Parking at Mixed-Use Centers in Small Cities

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ABSTRACT

The debate about parking has shifted in the last decade, as some places attempt to move from conventional development patterns to creating urban centers modeled on new urbanism and smart growth concepts. Now the focus is less on providing sufficient parking to meet demand and more on ensuring that issue of parking does not undermine the possibility of creating vibrant places. The goal of this project is to better understand parking and parking provision as it relates to smaller cities and towns with mixed-use centers. Specifically, we wanted to address how having a dense, walkable, mixed-use center affects parking supply and demand, and how mixed-use centers compare to centers designed along more conventional lines. We tested these questions by conducting case study assessments of six sites in New England.

In general, the three mixed-use study sites provided much less parking per square foot than the conventional control sites. The study sites thrived by making much more efficient use of land for parking. The study sites also furnished a significant amount of on-street parking and relied more on shared municipal parking lots and parking garages. Given these differences, it is surprising to note that the towns with mixed-use centers demanded almost as much parking for new construction as did the towns in which the conventional sites are located. On average, the amount of parking mandated by base regulation in these six towns is about two and a half times more than the peak use.

INTRODUCTION

Parking and the provision of parking are often overlooked subjects of academic research in the transportation field. However, the issue of how, when, where - and how much parking is provided - plays a large role in transportation choices and in the health and vitality of urban areas. The debate about parking has shifted in the last decade as some places attempt to move from conventional development patterns to the creation of urban centers in the paradigm of the new urbanism. Now the focus is less on providing sufficient parking to meet demand and more on ensuring that parking does not overwhelm the desire for vibrant places. But some developers and planners are finding that it is extremely difficult to create relatively dense urban districts in face of the amount of parking that is mandated in conventional zoning regulations. Some argue that these regulations not only dampen the vitality of urban centers, but that the amount of parking mandated is actually not needed since, by their very nature, mixed-use places use less parking.

This premise seems to have gained wide acceptance even though only a handful of studies have been conducted to test the extent to which parking behavior in mixed-use urban centers differs from that in districts developed along more conventional lines. And those studies that have been done have focused on sites in larger cities where the parking patterns and other variables are quite different from those in smaller cities and towns. The goal of the research reported in this paper is to begin to address the need to better understand parking and parking provision as it relates to smaller cities and towns with mixed-use centers. Specifically, we wanted to address the following questions: To what extent does having a dense, walkable, mixed-use center affect parking supply and demand? Do these mixed-use centers perform differently from more conventional centers?

We tested these questions by conducting case study assessments of six sites in New England. The sites were selected because they fit into one of two categories: study sites with dense, walkable, mixed-use places, and control sites with more conventional single-use zoning. All six sites are major retail and commercial activity centers of small New England towns. The three study sites are older, traditional downtowns: Brattleboro (VT), Northampton (MA) and West Hartford (CT). The more conventionally-oriented sites in terms of parking include one small traditional downtown that has been expanded along conventional lines (Glastonbury Center, CT), and two newer commercial centers (Avon, CT and Somerset Square also in Glastonbury, CT). We compared land uses, municipal parking requirements, in addition to peak and non-peak parking demands in these centers. We also examined parking facility attributes such as the differences in usage between municipal lots and private parking, the quality of the pedestrian environment, and the degree of mixed land use for each town center.

LITERATURE REVIEW

The attitude towards parking and the provision of parking in American cities and towns has evolved significantly since the 1960s. Now there is more focus on the impact of parking in the urban environment as opposed to simply ensuring that sufficient, cheap, and convenient parking is provided. This change in approach is reflected in the research literature. In the following section, we present an overview of the literature relating to research on parking provision and parking policy.

