the southwest of downtown Atlanta, its residential development includes single-family cottages, a subsidized low-income housing complex, and some larger single-family houses that are either newer or renovated. Other land uses include abandoned commercial sites, a few stores, and churches. There is transit available, but the amenities are minimal (e.g., no bus shelters). Other street elements of the streetscape include small setbacks, narrow streets, razor wire and fencing, small lots, little designed or maintained landscaping, and little pedestrian traffic, even with the presence of sidewalks.

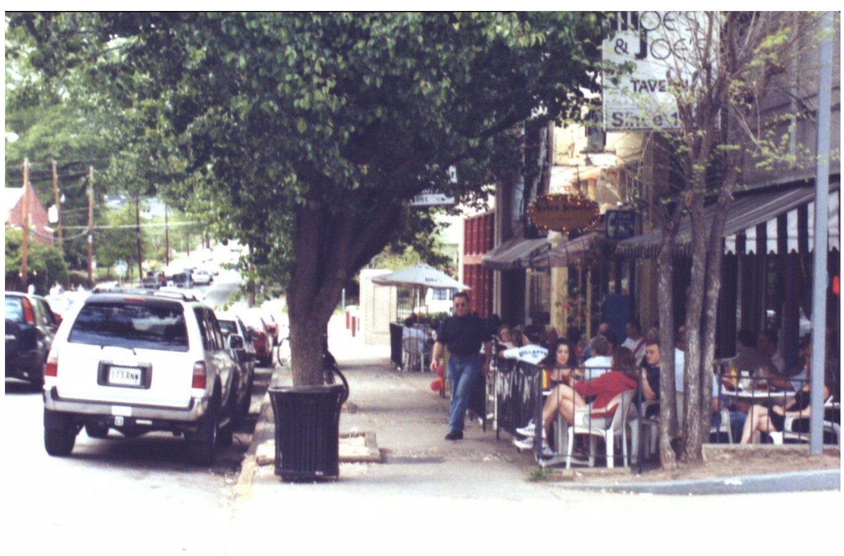
An aerial photograph of the Turner Stadium Neighborhood in Atlanta reveals an older gridded street pattern with small, single-family lots and a large park—Grant Park—near the center of the image.

Oakland Avenue streetscape with small setbacks, small cottages, and an abundance of sidewalks.

An example of the challenges of transit use in a non-transit-oriented neighborhood, on McDonough Boulevard. In this lower-income neighborhood, residents—such as this young man—who really need access to transit are provided with simply a pole and a sign, rather than a bench, a shelter, or other amenities such as lighting, trashcans, or telephones.

Virginia Highland: Clearly a middle-income neighborhood due to the nature and cost of housing as well as the relatively upscale commercial development, it is located northeast of downtown Atlanta. The housing is primarily denser single-family (i.e. small lots and houses) with a few multi-family buildings as well. Other land uses include commercial such as restaurants, bars, antique stores, and a gas station. The neighborhood is vibrant and its physical character contributes to this vibrancy through a tight street edge, well-maintained sidewalks on both sides of the roads, and well designed and maintained landscaping. Traffic calming is achieved through curbside parking, dense landscaping, the presence of sidewalks, and a 25 miles per hour speed limit. The neighborhood is transit-friendly through its location and the presence of amenities such as fully equipped bus shelters. It is bicycle-friendly only in the slow speed of vehicular traffic—one sees quite a few bicyclists. Vehicular traffic is high-volume and low-speed due to the density of development, on street parking, and the gridded street pattern.

An aerial photograph of the Virginia Highland neighborhood in Atlanta with its consistent and dense grid, presence of trees throughout the area, and a fine-grain urban fabric that is both pedestrian- and transit-friendly.



A view of the restaurants and sidewalk cafes on North Highland Avenue, near the intersection with Virginia Avenue.

Older and small single-family houses on Amsterdam Avenue with sidewalks and a well-defined street edge, which contribute to its pedestrian-oriented character.

CLUSTER C: BOSTON

Neighborhood in Brookline: Located southwest of downtown Boston, the Brookline neighborhood possesses a truly rich mix of housing types, from large, old and expensive single-family detached homes on Fisher Avenue and Hyslop road to walk-up apartments on Beacon Street. The mix of land uses includes (sometimes within the same building): residential (e.g., Regency Park high-rise apartment building), commercial (e.g., neighborhood laundry, Star Grocery Store), recreation (e.g., park), and institutional (e.g., Newbury College on Fisher Avenue). The neighborhood is both transit-oriented (e.g., two light-rail stations) and pedestrian oriented (e.g., sidewalks, crosswalk, median on major arteries, and walkable destinations).

The rich mix of land uses and housing types is revealed in this aerial photograph of the Brookline neighborhood in Boston: Brookline Reservoir and Park on the lower right hand corner, Newbury College lower center left, Beaconsfield Elementary School upper center left, single-family detached homes dotting the secondary streets and the larger multi-family apartment complexes along Beacon Street on the upper portion of the photograph.

Commercial development (e.g., café, nail salon), residential development (5-storey apartment building), transit (e.g., rail tracks in the middle of the road), and pedestrian amenities (sidewalk, crosswalk, and crossing median) on Beacon Street at Winthrop Street in the Brookline neighborhood in Boston.

The intersection of Hyslop Road and Fisher Avenue with large single-family detached homes, sidewalks, and stop signs—essentially an automobile-oriented character with its wide roads and spread-out layout, but with a few pedestrian amenities.

Neighborhood in Waltham: Waltham is an inner-ring suburb, located several miles due west of downtown Boston. The neighborhood consists of medium-density mixed uses, including single-family homes converted to multi-family occupancy—perhaps for students at nearby Brandeis University, duplex housing units, walk-up apartments (all often on the same block), commercial, industrial—located near multi-family housing (e.g., Raytheon Electronics Manufacturing Plant on Seyon Street), and institutional (e.g., Jonathan Bright Elementary School). The commercial is located primarily on Main Street with residential behind it; however, it is also interspersed—for example, in the case of a convenience store in a converted house in the middle of a residential block.

The gridded street pattern of residential streets meets a major artery (Pleasant Street, towards the bottom) in this aerial photograph of the Waltham neighborhood. The grain of the residential is medium, with large single-family homes (often converted to multi-family uses) and smaller apartment buildings constituting a tight street edge.

Multi-family walk-up apartments next to single-family detached homes on Barton Street. The curbside parking, sidewalks, and landscaping (e.g., trees, hedges, and grass) help create a pedestrian-oriented environment by softening the hard edges.

The intersection of Newton Street and Main Street shows a plethora of amenities for automobiles (e.g., traffic lights, left turn lane, curbside parking and automobile-oriented businesses) and for pedestrians (e.g., sidewalks, crosswalks, and street-oriented retail with awnings).

CLUSTER D: ATLANTA

Hapeville: An older inner-ring suburb of Atlanta, Hapeville possesses a ‘Main Street’ type of neighborhood commercial development, such as small shops within walking distance along with curbside parking. Downtown businesses include small stores, restaurants, financial institutions, and public agencies. Housing consists of small single-family homes on small lots. Street activity—due to the pedestrian-orientation of the neighborhood—includes children playing outside, and people walking back from the local grocery store. Other physical characteristics include an abundance of sidewalks, shorter blocks with frequent intersections (which helps slow down vehicular traffic), and transit amenities such as bus stops with benches and trashcans at major intersections.

An aerial photograph of Hapevillie showing the neighborhood commercial on the lower left, mostly single-family residential on the inner streets, and major commercial and some industrial facilities on the major arteries at the edges. The two highways are I-85 on the left and I-75 on the right, just north of Hartsfield Atlanta International Airport.

Neighborhood commercial on North Central Avenue in the Hapeville neighborhood of Atlanta, with curbside parking and low speed limits, all within walking distance of the single-family residential areas.

Small single-family housing with narrow street, sidewalks and landscaping on Myrtle Road.

Neighborhood in Tucker: An inner ring suburb, this neighborhood is located east of downtown Atlanta and possesses some of the major physical characteristics of suburban residential developments of the era: cul-de-sacs, low density single family homes on medium size lots, no sidewalks (only on major arteries) or crosswalks, and manicured lawns. The land use mix includes an elementary school which is not walkable due to a low density fabric and a lack of sidewalks, and outdoor recreational facilities (e.g., baseball diamond) in walking or biking distance; the elementary school serves as a focal point of the neighborhood. The neighborhood is very much automobile-oriented, and is neither pedestrian friendly (e.g., wide streets, no sidewalks or crosswalks), nor transit friendly (e.g., absence of transit services even on major arterial—5-lane, 45-mph road.). The housing faces inner streets while schools, churches, and parks face collector streets.