In 1965, *Parking in the City Center* was published as an examination of the needs of cities as they increase their parking supply to meet growing parking demand (*1*). Focusing on major cities, the authors contended that due to the increasing use of cars, the central business district of every American city will need more parking with the goal of providing ample spaces for all of the city's daytime population. However, in order to accommodate the increased traffic flow, the authors reasoned that *on*-street parking should be *reduced*. Consequently, they asserted that *off*-street parking would be the most critical factor to the future success of cities. Furthermore, they stated that parking lots often make for the best land use. From their research in Hartford and Los Angeles, they concluded that off-street parking enhanced commercial activity in these cities by taking the place of less productive land uses without obstructing other alternative uses.

Special Report No. 125, published by the Highway Research Board in 1971, also supported the need for substantial off-street parking increases in American cities. An important recommendation in this report was that on-street parking in downtown areas should be eliminated altogether to address traffic and safety concerns. The main justification given was a 1959 program supported by the National Parking Association that called for the eventual cessation of on-street parking in downtown areas because the first priority of any street should to be the through movement of traffic (*2*). This prioritizing of the street realm as being primarily for through traffic is at odds with current thinking about the function of streets in the urban environment (*3*). This approach to the allocation of street space away from parking to increasing traffic flow has been very influential and is the status quo in most American cities (*4*). Interestingly, in the case of the cities in our study, all the study sites have on-street parking in comparison to the more conventional control sites that have almost no on-street parking.

The HRB Special Report No. 125 is also one of the only studies that looked at the differences in parking between cities of different sizes. The goal was to provide a reference for municipalities to use in creating their own zoning ordinances. The study grouped cities by population and collected information regarding parking quantities and use. From the point of view of our current research, this report demonstrated the extent to which parking use and provision in small cities differed from that in the larger cities, which are usually the focus of most research on parking.

Lots of Parking explored the history of the on-street versus off-street parking question. Streets with on-street parking were always known to be more problematic when it came to cleaning and plowing, but on-street parking was not typically restricted until the mid 1960s and early 1970s when traffic engineers started to point out that it reduced the capacity of the road by as much as 45% (*5*). On the other hand, the authors point out that limiting on-street parking reduces the functionality of the street by transforming it from an entity that provides access to a corridor that provides primarily for the through movement of vehicles. Traffic also tends to move slower in the presence of on-street parking, which can be of benefit to a commercial district. In Los Angeles, the decision to ban on-street parking resulted in a noticeable decline in retail business (*5*).

Zoning regulations play a significant role in the development of parking. As cities eliminated on-street parking, off-street parking grew in relative importance. Consequently, towns began to regulate off-street parking as part of their regular zoning requirements. In general, their goal was to ensure that enough parking was provided so not to impact businesses and traffic mobility or to disturb nearby uses. The 1972 edition of the Eno Foundation's work titled *Zoning, Parking, and Traffic* compiled survey results from over 200 planning and zoning

officials located throughout the country (*6*). This report is one of the first to take a more holistic approach to the provision of parking and its impact on an urban area. In fact, many of the principles discussed in this report are similar to principles from the much more recent charter of the New Urbanism movement (*7*). This included measures to shortening trips and reducing travel demand by allowing mixed-land use. The Eno Foundation Report also discussed problems associated with setting aside more area for parking than for more active land use, arguing that development then becomes too spread out for pedestrians to negotiate.

The most common reason cited for needing parking regulations in the Eno Report survey was the contention that insufficient parking leads to traffic congestion and aggravates neighbors. However, some of specific comments from the survey contradicted this thinking. Comments gathered from the planning and zoning officials included the following:

- "The more parking you provide, the more cars you attract and you're back where you started."
- "Automobiles are a detriment to the business district; that is why we do not require parking with new buildings in the business district."
- "Access may be more important than off-street parking" (*6*).

The Eno Foundation Report begins to hint at the idea of a link between parking policies and the character of a central business district in 1972. Our research of New England cities is designed to further explore some of these concepts.

Since the 1980s, the trend in parking research has shifted to a greater emphasis on understanding the influence of parking on the economic and social vitality of cities. For example in "People, Parking, and Cities," Shoup looks at parking and parking regulations in Los Angeles, San Francisco, and New York (*8*). One important theme from this paper is that a uniform parking policy across an entire city is detrimental. Shoup contends that a uniform parking requirement across an entire city harms the downtown area because of the cost associated with complying with this requirement downtown and the lost opportunity cost. He points to Los Angeles as an example of a city that has suffered from trying to accommodate too much parking downtown. Shoup recommends that cities would be better served to set parking maximums and allow the market to establish the cost to park.