An aerial photograph of the Tucker neighborhood, showing the curvilinear streets, major collector roads, and low-density, single-family detached residential fabric that characterizes much of the suburban development in the 1950s and 1960s in the U.S.

Entrance to the Midvale Elementary School with a single-family home on Midvale Road in the background in the Tucker neighborhood of Atlanta. Even though the school is in close proximity to the housing, it is not walkable due to a low-density, spread-out layout of the neighborhood as well as a lack of sidewalks.

Major collector road that borders, and separates, the Tucker neighborhood from the surrounding areas.

CLUSTER D: BOSTON

Danvers Neighborhood: Case study neighborhoods—such as Danvers—in clusters D and E in Boston tended to be older than those in Atlanta and more rural in character due to their origins as hamlets, villages, or small towns. Danvers has large single-family homes that occupy their lots almost fully and constitute a more consistent density than neighborhoods in cluster E. The rural origins of the neighborhood can be seen in natural features such as woods, fields, and hills, and in the presence of institutions such as the Essex Agricultural and Technical Institute. Other land uses include a church, a Friendly's Restaurant, and other retail.

The off-ramp from Route 128 in the Danvers neighborhood is short and sharp, causing vehicles to slow down considerably and consume less land; thus, the presence of development so close to a highway off-ramp—not normally possible with the much larger clover-leaf type of interchanges.

The intersection of Poplar Street and Locust Street shows the physical characteristics for a comfortable coexistence of automobile and pedestrian in the Danvers neighborhood of the Boston region: grass buffer between road and sidewalk, crosswalks and walk signals, and sidewalks on both sides of the street.

Neighborhood in Weston: Located just west of Waltham, Weston is a New England town that has become a suburb of Boston. The neighborhood contains a town hall next to residential, a village green and commons bordered by institutions such as the town hall, church, and fire department, and a traditional dense small town downtown but with plenty of accommodation for cars through abundant parking. A partial pedestrian orientation of the neighborhood is accomplished through some sidewalks and the human scale of the commercial buildings as well as some walkable destinations such as commercial (retail such as stores and services such as tailors, and offices such as publishing, marketing and catering) at the center of the neighborhood and a commuter rail station next to low-density housing.

The commercial in the center of the Weston neighborhood has pedestrian feel and residential scale to it; however, we observed almost all visitors coming and going by automobile.

The Village Green and Commons is also near the center of Weston (not far from the commercial), and is surrounded by the town hall, church, and fire department; in terms of location and size, it is thus the preeminent public open space of the neighborhood.

The Kendal Green commuter rail station in Weston is located in an area of low-density housing, an example of transit access to areas of employment from low-density suburban fringe neighborhood.

CLUSTER E: ATLANTA

Roswell: A newer (i.e. 1980s - 1990s) neighborhood on the northern suburban fringe of Atlanta, Roswell houses mostly middle- to upper-income residents. The physical character of the area is that of seclusion, as demonstrated in the introverted (e.g., with single entrances) single-family residential developments, the large-scale controlled-access apartment complexes, and the inability to access the commercial areas easily by foot. There is no transit service close to the residential areas; there are several high-speed arteries and wide neighborhood streets with T-intersections and cul-de-sacs, strip commercial development, and limited sidewalk provision. Roswell possesses a large shopping area but no identifiable civic center.

The neighborhood of Roswell, located several miles to the north of central city Atlanta, is dominated by large-scale single-family detached residential and commercial strip development. The street pattern is that of cul-de-sacs and looped roads with limited access to major arterials, such as Houze Road, in the middle of the aerial photograph above.

The large automobile-oriented residential development of Roswell in the Atlanta region (i.e. multiple-car garages, low-density land use, no walkable destinations).

The commercial strip on Houze Road contains no sidewalks and hardly any crosswalks, while dominated by large parking lot and wide roads with high-speed vehicular traffic.

Union City: The neighborhood of Union City, located at the ex-urban and quasi-rural fringe of Atlanta, possess both older rural characteristics (e.g., smaller houses and lots, natural features such as woods, hills, and creeks, and streets without curbs, gutters or sidewalks) as well as those which reflect its recent urbanization (e.g., major 5-lane road with 45 miles per hour speed limit, bus stops but without any amenities, and a downtown area with wide streets). The landscapes are less manicured than the suburbs of the 1950s and 1960s (in fact, it is not unusual to find cars parked on the lawns themselves!), and the winding neighborhood streets are narrow with little vehicular traffic. The neighborhood is not bicycle friendly either, with no bike lanes, no bike signs, and high-speed vehicular traffic on the major roads.

An aerial photograph of Union City, showing natural features such as lakes and wooded areas, a major artery on the right hand side of the image (Roosevelt Highway), and the spread-out nature of the single-family residential development.

A view of Stonewall Drive, with older houses, no sidewalks, and less manicured lawns than, for example, the Tucker neighborhood—a 1950s—1960s era suburb—of Atlanta, described in a previous section.

The MARTA bus stop has a minimal presence—i.e. a pole planted in the grass and dirt—at the intersection of Roosevelt Highway and Highpoint Road of the Union City neighborhood in Atlanta.

CLUSTER E: BOSTON

Neighborhood in Bolton: Bolton is clearly on the ex-urban/rural fringe of Boston located about thirty miles due west of the center of Boston. The physical environments between the older village center (the town was established in the 18th century) and the outlying rural areas are very different, but too fine-grained for us to distinguish in our clustering. For example, at the center, the town hall and church are located on a busy thoroughfare, State Route 117, and land uses are mixed, including a Mobil gas station and residential. The residential consists primarily of large houses on large lots with upper-income residents. In the outlying areas, on the other hand, the rural feel is fostered by wooded lots and some unpaved and dirt roads. Overall, narrower roads, slower speeds, and lesser volume of traffic make some roads more pedestrian friendly; however there are no sidewalks or walkable destinations. At one of the major intersections, that of Harvard Road and Twin Maple Road, there were no bus stops, no sidewalks, no bike lanes or signs, no curbs, no crosswalks, and poorly defined road edges. Similarly, at the Nashoba Regional High School there was no connection for children who can or want to walk (e.g., the sidewalk in front of school simply ends). The Bolton Office Park is close to residential but the buildings are objects floating in grass and asphalt, with no pedestrian amenities or connections with surroundings (e.g., no continuous sidewalks).

The town hall and church on the major thoroughfare—State Route 117—in the center of the Bolton neighborhood in the Boston region.

The outlying rural character of the Bolton neighborhood consists of large houses on large lots, with wooded lots, and narrow roads which are sometimes unpaved. This view of Twin Maple Road shows both its pedestrian friendly characteristics (e.g., small volumes and slow speeds of vehicular traffic) and non-pedestrian-friendly characteristics (e.g., no walkable destinations or sidewalks).

The Bolton Office Park is an example of mixed land use (i.e. commercial in proximity to residential), which is clearly oriented towards automobiles (e.g., no sidewalks or cross walks on a major artery).

Neighborhood in Hudson: The Hudson neighborhood is similarly located as the Bolton neighborhood—thirty miles west of central Boston on the ex-urban fringe, close to the outer ring of highways (e.g., I-495), which serve the Boston metropolitan region. The historic center of the neighborhood consists of a tighter, more pedestrian-oriented physical character, including a tight street edge, abundant sidewalks, and a mix of land uses, including more modest (e.g., smaller, less expensive) housing. The rest of the neighborhood is much more automobile oriented; for example, Kentucky Fried Chicken and Taco Bell fast food restaurants with drive-through windows, no pedestrian crossings or sidewalks or sense of connection to their surroundings, and the Hudson Business Park which is clearly designed for automobile access. Similarly, newer residential development—such as the Washington Square Condominiums—are often surrounded by parking, no sidewalks, and set back considerably from the road. Overall, neighborhoods in Cluster E seem to incorporate a greater variation in density, with the denser village territory surrounded by quasi-rural and rural fabric.

In an example of the clearly automobile-oriented character of the fringes of the Hudson neighborhood in the Boston region, the Wal-Mart store sits in a sea of parking set back considerably from the major road, State Route 85.

The denser and more pedestrian-oriented historic center of the Hudson neighborhood has sidewalks, prominent crosswalks, landscaped median, and street lamps at the intersection of State Route 62 and State Route 85.

The view of Ostego Drive, off Oneida Place, shows typical residential streetscape of the Hudson neighborhood—middle-income residents who live on large lots, large houses, and manicured lawns.

The perceptual and experiential analysis of the ten case study neighborhoods—five in each cluster in Atlanta and Boston respectively—suggests that not only does Boston contain a wider range of options, in terms of a richer mix of pedestrian-, bicycle-, transit-, and automobile-oriented physical characteristics, but that within each cluster and neighborhood, there is a great variety of those characteristics in Boston than in Atlanta. For example, we came across several neighborhoods in Boston, where we found an abundance of amenities that served both pedestrians (e.g., walkable destinations, sidewalks, landscaping at the neighborhood centers) and automobiles (e.g., wide streets, parking at the neighborhood peripheries).

Moreover, these same neighborhoods were better served by transit (e.g., bus and light rail) in Boston than in Atlanta. Some of these characteristics are attributed to the longer history, and thus evolution, of neighborhoods in the Boston metropolitan regions, such as in the case of villages and small towns, with their dense and walkable centers, which later became more automobile oriented (e.g., office parks and shopping centers) suburbs of Boston. Thus, the clusters became more and more automobile-oriented in order from A to E in the Atlanta metropolitan region, while in the Boston metropolitan region, there was less of this connection of cluster ordering and automobile-orientation.

CHAPTER SEVEN

NEIGHBORHOOD PREFERENCES AND NEIGHBORHOOD CHOICES

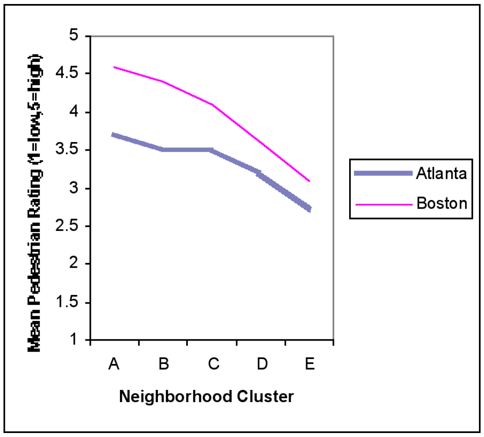
RESIDENTS' ASSESSMENT OF NEIGHBORHOOD TRANSPORTATION ENVIRONMENTS

The analysis above suggests that despite the statistical similarities of a given neighborhood type between Boston and Atlanta, differences in the quality of the transit/pedestrian environment remain. In order to assess this in a different fashion, residents were asked to rate their own neighborhoods as places to walk, use transit and drive cars. In addition, residents were asked to rate the quality of their neighborhood for their household overall. Several distinct patterns emerge from this analysis (Figure 14). First, the analysis tends to confirm the definitions of neighborhood clusters in that perceptions of neighborhood amenability to walking and transit use decline consistently as one moves from the centrally located "A" neighborhoods to the peripherally located "E" zones. The exception in both Atlanta and in Boston, zone "B"—generally the central city outside of the downtown area—is rated as better than the downtown as a place to take transit. The rating of neighborhoods for automobile use tended to go in the opposite direction; the more peripheral zones in both cities were rated as better for car use than more central zones, though the change was not as dramatic as that associated with pedestrian or transit use.

Equally importantly, significant differences were apparent between metropolitan Boston and metropolitan Atlanta, even within a given cluster. For example, residents of neighborhood cluster "C" in Atlanta rated the pedestrian environment neighborhood an average of 3.5 on a scale of 5, while their counterparts in the same cluster in Boston ranked their neighborhood an average of 4.1. Atlanta-Boston differences in the pedestrian ratings were statistically significant with 99 percent confidence; those of the transit environment only at 80 percent. Thus despite the efforts of this study to render the neighborhood clusters of the two metropolitan areas comparable, Boston neighborhoods retained a significant transit and pedestrian advantage over corresponding neighborhoods in Atlanta (with one exception in the case of transit), at least in the eyes of their residents. In general, pedestrian and transit ratings observed in inner zone A of Atlanta is encountered in Boston in middle-outer zones C and D. Clearly the unmeasured characteristics of the neighborhoods and perhaps of the region contributed to this outcome. The qualitative urban design analysis presented above led to the same conclusion; i.e., within a given cluster type, Boston neighborhoods were more transit- and pedestrian amenable than their Atlanta counterparts. For this reason, the preference modeling in the next section will employ the mean ranking variables as representing the characteristics of neighborhood choice.

In addition to the transit and pedestrian environment of their neighborhoods, respondents were asked to indicate their views of their neighborhoods as places to drive cars. The question directed respondents' attention to issues such as parking availability, congestion, and auto access. Inner Atlanta neighborhoods enjoyed a significant advantage over their Boston counterparts in mean ratings as a place to drive cars. The automotive advantage of the Atlanta disappeared, however, in suburban neighborhoods "D" and "E"; in other words, suburban Boston is seen as just as amenable to car use as suburban Atlanta.

Finally, residents were asked to rate the quality of their neighborhood for their household overall, given whatever was important to them. Here, differences between the two regions were striking, with Boston residents rating their neighborhoods significantly higher than their Atlanta counterparts, with the exception of middle ring neighborhood C. Particularly interesting (and statistically significant) was the difference of the neighborhood effects between the two regions; residents of central Boston neighborhoods rated their areas nearly as highly as those of the suburban areas. In contrast, significant differences were observed between ratings of central Atlanta residents and those of the outer ring suburban and exurban communities, with the latter significantly more satisfied with their environments. These ratings are not restricted to the transportation and land use characteristics of the respondents' neighborhood, and incorporate the full range of factors that influence people's neighborhood satisfaction: schools, social characteristics, safety, etc.



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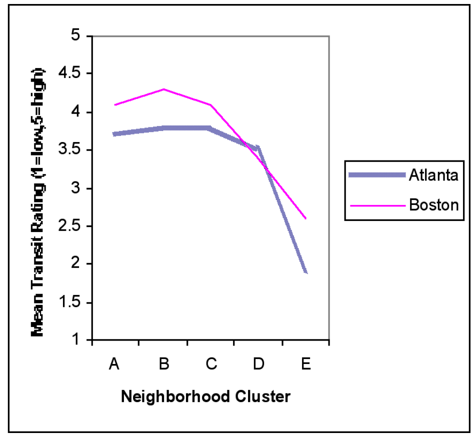

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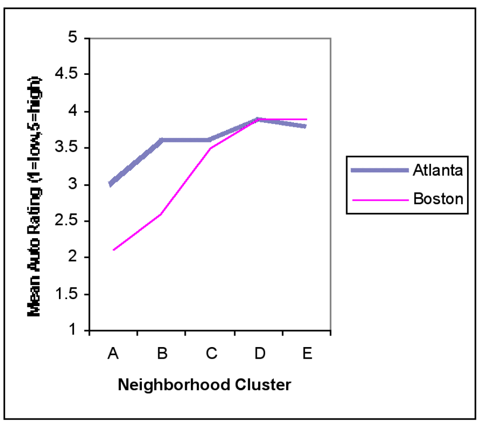

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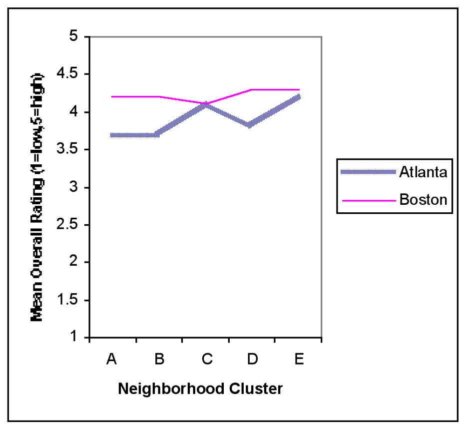

Region>80%; Cluster>99%; Interaction>99%

Figure 14: Mean Pedestrian, Transit, Auto and Overall Ratings of Atlanta and Boston Neighborhoods by their Residents

Note: Text below tables refers to significance of general factorial ANOVA. “Region” refers to differences between metro Atlanta and Boston. “Cluster” refers to differences between the neighborhood clusters A through E. “Interaction” refers to the interaction of the two, testing whether cluster has a different effect in the two cities, i.e., whether the slopes of the lines are significantly different.

NEIGHBORHOOD ENVIRONMENTAL PREFERENCES

The principal purpose of the survey was to assess the neighborhood preferences of residents of Atlanta and Boston. Table 10 summarizes preference indicators by metropolitan area and by neighborhood cluster. The table reports the proportion of respondents in each area indicating strong or moderate preferences for each of the choices listed. It should be noted that though questions were phrased in varying fashions, the proportions reported in the table are those of respondents with “strong” or “moderate” preferences for transit, pedestrian or short distance travel options.