The majority of municipal zoning regulations do the exact opposite. They mandate parking minimums by specifying the fewest number of parking spaces that must accompany a building. Most office and retail uses require parking based upon the square footage of leasable space while residential uses typically require parking on a per unit basis. However, parking maximums are becoming more common; in addition to San Francisco, other major cities with at least partial parking maximums include Seattle and Portland. Portland has a regional program that extends those maximum parking regulations beyond the city into the surrounding areas.

Millard-Ball in "Putting on Their Parking Caps" researched innovative approaches to zoning regulations in smaller cities (*9*). Cities cited include Beaverton and Eugene, Oregon, and Cambridge, Massachusetts. Beaverton's regulations specify the maximum area of land available to the developer for parking rather than a maximum number of spaces. This allows those with greater parking needs to build a structure if they deem it necessary. Cambridge instituted parking maximums in the early 1980s. It also has a program requiring all developers to submit a Transportation Demand Management (TDM) plan that attempts to reduce automobile usage. The plan was to reduce automobile use to at least 10% below the 1990 census average by

subsidizing public transit passes, decreasing the amount of parking available, and implementing parking fees. Eugene initiated parking maximums in order to increase densities and decrease paved areas, not just to reduce the area devoted to parking. According to Millard-Ball, the benefits these smaller cities and towns have seen included reduced traffic and congestion as well as becoming denser and more pedestrian-oriented.

In "An Opportunity to Reduce Minimum Parking Requirements," Shoup makes the case that more people drive because minimum parking requirements virtually guarantee a space (*10*). This induces a higher demand and sets up a vicious cycle of requiring even higher future minimum parking requirements. According to Shoup, many places work on the theory that parking requirements should serve the 20th busiest hour of the year. This leaves empty spaces over 99% of the time and half the spaces empty more than 40% of the time. If parking regulations do not accurately reflect demand, these percentages of empty spaces can become even more drastic. Our research will evaluate demand in terms of the zoning ordinances, but also in terms of the actual number of parking spaces provided.

Shoup suggests various solutions for mitigating spillover such as residential parking permits, time limits, and setting fees for parking. The need to charge for parking is a principle that Shoup repeatedly emphasizes. In *The High Cost of Free Parking,* Shoup states that nothing is truly free, especially parking (*11*). When zoning regulations require excess parking, that cost usually winds up in the form of hidden prices. Thus, everyone ends up paying for free parking, even those who walk, bike, or ride public transportation. Free parking also encourages people to drive more often. Interestingly, of all the cities surveyed by Shoup, Hartford, CT (which is the core metropolitan city for four of the sites in our study) had the highest percentage of drivers parking for free at 98%. The value of parking fees for a city can be more than just parking revenue and the potential for a decrease in driver mode share. *Lots of Parking* points to research demonstrating that metered spaces result in an increase in sales on a per vehicle and per person basis (*5*).

In trying to understand the numerical basis for the parking minimums in many towns, Shoup examined *ITE Parking Generation* (*11*). Shoup found that many of the assumptions ITE uses in determining the parking generation rates were faulty when applied to many situations. He reported that ITE develops most of the data based on suburban sites with plenty of free parking, insignificant transit ridership, and the automobile as the single mode choice.

The stated goal of the 2004 version of *ITE Parking Generation* (*12*) is to provide observed parking demand information for a variety of land uses. ITE emphasizes the informational nature of the data by noting that the report is "NOT a manual, recommended practice, or standard" and that "the data alone will not provide accurate estimates" (*12*). Given this disclaimer, it is not clear how engineers and planners should use this publication. Our research suggests that there are no set standards to guide towns in developing appropriate parking standards.

In 2002, a parking study was conducted for the Northwestern Connecticut MPO using a format similar to that in the *ITE Parking Generation* (*13*). The motivation for the study was to improve water quality by reducing the amount of unnecessary impervious parking surfaces. The study looked at forty-two different sites with freestanding retail or office complexes. They found that most lots were significantly underutilized with an average of just over 47% of parking spaces occupied (it is not clear whether this is the peak or average use). All the big box retail stores studied experienced less that 25% occupancy. The study holds municipal regulations

responsible for the overbuilding of parking facilities and recommends taking other factors into account beside square footage of building space.

Our study differs from that of the Northwestern Connecticut MPO in that we are focusing on activity centers within our study towns that have a degree of mix of uses and are not stand alone sites (the control sites in our study generally have much less mix of use). Todd Litman of the Victoria Transport Policy Institute identifies the unique role of a town center in the economic and social development of an area with his paper "The Value of Downtown" (*14*). Litman defines a downtown as follows: "a downtown is a relatively small, central, walkable area, usually less than a square kilometer, where commercial, cultural, and civic activities are concentrated." According to Litman, what makes a town center special and successful is a critical mass of activities. This allows for a compact development that improves efficiency and convenience. Part of this efficiency is the reduced need for parking. The advantages of a town center are multifold ranging from environmental benefits, such as reducing sprawl and preserving greenspace, to health benefits, such as increasing walking. In terms of transportation, Litman contends that a well-designed town center will reduce per capita automobile use, and in turn, reduce traffic crash risk by limiting exposure. The study sites in our research embody many of the qualities identified by Litman. These types of sites have not been extensively researched. Our goal is to determine if the advantages cited by Litman in terms of parking do indeed accrue to these types of locations.

STUDY DESIGN

Three study sites and three control sites were chosen based upon the following factors: land use type, area, demographics, and parking system. The study sites tended to possess the qualities of a good downtown described by Litman such as mixed land uses and highly walkable precincts while the control sites generally did not have these qualities (*14*). Each site possesses a comparable land area in a town with similar income levels surrounded by like population levels. All the sites are also similarly accessible by bus public transportation. The system of parking varies amongst the sites including on-street parking, private spaces, shared parking, municipal parking, and garage parking.

The following study sites were chosen based upon these criteria:

1. Brattleboro, VT
2. Northampton, MA
3. West Hartford, CT

The following control sites were chosen:

1. Avon, CT
2. Glastonbury, CT
3. Somerset Square in Glastonbury, CT

Our original goal was to confine the study to Connecticut cities, but we found it difficult to find sites that met our criterion of being mixed-use, walkable precincts in small cities. With few candidates for inclusion, we had to expand the search to nearby cities in other New England states. We finally settled on the three cities chosen primarily because of their similarity in size.

Once the three study sites where chosen, we then sought control sites that were of roughly the same size as the study sites.

One issue encountered in this process is that there are some structural differences relating to parking between the study sites and the control sites. For example, all the study sites have managed, municipal parking, and generally charge for parking. None of the control sites do. In addition, the study sites all have on-street parking, which is generally not the case for the control sites. Based on our site vetting process, it appears that these confounding factors are unavoidable.

Fieldwork consisted of the research team conducting several parking occupancy counts for each site. The intent was to find the peak level of parking occupancy as well as a typical day count. The peak parking demand for most of the sites occurred during the holiday shopping season. We also collected typical daily average counts during the summer months under good weather conditions. In terms of the peak parking occupancy, Brattleboro turned out to be a distinctive case because the anticipated holiday season peak period was about the same as the average daily count taken during the summer. From discussions with pedestrians and business owners, most regarded Brattleboro as an event-driven downtown. Over the course of the year, the downtown plays host to several such events each month. One of the busiest regular parking periods (as opposed to a one-time event) takes place on the first Friday of each month at Gallery Walk. The local businesses take turns hosting artists and their works, while people walk up and down Main Street eating, shopping, and perusing the exhibits. Thus, while peak demands in most centers revolved around the holiday shopping season, the peak parking occupancy for Brattleboro was Gallery Walk. The fieldwork portion of the study also included a survey component questioning shoppers, employees, and business owners on their impression of the town center and the parking situation.