Most apparent from the table is the significant variance in preference between zones. In all cases in Boston and Atlanta, transit and pedestrian preferences decline sharply as one moves from neighborhood cluster “A” to “E.” For example, the proportion of people in Atlanta feeling moderately or strongly favorably to living in a neighborhood with a bus system drops from 62 percent in zone “A” to 46 percent in zone “E.” Similarly, the proportion of Atlantans moderately or strongly preferring a neighborhood that “has good public transit, even if this means lots of people from different neighborhoods walking on the street where I live” drops from 75 percent in the central zone to 20 percent in the “E” neighborhood.

It should be noted that the lower five lines of the table refer to tradeoff questions where people were asked to indicate their preference for a particular neighborhood outcome (e.g., transit availability), *even if* it entails what some might perceive as a cost (e.g. strangers walking on my street). By focusing both on what might be perceived as benefits and as costs of a transit and pedestrian friendly environment, the tradeoff styled questions were able to winnow out some of the more peripheral interest in transit- and pedestrian-friendly environments. For example, 64 percent of residents of zone “D” in Boston felt at least moderately favorably toward living in a neighborhood with a bus system. That number dropped to 53 percent when the tradeoff of living close to one’s neighbors was introduced, 45 percent if transit’s effectiveness depended on a mix of single- and multifamily buildings close together, and 44 percent it entailed “people from different neighborhoods walking on my street.”

Notwithstanding this drop-off in support for transit and pedestrian environments when explicit tradeoffs are introduced, considerable interest was exhibited in such environments, even in the suburban neighborhoods of Boston and Atlanta. Among residents of neighborhood “D,” roughly 35 percent of Atlantans and 45 to 50 percent of Bostonians expressed moderate or strong preferences for such neighborhoods. Even among residents of the outer ring communities, roughly 20 percent of Atlantans and 30 percent of Bostonians expressed favorable opinions. These proportions tend to be confirmed in Table 11, which reports results of a question in which neighborhood attributes were bundled into two imagined neighborhoods, and the respondent asked to choose between them.

Table 10: Percent of Respondents Reporting Moderate or Strong Preferences for Various Neighborhood Options

		Atlanta					*Boston*				
Neighborhood Cluster		**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**
Neighborhood with a bus system		100%	83%	69%	64%	28%	62%	83%	80%	64%	46%
Mixed residential/commercial use		100%	83%	59%	53%	36%	85%	76%	68%	49%	37%
Mixed housing types		75%	26%	53%	24%	19%	55%	75%	55%	39%	29%
"Moderately" or "strongly" prefer a neighbor-hood where people can:	**Even if this means:**										
Live close to work, school or shopping	Mix of single- and multifamily buildings close together	100%	83%	37%	34%	18%	100%	83%	61%	42%	26%
Walk or take the bus	Living close to my neighbors	100%	74%	75%	49%	26%	90%	80%	74%	53%	42%
Use public transit	People from different neighbor-hoods walking on my street	75%	46%	47%	34%	20%	70%	88%	68%	44%	29%
Walk to stores, libraries or restaurants	Houses and commercial areas within a block or two	100%	74%	63%	36%	26%	76%	88%	68%	44%	33%
Use public transit	Mix of single- and multifamily buildings close together	75%	63%	47%	35%	18%	85%	83%	63%	45%	26%
	n	3	11	36	148	612	13	51	212	324	201

Note: Small sample sizes in clusters A and B of Atlanta and A of Boston render the percentages reported in those columns not reliable statistically. Nonetheless, for all rows of the table, a chi-squared test for independence of preferences between neighborhood cluster and metropolitan area indicates statistically significant differences with greater than 99% confidence.

Table 11: Proportion Preferring Pedestrian and Transit-Oriented Neighborhood over Auto-Oriented Neighborhood

Neigh-borhood Cluster	Atlanta	Boston	Description of Auto-Oriented Neighborhood	Description of Pedestrian and Transit-Oriented Neighborhood
A	100%	85%	"The first neighborhood has convenient driving opportunities. This community does not offer people the opportunity to walk or take transit to their destinations, but they can drive cars easily to shopping and community facilities in about 10-15 minutes. Commute locations are about 20 minutes away by car, including time on a highway. The houses consist entirely of single family houses on larger lots."	"The second neighborhood has a good transit system and convenient walking locations. Shopping, entertainment, and a public library and school are within a 10-15 minute walk. Commute destinations are about 20 minutes away by transit. So travel times are about the same as in the first neighborhood, even though distances are shorter. Houses in this neighborhood are close together. Residences on each block are a mixture of single family detached houses, town houses, and smaller multifamily buildings."
B	73%	90%		
C	67%	66%		
D	34%	52%		
E	17%	32%		

Finally, very apparent are the differences between transportation and land use preferences between Boston and Atlanta. In nearly all cases, the Boston residents of a given neighborhood type exhibit more transit and pedestrian preferences than Atlanta residents of the corresponding neighborhood. This outcome can be the product of at least two phenomena, both of which are probably at work here. First, it may be that Atlantans' greater preference for low density, automotive environments shaped their metropolis; homebuyers and renters, expressing their preference through markets led to a lower density, more automobile oriented development style than in Boston. The second explanation, equally plausible, is that people's environmental preferences are shaped by their experiences. Given the greater experiences of residents of metropolitan Boston with successful pedestrian and transit-oriented neighborhoods, they develop preferences more favorably inclined to residence in such areas.

Of the two, the more challenging explanation for proponents of accessible land use and transportation alternatives is the former. If individuals' preferences are shaped by their environments, intervention into markets might be justified on the basis that "they don't know what a good urban environment is because they've never seen one." On the other hand, if one assumes that environmental preferences are fixed, this reasoning might appear unacceptably paternalistic.

This study does not attempt to untangle competing explanations for the genesis of people's preference structure. For analytic purposes, the study is effectively assuming the more challenging of the two assumptions—that of fixed environmental preferences. In the next section, it considers the relationship between people's preferences—however generated—and their actual choices in each of the two regions.

RELATIONSHIP OF PREFERENCES AND CHOICES IN BOSTON AND IN ATLANTA

The questions referred to in Table 10 and Table 11 were designed to elicit respondents' preferences along a number of dimensions pertaining to transit or automobile orientation and pedestrian environments. Nonetheless, it should not be surprising that individuals' preferences tend to move together. That is, an individual indicating strong preferences for transit is likely to indicate similarly strong preferences for pedestrian environments, and possibly strong tastes for more accessible living generally.

Under conditions such as these it is possible to use principal components analysis to create a limited number of indices, or factors, that capture the underlying similarity between individuals' responses to questions that are related in the fashion described above. By creating a small set of variables that represent a significantly larger number, this technique can facilitate further modeling without using the full set of variables. The factor thus created can be thought of as a single scale that captures as much as possible of the variability in the individual variables upon which it was based. In this study, the factor that was extracted is interpreted as an indicator of preferences for land uses supportive of pedestrianism and transit (Table 12). While the factor score does not have interpretable units, lower values indicate preferences for transit and pedestrian-oriented environments, while higher values indicate preferences for automobile-oriented environments. The distribution of this factor is displayed in Figure 15; the figure displays the significantly different preference structures of the Atlanta and Boston samples, with the latter being considerably more oriented toward transit and pedestrian friendly environments than the former.

Table 12: Factor Loadings of Transit/Pedestrian Preference Factor

Variable	Factor Loadings
Bus (Q7)	.678
Land Use Mix (Q8)	.673
Housing Mix (Q9)	.722
Proximity (Q10)	.786
Transit (Q11)	.749
Transit (Q12)	.756
Walkability (Q13)	.801
Transit (Q14)	.817
Neighborhood Bundle (Q15)	.796

(eigenvalue=5.1, 57% of variance explained, no rotation)

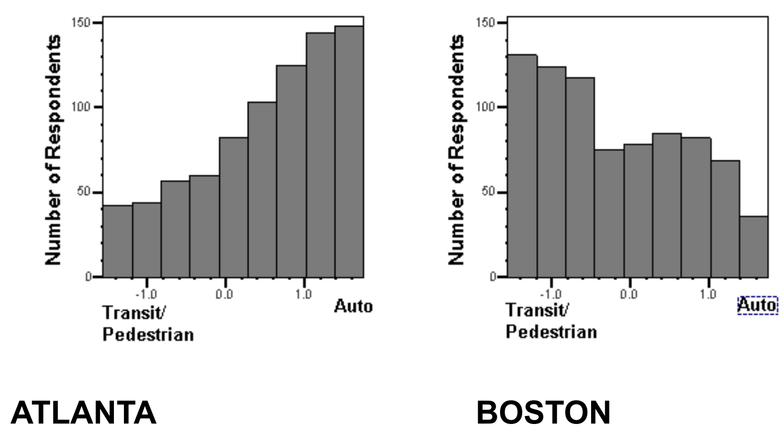

Figure 15: Neighborhood Preference Score Distributions, Atlanta and Boston

Given the combination of the divergent preferences of residents of the two areas and the significantly different metropolitan form of each area, it may be that differences in the characteristics of people's neighborhood environments are explained by differences in their preferences. For example, on the whole, Atlantans live in more car-oriented environments than Bostonians. Is the difference in their preferences sufficient to explain the differences in the neighborhood environments in which they find themselves?