Characterization of the Six Sites

Every site chosen is in an economically strong location with minimal retail/office vacancies. As an indicator of the economic state of the town centers selected, we compared first floor retail rental rates with those of town centers near each of our six sites (the same comparison towns were used for all four Connecticut sites since all four sites are in the same metropolitan region). Retail rental rates for all six sites compare favorably with nearby town centers.

The parking lots at each site were predominantly well maintained and kept very clean. All parking at the control sites was free, while a fee was charged for most of the parking at the study sites. Parking fee rates varied, and money collection was carried out with meters, attendants, or pay-and-display machines. Similar to a parking meter, pay-and-display machines collect money (typically cash but sometimes credit or debit cards). The driver pays for the desired amount of time and the machine dispenses a ticket that must be displayed on the dashboard of the vehicle. The ticket identifies the time of day when the ticket expires. Unlike a parking meter that is located at each parking space, a single pay-and-display machine services numerous parking spaces. A large lot may possess several pay-and-display machines in order to limit the need for a patron to traverse a long distance to the machine and back to the car to pay for parking.

The three study sites seemed to rigorously police parking violations. One difference in fee collection is whether the patron pays at the beginning or pays at the end. Up-front payment requires the person to guess how long they will stay parked compared to allowing the patron to

stay as long as they like and pay for what they use at the end. Brattleboro and Northampton primarily employed the pay first system, whereas the West Hartford municipal lots collected money upon completion of parking. Although West Hartford may accrue less revenue from parking violations, their method allows drivers to spend as much time as they need in the town center without having to worry about underestimating their time and having to return to their cars prior to completing their business. Northampton recently switched their parking garage collection system from paying at the end to up-front payment. One business owner noted in their survey that sales have been noticeably down since the change, and that he or she has observed many customers leaving the store before completing their shopping.

When comparing the number of parking spaces required to the number provided, this study used both the base parking regulations from each town as well as the maximum reduction allowance specified for reasons such as shared parking. To qualify for a reduction allowance, a developer would typically have to confront the zoning board of appeals and plead their case. Because of a potentially arduous process, many shy away from this and end up adhering to the base number specified. Most of the towns specify a 20% to 30% reduction in a shared parking situation. West Hartford allows for a 50% reduction with "good cause." Brattleboro is an exception because in addition to shared parking reductions, Brattleboro may reduce parking requirements if an alternative mode of transportation is available or if 50% of the spaces could be accommodated on the side or back of the building. Furthermore, if the site is located within 300' of a municipal parking lot, Brattleboro completely waives the parking requirements. Thus, for some of the buildings near Brattleboro's town center, no parking would be required whatsoever. For the purposes of these calculations, we assumed a shared parking reduction for Brattleboro.

Assessment of the Pedestrian Environment

Off-street parking is important to any town center, but placement, design, and operation are the key elements in creating a pedestrian-friendly environment. Parking layout styles vary tremendously amongst the sites. For the study sites, parking rarely detracts from the layout of the buildings. Brattleboro places municipal pay-and-display lots behind buildings along Main Street with one mid-block parking lot serving as the courtyard for numerous shops and restaurants. Most stores and restaurants possess secondary rear entrances for patrons.

In Northampton, the municipal parking lots and parking garage sit on the periphery of the downtown leaving mid-block parking for mostly private, business-related use. The parking layout for West Hartford is similar to Northampton with municipal lots surrounding the downtown area. West Hartford reduces the visual impact of the parking lots with landscape barriers and makes the pedestrian connections attractive with brick paving and landscaping. Most stores and restaurants in West Hartford with secondary entrances adjacent to the parking lots reserve these entrances for employees, forcing patrons to enter from the street side.