The analysis presented in Figure 16 rather dramatically suggests that this is not the case Both the Atlanta the Boston samples are divided into deciles in terms of neighborhood preference scores, or preference ratings. The far left points in the figure represent the Atlanta and Boston members of the sample who are in the ten percent slice with the strongest transit and pedestrian preferences. Despite these equivalent preferences, these groups' representatives in Atlanta live in transit and pedestrian friendly areas "A," "B," and "C" at a considerably lower rate than their Boston counterparts. For example, a person in the second decile in terms of preferences (i.e., one strongly interested in transit and pedestrianism) has a nearly 75 percent probability of living in one of these three zones in Boston, but only a 35 percent probability of such living if the person in question is an Atlantan. It should be noted that the graph is most likely an underestimate of the phenomenon, because of the inequality of the zones between the two regions; zone "B," in Atlanta, for example, was seen as less pedestrian and transit friendly than the parallel zone in Boston. This graph appears to confirm the validity of the transit-pedestrian preference scale used in these analyses, as the mean transit-pedestrian ratings of people's environments declines quite regularly as people's preferences move from transit and pedestrian to more automobile oriented environments. But more importantly, it illustrates that the variation in residence in transit- and pedestrian friendly neighborhoods is only partly explained by the difference in households' preferences between the two regions.

Figure 16 also lends support to the use of stated-preference methodology in transportation and land use studies such as this one. Stated preference methods, because they focus on what people say they want, rather than what they actually choose, are vulnerable to the criticism that respondents may answer strategically, idealistically, or in another fashion that bears only scant resemblance to their actual likely choices. Reliance on stated preference data would depend on respondents' at least attempting to make choices in line with their preferences; for example, one would expect Atlantans with preference for transit and pedestrian friendly neighborhoods to gravitate towards such neighborhoods as do exist in Atlanta, however constrained. Figure 16 demonstrates this phenomenon with a highly regular sorting of people according to their stated preference. In both Boston and Atlanta, the proportion of people choosing pedestrian and transit friendly zones declines regularly with declining stated preferences for their zones; this decline is just as regular in Atlanta as it is in Boston. The difference is that the Atlantans face a supply constraint that precludes a majority of even the most transit- and pedestrian-oriented individuals from residing in neighborhoods that match these preferences.

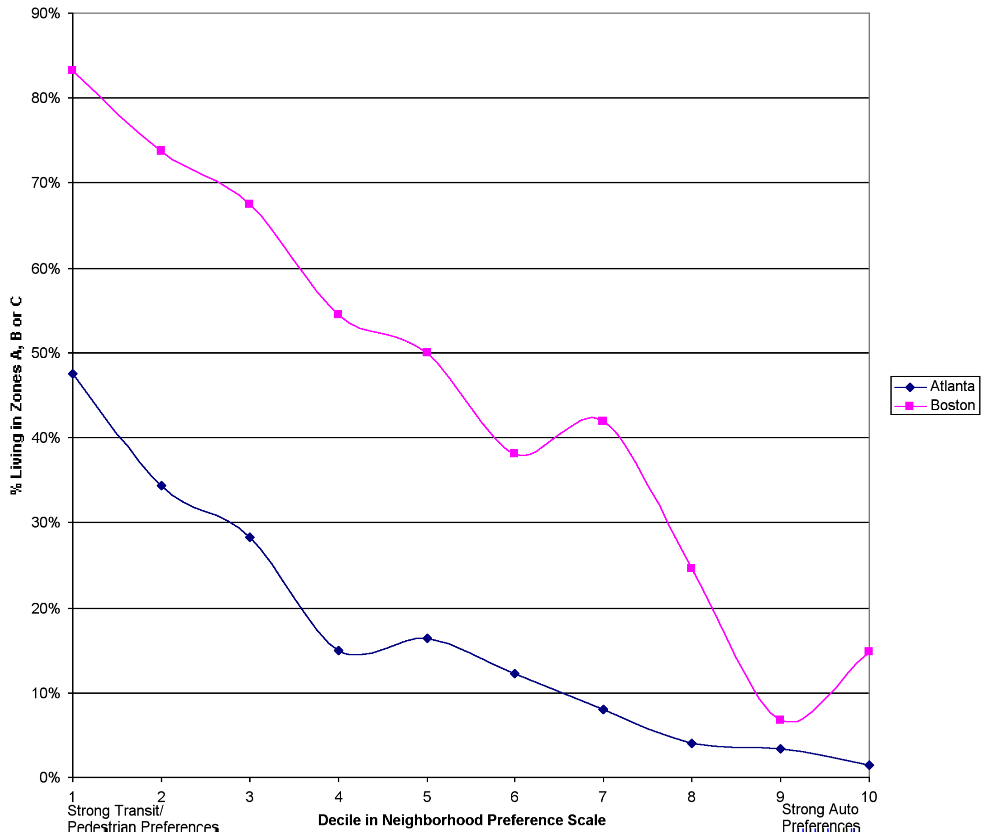

Figure 16: Relationship of Transit-Pedestrian Preference to Residence in Transit- and Pedestrian Friendly Zones

DISCRETE CHOICE MODELING OF CHOICE OF NEIGHBORHOOD CLUSTERS

Residence in a given neighborhood cluster was modeled as a multinomial logit discrete choice. Six models were estimated for each metropolitan area: a model for the population as a whole, and models for white, nonwhites, and households of low, medium and high income. Each model has two sets of independent variables: neighborhood specific constants, and the neighborhood preference score described above (interacting with neighborhood choices. In all cases, neighborhood type E is the omitted category, and types A and B have been combined because of low sample sizes in zone A. The models are constructed to assess: 1. The closeness of the “fit” between people’s land use and transportation preferences on the one hand and their choice of actual neighborhood on the other; and 2. To gauge the sensitivity of people’s choices to their preferences; that is, how readily can people act upon their transportation and land use preferences when selecting a residential location?

The models are presented in Table 13. All coefficients are significant with at least 95 percent confidence with the exception of the models for nonwhites and the Boston model for low income. All coefficients of the preference score variable carry the expected negative sign; lower preference scores mean greater preferences for transit and pedestrian-oriented neighborhoods. In all cases (save the model for nonwhites in Boston) the coefficients become progressively more negative as the choices approach the central A and B zones, indicating the impact of stronger transit/pedestrian neighborhood preferences on the utility of residence in one of those zones.

All of the Atlanta models have significantly greater explanatory power than their corresponding Boston model; pseudo-R^2 statistics range around 0.3 to 0.4 for Atlanta, and around 0.1 to 0.2 for Boston. This is an artifact of the lopsided distribution of households in Atlanta, with 60 percent of households residing in zone E; Boston’s more even distribution of households between zones tend to lead to less explanatory power in the models. Two approaches are used to control for this distribution effect. First, models with neighborhood alternative specific constants only were estimated; the increase in explanatory power that came with the addition of data about household’s preference is interpreted as a measure of closeness of fit between preferences and choices. Second, the marginal effect of the neighborhood preference score on the probability of residence in a given neighborhood was estimated. This marginal effect is the first derivative of the probability of selection of a given neighborhood with respect to the neighborhood preference score, and is a measure of the sensitivity of neighborhood choice to transportation and land use preferences. Higher marginal effects indicate greater responsiveness of choice to preference; lower effects indicate relative unresponsiveness.

The comparison of pseudo-R^2 statistics between the models with and without neighborhood preference scores is revealing. In every case, inclusion of the preference scores lead to a greater increase in the pseudo-R^2 statistics in the Boston model than in the Atlanta, with differences ranging from a low of 0.02 to a high of 0.13. In other words, knowing one's land use and transportation preferences added more explanatory power to a model of residential locational choice in Boston than in Atlanta. This is interpreted here as a function of the greater variety of the choice set in metropolitan Boson; given a broad range of choices, people were better able to act on their preferences than in Atlanta, which is much more dominated by an auto-dependent development model.

These findings are amplified by analysis of the more sensitive "marginal effects" indicator. For example the marginal effect of an increase in the neighborhood preference score on the probability of selecting zones A or B in Boston was -0.25; the parallel statistic for Atlanta was -0.03. In other words, a shift in the neighborhood preference score towards greater transit and pedestrian neighborhoods affected the probability of selection of a central neighborhood in Boston over eight times more than in Atlanta. This is consistent with the paper's core argument; relative lack of choice in the Atlanta context rendered one's neighborhood selections much less sensitive to one's preferences than in Atlanta. In general, marginal effects for zones A, B and C were much greater in Boston than in Atlanta; in contrast, marginal effects for zone D (the next-to-outer ring) were somewhat greater in Atlanta. Given the greater supply of suburban housing in Atlanta, people with preferences for this type of housing were slightly more able to satisfy those preferences than their Boston counterparts. However, the relative Boston disadvantage in this neighborhood type is considerably less than the its relative advantage for the more transit and pedestrian friendly neighborhoods; this is further supported by the fact that the marginal effect on explanatory power of the addition of neighborhood preference as an independent variable is consistently greater for Boston than for Atlanta.

Similar analyses can be performed on population subgroups. For example, marginal effects for nonwhites in both Boston and Atlanta were significantly less than for whites, suggesting a more constrained ability on the part of the nonwhites to act on transportation and land use preferences. Analysis of marginal effects at different income levels is revealing. In the case of the

Boston sample, the marginal effects increase markedly with income. This is as is expected; the higher one's income, the greater the effect one's neighborhood preferences would have one's neighborhood choices. Results for low-income people in Atlanta are anomalous in this regard in that both the marginal effects and the additional explanatory power of neighborhood preferences appear to be highest in the low-income group.

	All		Whites		Nonwhites		Under $35,000 income		$35,000-$74,999 income		$75,000 income and higher	
	Boston	Atlanta	Boston	Atlanta	Boston	Atlanta	Boston	Atlanta	Boston	Atlanta	Boston	Atlanta
Coefficients of alternative specific constants:												
Zones A or B	-0.28	-3.26	-0.40	-3.58	1.14	-2.59	-0.07	-3.22	-0.57	-3.15	-0.54	No obser-
(t-statistic)	(-1.5)	(-10.6)	(-2.0)	(-8.5)	(1.4)	(-5.6)	(-0.2)	(-4.8)	(-1.6)	(-5.8)	(-1.5)	vations
Zone C	0.85	-1.74	0.75	-1.70	2.39	-1.89	0.92	-1.44	0.81	-1.99	0.55	-1.89
(t-statistic)	(6.5)	(-12.2)	(5.6)	(-10.7)	(3.3)	(-5.6)	(3.8)	(-5.3)	(3.6)	(-6.7)	(2.2)	(-7.2)
Zone D	1.05	-0.48	1.01	-0.58	1.91	-0.13	1.17	-0.31	0.97	-0.79	0.96	-0.76
(t-statistic)	(8.5)	(-5.3)	(8.0)	(-5.5)	(2.6)	(-0.73)	(5.2)	(-1.6)	(4.6)	(-4.3)	(4.2)	(-4.4)
Coefficients of neighborhood preference scores (interacting with neighborhood choices)												
Zones A or B	-1.97	-1.73	-2.05	-2.02	-1.05	-0.91	-1.51	-2.35	-2.16	-1.62	-2.45	No obser-
(t-statistic)	(-10.4)	(-6.0)	(-10.4)	(-5.6)	(1.0)	(-1.7)	(-4.6)	(-4.3)	(-6.1)	(-2.9)	(-6.8)	vations
Zone C	-1.22	-1.25	-1.2	-1.31	-1.41	-0.88	-1.04	-1.39	-1.14	-1.25	-1.44	-1.26
(t-statistic)	(-8.4)	(-8.1)	(-8.2)	(-7.8)	(-1.4)	(-2.3)	(-4.0)	(-4.8)	(-4.5)	(-3.9)	(-5.4)	(-4.7)
Zone D	-0.55	-0.48	-0.55	-0.81	-0.30	-0.13	-0.30	-0.90	0.97	-0.65	-0.75	-0.80
(t-statistic)	(-4.0)	(-5.3)	(-4.1)	(-7.3)	(0.3)	(-0.7)	(-1.3)	(-4.5)	(4.6)	(-3.4)	(-3.2)	(-4.5)
Marginal Effects of Neighborhood Preference Scores on Neighborhood Choice[1]												
Zones A or B	-0.25	-0.03	-0.26	-0.03	-0.13	-0.03	-0.19	-0.061	-0.26	-0.04	-0.29	---
Zone C	-0.26	-0.08	-0.25	-0.09	-0.31	-0.06	-0.22	-0.11	-.025	-0.07	-0.27	-0.07
Zone D	-0.12	-0.14	-0.12	-0.14	-0.06	-0.10	-0.07	-0.17	-0.12	-0.11	-0.17	-0.12
Overall model statistics												
N	798	800	748	653	50	147	241	191	262	215	245	284
Adjusted Pseudo-R^2	0.13	0.38	0.13	0.41	0.23	0.27	0.12	0.33	0.12	0.40	0.15	0.36
Adjusted Pseudo-R^2, model with alternative-specific constants only	0.05 _=+0.08	0.31 _=+0.07	0.05 _=+0.08	0.33 _=+0.07	0.19 _=+0.04	0.25 _=+0.02	0.07 _=+0.05	0.21 _=+0.12	0.05 _=+0.07	0.34 _=+0.06	0.02 _=+0.13	0.30 _=+0.06
Average Neighborhood Preference Scores[2]	-0.38	040	-0.39	0.46	-0.24	0.16	-0.46	-0.04	-0.42	0.39	-0.34	0.59

[1](_y/_x), where y=probability of selection of n; x=neighborhood preference score

[2]Boston-Atlanta differences significant with >0.99 confidence. Differences within Boston groups not statistically significant. Differences within Atlanta groups (ethnicity, income) significant with >0.99 confidence.

Table 13: Multinomial Logit Model of Choice of Neighorhoods Type

None of the foregoing analysis is to suggest that preferences for the physical characteristics and accessibility of neighborhoods dominate, or should dominate, other aspects of the residential choice decision. Clearly issues such as school quality and neighborhood safety tend to be more important to the locational decisions of many, if not most households. But this analysis does not rest on any assumption of primacy of transportation and accessibility factors. Rather it is assumed that where greater choices are available, more households will be able to satisfy their preferences even for non-primary characteristics in their neighborhood wish list. For example, imagine a locating household whose first priority is a neighborhood with good schools, and whose second priority is a neighborhood that facilitates pedestrianism, transit and short distance commuting. If all the neighborhoods affordable to this household that offer good schools are located in auto-oriented suburbs with poor accessibility characteristics, it would likely choose such a locale, and its preferences for accessible living, transit and pedestrianism would never be revealed. On the other hand, if because of greater diversity of choice, the desired neighborhood environmental characteristics could be found in affordable communities with good schools, a selection closer to the household's preferences—both primary and secondary—could be made.

CHAPTER EIGHT

CONCLUSIONS

This study was concerned with the core rationale for the development of physical forms—including New Urbanist neighborhoods, transit villages, job-housing balance, and "smart growth"—that seek to provide an alternative to low density, automobile oriented neighborhoods and communities. Much of the research and policy debate currently surrounding these physical and policy directions centers on the potential impact their provision may or may not have on travel behavior; under this formulation, scientific evidence establishing the connection between alternative forms of urbanization and reduced automobile use is the rationale for policies that would be supportive of such alternatives.

Underlying such a framework is an implicit worldview that current auto-dependent development patterns are the product of individual preferences revealing themselves through markets, and that development of alternatives rests on planning's regulatory intervention into market processes. But the process of neighborhood development is hardly an unfettered market, as is evidenced by the rich literature on exclusionary zoning in the United States. Individual communities frequently employ their regulatory powers in order to limit certain types of land uses, notably housing that is likely to be occupied by people of lower socioeconomic status than current community residents. Very often those land uses can constitute precisely the kinds of alternatives to low density, automobile oriented development that are discussed in this paper. Where markets can support alternative development forms, the primary benefit of these forms is in allowing their residents to forge a closer link between their preferences for transportation and land use environments on the one hand and their actual choices on the other.