Northampton and West Hartford offer wide, sometimes brick-paved sidewalks often on the order of 12' to 15' wide. The three study sites provide sidewalks with high connectivity to and from the parking lots as well as within the town center and to adjacent neighborhoods. This permits drivers to park in one location and run multiple errands around the town center. Results from the survey data indicate that over 70% of people at the study sites always park in one location and walk to several destinations compared to 25% at the control sites.

In Avon, the parking lots are well landscaped and maintained but separate many of the buildings from the street. For those buildings set close to the street with minimal setback, few

provide pedestrian access from the sidewalk along the street. Even though a good portion of the area possesses sidewalks, many of these sidewalks are not continuous. Parking for one store and trying to walk to another, other than within the same plaza, proved to be very difficult especially if this involved crossing Main Street, which is a four lane, highway like facility. Glastonbury Center possesses a blend of parking layouts with many of the older buildings along Main Street having on-street parking and rear parking similar to the study sites, while the newer complexes are more conventional with the buildings set back and separated from the street by the parking lot. This arrangement makes for long distances between some of the neighboring shopping areas, but with good sidewalk connectivity, these walks are feasible.

For Somerset Square, parking surrounds and separates the various shopping and office complexes. There are residences beyond the outer parking near the main shopping area, but there are no viable pedestrian connections, although opportunities exist. Glastonbury Boulevard, which divides the two sides of Somerset Square, has attractively tree-lined sidewalks and a landscaped median. However, with high vehicle traffic and no crosswalks, Glastonbury Boulevard is difficult to cross as a pedestrian. Overall, the control sites seem to be less pedestrian friendly than the study sites.

Degree of Mixed Land Use

The study sites all have a significant mixed-use component with a sizeable residential component approaching 30% of the overall town center building space. Conversely, the control sites provide less than 5% of the residential space available at the study sites. This discrepancy enables the study sites to take advantage of the efficiencies of a mixed-use downtown environment and the reduced need for parking (*14*). However, it should also be borne in mind that some of the differences in the use of parking may be related to the fact that the study sites charged for parking and the control sites did not.

RESULTS

In the results section we will assess how much parking is required, how much parking is used, and how much parking is supplied. We perform this analysis for each individual site and look for overall trends as well as the overall differences between the study and control sites. Looking beyond site occupancy counts, we will investigate parking demand as it relates to the type of parking space provided, i.e. municipal parking lot or private parking lot. We will also assess the differences in the pedestrian environments as well as the land use mix in an effort to identify key characteristics of the study sites and control sites. The key findings from the study are summarized in Table 1 including parking provided, parking used, parking required by current zoning, and the amount of land devoted to buildings versus that devoted to parking. These themes will be discussed in the following sections.

Parking Provided

An important disparity between the study sites and control sites emerged with the number of spaces actually provided as summarized in Table 1.

- The study sites supplied half the number of spaces per 1,000 SF of building space.

This equates to the study sites providing 44.9% of the spaces required by the base regulations and only 71.1% of the spaces required when accounting for the maximum reduction allowances. In contrast, the control sites supply 79.0% of the base regulations required spaces and 112.8% of the reduced requirements. This substantial discrepancy can likely be attributed to the fact that the three study sites are traditional downtowns that were developed prior to the introduction of formal parking regulations. The control sites were developed more recently than the study sites, and as a result, parking regulations were part of the development process.

Although the study sites provided significantly less parking with respect to the regulations than the control sites, this decrease did not result in a parking shortage.

- Peak occupancy for the study sites was 79.8% of the parking spaces provided.
  - Off-peak occupancy was 66.5% of capacity.
- Peak occupancy for the control sites was only 49.9% of the parking spaces provided.
  - Off-peak occupancy was 37.3% of capacity.

At the control sites, this leaves more than half the parking spaces empty on the busiest day of the year.

Parking Requirements by Regulation

The number of parking spaces required by zoning regulations for all the sites is significantly more than the number being used, even on the heaviest use days.

- Peak parking demand was only 37.2% of the base number of spaces required by the towns and 56.6% of the maximum reduced requirements.

Peak usage numbers per 1,000 SF of building space fell far shy of the amount required.