This study started from this notion, suggesting that a region that offers rich alternatives in both low density, auto-oriented neighborhoods and transit and pedestrian friendly neighborhoods would afford residents the opportunity to create a closer preference-choice match than a region whose dominant development form was low density and automobile oriented. By separately characterizing the preferences of households in Boston and Atlanta, and the characteristics of the zones these households occupy, the study was able to assess the quality of the match that each region offered its residents. Bostonians both prefer and reside in more transit and pedestrian friendly environments than Atlantans, but the differences in preferences are insufficient to explain differences in outcomes. Atlanta residents with high preferences for pedestrian and transit friendly neighborhoods were much less likely to live in such neighborhoods than their Boston counterparts. These results suggest that if these groups in Atlanta had a set of choices available that were less constrained into a low density, automobile oriented development form, they would opt for such choices, and that such a move would bring their preferences and their choices closer together.

These results should call into question presumptions regarding the efficiency of a network of land use regulations that seeks to lower development densities. While economists have frequently supported such policies because they can promote the development of relatively homogenous communities that are efficient at service provision, other factors tend to negate these efficiency gains. These include the loss to the household associated with being excluded from its preferred residential location, including the continuing costs of transportation—or inaccessibility—that the exclusion engendered.

This argument is not intended to criticize land use regulation per se. Such intervention arose from early reformist activism aimed at unhealthful urban conditions, a concern that remains relevant today. Moreover, land use tools can very appropriately be employed to coordinate the development of the accessibility-based development forms in areas where there is sufficient market impetus to bring these forms about. But despite their reformist roots, regulatory tools today are broadly misused to exclude some development forms (and the population groups that would inhabit them) from selected neighborhoods and communities. They are not the only barriers, to be sure. But as tools implemented by directed planning and public policy, these regulations and their potential choice-constraining effects deserve more critical scrutiny than is currently evident in the national debate about the relationship between land use and transportation policy. Misconstruing the product of these regulations as "the market"—or a default ordering from which deviations need to be justified—leads to the erroneous conclusion that scientific proof of benefit (for example in travel behavior) is the logical precondition to their liberalization.

POLICY IMPLICATIONS

This study has fundamentally called into question the notion that the policy logic of accessibility-based development forms, such as jobs/housing balance, New Urbanist development or transit villages, rests on their capacity to reduce vehicle miles traveled. To the extent that current land use practice constrains the development of these alternatives, findings presented here would support relaxation of regulations that give preference to homogenous development in the form of low-density, single land use, automobile oriented settings. Accomplishing this liberalization is not an easy task, as local communities zealously guard their prerogative to employ land use and transportation planning to impose a low-density template on development.

But reform in this direction does not imply that communities take a "hands-off" attitude toward land use change in their community. Instead, they can be proactive in promoting regulations that facilitate development of a wider range of neighborhood types at the metropolitan and even local scales. Designation of zones where compact, mixed use development is to be the norm is clearly within the purview of municipalities, though the success of such zones will depend on their ability to gauge markets. Where such zones are designated but do not offer sufficient profit potential to developers, they will remain undeveloped.

The dependence of innovative land use and transportation planning on marketplace success is both bad news and good for planners and policy makers. The bad news is that they have limited capacity to compel development markets to produce density or mixed use where the markets see no profits in doing so. The good news it that where such designations are commercially successful they provide *prima facie* evidence that households are interested in broader ranges of solutions than have been allowed to develop under the current regulatory regime of transportation and land use.

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APPENDIX A: SURVEY QUESTIONNAIRE

RESIDENTIAL CHOICE QUESTIONNAIRE

Interviewer: Phone numbers should be called back a maximum of___ times in attempting to reach a person, not a machine.

When a person is reached use the following introduction:

Hello! I am conducting a university research project that focuses on the types of neighborhoods that people like to live in, including the types of transportation options available. I'm hoping to interview a person at least 18 years old in your household. Are you at least 18 years old?

Interviewer: If yes, begin interview.
If no, ask question 1.

1. Is there a person at least 18 years old who is currently there at your house?

Interviewer: If yes, begin interview.
If no, go to question 2.

INTERVIEW BEGINS:

I'm calling on behalf of the Mineta Transportation Institute in San Jose, California. This is a research organization sponsored by federal and state government to study transportation policy. You've probably received a letter from us regarding this study, and we certainly hope you'll be able to help us out by answering our questions. It's very important that we get an accurate picture of people's preferences for neighborhood and transportation options. This survey is strictly confidential, and your answers will only appear as totals combined with those of other respondents. Are you able to answer our questions now?

If yes go to question 3.

2. What would be a convenient time for me to call back?
3. Are you male or female?
4. How many children younger than 18 live in your household?

5. Apart from yourself, how many adults at least 18 years old live in your household?
6. **If more than 1)** In addition to asking about you, I'm going to be asking a few questions about another adult in your household. I'd like to talk about the person, apart from yourself, who most influences household decisions on where to live. Would you please think of the one person who best fits that description?

   (If more than 0) What is that person's relationship to you?

   Spouse/partner
   Roommate/housemate
   Other relative

7. How do you feel about living in a neighborhood with a bus system, including a bus line that stops within a block or two of your house—favorably, unfavorably, or neutral? **(If an answer other than "neutral," probe: slightly, moderately or strongly favorable or unfavorable).**
8. How do you feel about living in a neighborhood where the houses and commercial areas such as stores, libraries or restaurants are within a block or two of each other—favorably, unfavorably, or neutral?

   (If an answer other than "neutral," probe: lightly, moderately or strongly favorable or unfavorable).
9. How do you feel about living in a neighborhood that has a mix of single-family detached houses on small lots, townhouses, and other multifamily buildings on each block—favorably, unfavorably, or neutral?

(If an answer other than "neutral," probe: slightly, moderately or strongly favorable or unfavorable).

Now, I'm going to read two statements, and I'd like to ask you which one you agree with more, or if you feel neutral between the two statements. Then I'll ask you how strongly you feel about that statement.

Interviewer: Each statement is followed up to determine if the respondent feels "slightly," " moderately" or "strongly" for that statement, except if the respondent chooses "neutral."

10a. I like living close to work, school or shopping, even if this means living in a neighborhood with a mix of single family houses and multifamily buildings that are close together.	10b. I like living in a neighborhood with single family houses on larger lots, even if this means traveling far to work, school or shopping.
11a. I like living in a neighborhood where there is plenty of distance between my neighbors and me, even if this means that I have to drive just about everywhere.	11b. I like living in a neighborhood where I can walk or take the bus to places, even if this means that I'm living close to my neighbors.
12a. I like living in a neighborhood that has good public transit, even if this means lots of people from different neighborhoods walking on the street where I live.	12b. I like living in a neighborhood where the streets don't have many people from different neighborhoods walking on them, even if this means it doesn't have good public transit.
13a. I like living in a neighborhood where people can walk to places like stores, libraries or restaurants, even if this means that the houses and commercial areas are within a block or two of each other.	13b. I like living in a neighborhood where the commercial areas are kept far from the houses, even if this means that people can't walk to places like stores, libraries or restaurants.
14a. I like living in a neighborhood with single family houses on larger lots, even if this means that public transit is not available.	14b. I like living in a neighborhood with a good bus and train system, even if this means a neighborhood with a mix of single family houses and multifamily buildings that are close together
15a. I like living in a neighborhood with excellent public elementary, middle and high schools, even if this means that the cost of housing is about 15 percent higher than in similar areas with average schools.	15b. I like living in a neighborhood where the cost of housing is about average, even if this means that the public schools are also average.

Now I'm going to describe two types of neighborhoods, and will ask you which of the two you'd rather live in. Then I'm going to ask you how strongly you feel about the neighborhood you've chosen. The neighborhoods are different mostly in their housing and transportation options. The descriptions are a bit long, so you'll need to listen closely.

The first neighborhood has a good public transit system and convenient walking locations. Shopping, entertainment, and a public library and school are within a 10-15 minute walk. Commute destinations are about 20 minutes away by transit. Houses in this neighborhood are close together. Residences on each block are a mixture of large and small single family detached houses, town houses, and smaller multifamily buildings.

The second neighborhood has convenient driving opportunities. This community does not offer people the opportunity to walk or take transit to their destinations, but they can drive cars easily to shopping and community facilities in about 10-15 minutes. Commute locations are about 20 minutes away by car, including time on a highway. So travel times are about the same as in the first neighborhood, even though distances are greater. The houses consist entirely of single family houses on larger lots.

Interviewer: Since the presentation order of the two questions changes—half the respondents get one order of presentation, half get the other—alternative wording follows:

The first neighborhood has convenient driving opportunities. This community does not offer people the opportunity to walk or take transit to their destinations, but they can drive cars easily to shopping and community facilities in about 10-15 minutes. Commute locations are about 20 minutes away by car, including time on a highway. The houses consist entirely of single family houses on larger lots.