- The towns required a base average of 5.37 spaces per 1,000 SF of building space and a maximum reduced averaged of 3.53 spaces.
  - Peak demand averaged 2.00 spaces per 1,000 SF of building space.
  - Non-peak demand averaged 1.60 spaces per 1,000 SF of building space.

Taken as a whole, the base regulations required over 168% more parking spaces than necessary on the busiest day of the year and 235% more parking than is used on the average day. Even accounting for the maximum allowable reductions, minimum parking requirements would have to be drastically reduced in order to reflect actual demand in every one of these activity centers. In this case, the reduced regulations required over 75% more than the peak demand and 120% more than the non-peak average use.

Land Use in the Town Centers

Intelligent land use is especially important in a town center area where land is in limited quantity. By providing more parking than necessary during the peak period, the control sites averaged approximately thirteen acres of idle land occupied by empty parking spaces; in

contrast, peak demand for the study sites resulted in only 3.5 acres of vacant land for parking in each town center. But it could be argued that even the study sites are not using land to its optimum efficiency as they allocate more land to parking than for buildings.

- The study sites used 1,551 SF of land for parking for every 1,000 SF of building footprint, and the control sites used 2,842 SF of land for parking for every 1,000 SF of building footprint.
- Subtracting the effect of the multi-story parking garages, the study sites use 1,903 SF of land for parking for every 1,000 SF of building footprint while the control sites use 2,865 SF.

The additional land needed at the control sites is not only a result of the extra parking spaces provided but also the larger area the average space consumes due to pedestrian connections, longer access driveways, and a higher frequency of larger landscaped islands. By matching the amount of land per parking space realized by the study sites with more efficient layouts, the control sites would acquire 6.8 acres of additional land in each activity center for a use other than parking. Although these results are magnified due to the fact that each study site has a parking garage, subtracting this advantage would still yield 2.9 acres of added land in each control site town center.

The number of parking spaces provided by the study sites does not meet the minimum regulations even when taking into account the potential reductions. On average, the study sites have approximately 30% less parking than the regulations with maximum reductions would require. In terms of the land required for parking:

- Parking would occupy 84.6% of the total land for the study sites and 54.8% of the land at the control sites under base parking regulations.
- With the maximum allowable parking reductions, parking would still occupy 65.5% of the study site land and 39.0% of control site land.

In the most extreme case, West Hartford's base parking requirements would call for more than 100% of the downtown area. This supports the argument made by some that based on current regulations, it would be impossible to recreate a town center like West Hartford today unless substantial parking reduction allowances were granted from the zoning board of appeals.

Comparison of Two Sites: West Hartford and Avon

Figure 1 illustrates the contrast in land use for the study sites and control sites by examining the examples of West Hartford and Avon in more detail. Figure 1 serves as a visual to help consider the relationship among the land occupied by parking, the land occupied by buildings, and the overall activity center area.

Although West Hartford had 2.4 more acres of land occupied by buildings, West Hartford used 3.8 acres less acres to supply over 1,100 more spaces than Avon. This discrepancy resulted in Avon using almost three times more land for parking than for building footprint while West Hartford used 1.8 times more land for parking than for building footprint. In terms of the usable building space requiring parking, Avon's ratio of building space to land occupied by parking approached four while West Hartford's dropped to less than 0.7, indicating that West Hartford had more usable building space than land devoted to parking.

Characterization of the Provision of Parking

One of the key differences between the study sites and control sites was the number of parking spaces owned by the municipality. Brattleboro, Northampton, and West Hartford (study sites) all had on the order of two times more publicly owned spaces than privately owned spaces while control site parking was predominantly off-street and privately owned. West Hartford has a mix of municipal parking, both on-street and off-street, as well as a parking garage and private lots; private parking dominates Avon Center. Glastonbury Center did have a small number of publicly owned spaces. These spaces were not metered and represented less than 10% of the total parking spaces in the town center. In addition to a parking structure, each of the study sites has a significant number of on-street spaces. Based upon the occupancy rates, on-street spaces represented the most valuable parking spaces to the driver.