The second neighborhood has a good transit system and convenient walking locations. Shopping, entertainment, and a public library and school are within a 10-15 minute walk. Commute destinations are about 20 minutes away by transit. So travel times are about the same as in the first neighborhood, even though distances are shorter. Houses in this neighborhood are close together. Residences on each block are a mixture of single family detached houses, town houses, and smaller multifamily buildings.

16. Assume that the cost of housing and the mix of people in both neighborhoods are the same. Which neighborhood would you prefer to live in?

Interviewer: Do not read aloud the description below next to each box. Just ask the question above and check the appropriate box below. Please verify what the respondents mean. For example, if they say "the first neighborhood", double check: "so you mean the one with transit options," etc.

- ☐ Prefer the neighborhood with transit/walking options
- ☐ Prefer the neighborhood with no transit/walking options

17. How strongly do you prefer that neighborhood? "1" means a slight preference, "5" means a very strong preference, and 2, 3, or 4 are somewhere in between.

Would you select: 1 2 3 4 5

Interviewer: Ask Question18 only if there is more than one adult in the household (i.e., if question 5 is 1 or more).

18. Which of the two neighborhoods do you think your __________ (the other adult in your household) would prefer to live in?

Interviewer: Do not read aloud the description below next to each box. Just ask the question above and check the appropriate box below.

19. How strongly would your _____________ (the other adult in your household) prefer that neighborhood? "1" means a slight preference, "5" means a very strong preference, and 2, 3, or 4 are somewhere in between.

Would that person select: 1 2 3 4 5

20. Have you driven a car or a truck at least a few times in the past half-year or so?

(If yes, continue. If no, read the instructions below and skip to Question 22).

Now, I am going to read some statements. With each statement, I'd like to ask whether you:

Strongly agree
Moderately agree
Neutral
Moderately disagree
Strongly disagree

21. I feel uncomfortable driving a car under certain conditions, such as long distances, at nighttime, or on routes I don't know well.

22. **(For households with more than one adult, i.e., if question 5 is 1 or greater)**
My ____________ (the other adult in my household) feels uncomfortable driving a car under certain conditions, such as long distances, at nighttime, or on routes he or she doesn't know well.

Interviewer: Note that one possible answer to this question is "That person doesn't drive a car".

23. I benefit greatly, or I would benefit greatly, from being able to get around sometimes without a car.

24. **(For households with more than one person, i.e., if question 5 is 1 or greater, or if question 4 is 1 or greater)**

Another adult or child in my household benefits greatly, or would benefit greatly, by being able to get around sometimes without a car.

25. The government should spend more transportation money on expanding roads and highways rather than on public transit.

Interviewer: The following questions are to be answered on a 1 to 5 scale.

Now I am going to ask you a few questions about the quality of the transportation options in your neighborhood. Rate your answers on a scale of 1 to 5, with 1 being a POOR neighborhood for walking to destinations, 5 an EXCELLENT neighborhood, and 2, 3, or 4 as somewhere in between.

26. How would you rate your neighborhood as a place for people to walk to destinations, considering such things as closeness of destinations, safety, and inviting street environments?

27. How would you rate your neighborhood as a place for people to drive cars, considering things such as congestion, parking, and good access to common destinations? Again, use a 1 to 5 scale for your response, with a 1 being a poor rating and a 5 being an excellent rating.

28. How would you rate your neighborhood as a place for people to take buses or trains, considering things such as access to destinations, frequency, and safety? Again, use a 1 to 5 scale for your response, with a 1 being a poor rating and a 5 being an excellent rating.

29. How would you rate the overall quality of your neighborhood for your household, considering such things as the quality of schools, transportation, shopping, safety, environment, or whatever is important to you? Again, use the 1 to 5 scale for your response.

NOW I AM GOING TO ASK YOU SOME QUESTIONS THAT WE NEED IN ORDER TO GROUP RESPONDENTS.

30. Over the past half-year or so, approximately how many days in a typical week have you traveled to work, or school?
(If 0 or 1, skip to Question 33).

31. During that time, how have you usually commuted to work or school?
(If respondent used multiple modes, we're looking for the one that covered the largest share of the distance).

Driven alone
Carpooled or rideshared
Taken the bus or train
Walked
Bicycled
Other

32. What is the distance, in miles, that you usually have traveled to work or school? We’re talking about one way distance here.

Interviewer: Ask Question 33 only if there's another adult in the household, i.e., if question 5 is 1 or greater:

33. Over the past six months or so, approximately how many days in a typical week did your __________ (the other adult in your household) travel to work or school?
(If 0 or 1, skip to Question 36).

34. During that time, how has your _______ (the other adult in your household) commuted to work or school?

Driven alone

Carpooled or rideshared

Taken the bus or train

Walked

Bicycled

Other

35. Within the past half-year or so, what is the distance, in miles, that your ___________ (the other adult in your household) usually has traveled to work or school? We’re talking about one way distance here.

36. What is your age group?

18-25

26-35

36-45

46-55

56-65

66-75

Over 75

37. What is the highest level of education you have completed?

Less than High School
High School
Some College (including Associate's degree)
College Graduate
Post-graduate

Interviewer: Ask Questions 38 and 39 only if more than one adult in the household (i.e., if question 5 is 1 or more).

38. What is the highest level of education completed by your __________ (the other adult in your household)?

Less than High School
High School
Some College (including Associate's degree)
College Graduate
Post-graduate

39. Is that person male or female?

40. How many licensed drivers live in your household?

41. How many operating cars, trucks, and motorcycles does your household currently have?

42. What best describes your ethnic background:

White/Caucasian
Black/African American
Asian/Asian American
Latino/Hispanic
Native American
Other/Mixed

43. **One last question—**I am going to read some household income categories. Please stop me when I get to the category that covers your household's gross income (before taxes) for PUT YEAR HERE.

Under $20,000
$20,000-$34,999
$35,000-$49,999
$50,000-$74,999
$75,000-$99,999
$100,000 or more

Thank you very much for your time and patience!

APPENDIX B: KEY MAPS

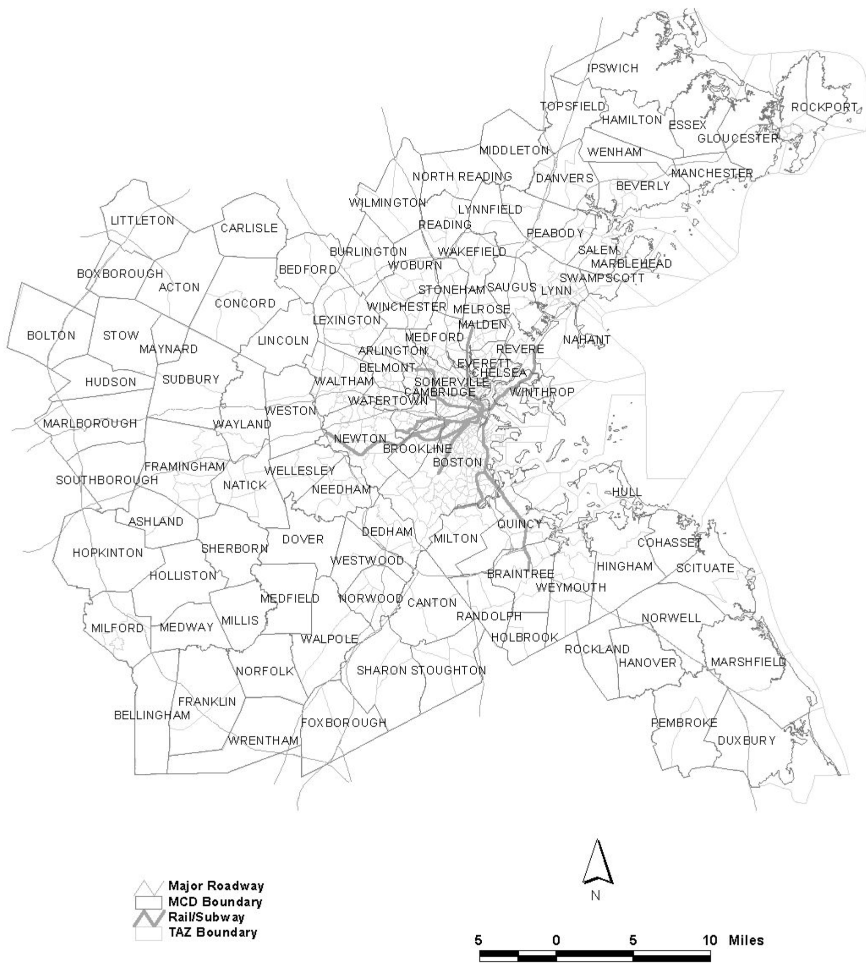

Figure 14: Boston Key Map

Figure 15: Atlanta Key Map

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