- On-street spaces averaged 98.9% occupancy during the peak periods and 84.0% off-peak occupancy.

If an on-street parking space was not open, drivers most often used off-street municipal spaces.

- Off-street municipal spaces averaged 85.3% occupancy during the peak periods and 81.1% off-peak occupancy.

The data suggesting that on-street parking and municipal lots were the most appealing was consistent for all three study sites. Conversely, the control sites continue to limit on-street parking as once recommended by the federal agencies, therefore escalating the need for off-street parking (*6*). Recent research suggests that on-street parking can help curtail vehicle speeds and create a more pedestrian-friendly town center. On-street parking can also shift the functionality of the road from through mobility to land access helping to bring vehicles into the street life. People view the street as an end in itself rather than as a means to get somewhere (*5*).

While all of the on-street spaces in Brattleboro are parallel parking spaces, Northampton and West Hartford primarily use angled on-street parking. Angled on-street parking tends to give drivers and pedestrians an occupied outlook of the street, and parallel on-street parking leaves sight lines somewhat more open (*5*). Parallel on-street parking reduces pedestrian crossing distances, but it often requires drivers to spend extra time entering and exiting the space; angled on-street parking increases pedestrian crossing distances, and the crowded view of the street can help slow drivers down.

CONCLUSION

Many cities and towns are rethinking their approach to providing parking for their activity centers. This is occurring in the framework of an overall reconsideration of contemporary development patterns influenced by New Urbanist concepts, the smart growth movement, and considerations of sustainability. Some argue that New Urbanist type places are difficult to develop in light of the amount of parking currently mandated in typical zoning regulations. They also argue that New Urbanist type places, with potentially dense and walkable precincts, require much less parking than conventional developments. These two points illustrate that parking and

parking provision cannot be treated in a simple cookbook manner relating building square footages to parking spaces and that more attention needs to be paid to understanding the inter-relationship between parking and place making.

The purpose of this study was to examine some of the issues related to parking and the provision of parking in small urban areas. In this study, we focused on parking provision, parking demand, and parking regulations in six New England activity centers. Three of the centers, which we designated study sites, embodied the New Urbanist characteristics of walkable, mixed-use activity precincts embedded in and connected to surrounding (largely residential) urban neighborhoods. The three sites in this category were Brattleboro (VT), Northampton (MA) and West Hartford (CT). The other three sites, designated control sites, were typically more homogenous in terms of use, much less walkable, and generally isolated from their surrounding urban neighborhoods. We compared land uses, municipal parking requirements, in addition to peak and non-peak parking demands in these centers. We also examined parking facility attributes such as the differences in usage between municipal lots and private parking, the quality of the pedestrian environment, and the degree of mixed land use for each town center.

Overall, the study sites are getting much more benefit out of a smaller amount of parking. In terms of parking used, we found that the study sites consistently used less parking both on a regular basis and during the peak period. The difference is relatively small (11.0% less on an average day and 19.7% during the peak period) but the study sites are generally much more vibrant (in terms of the number of people around) than the control sites.

Parking occupancy counts revealed that every site provided more parking than necessary, even during the peak parking period. This was particularly true for the control sites because the busiest day of the year still left more than half the spaces empty. The parking supply for the study sites was more in line with demand in part because the study sites provided less than half the spaces required by the base regulations and only about 70% of that required by the regulations when allowing for the maximum parking reductions. Both are far less than the amount of parking provided by the control sites. The study sites thrive with less parking than conventional wisdom would suggest by minimizing the amount of land area taken up by parking, furnishing as much on-street parking as possible, relying more on shared municipal parking lots and parking garages, as well as making much more efficient use of spaces over the course of a day due to the wide variety of activities.

Given these differences between the study sites and the control sites, it was surprising to note that the towns with mixed-use centers stipulated almost as much parking for new construction as did the towns in which the conventional sites are located. On average, the amount of parking mandated by the base regulations in these six towns is about two and a half times more than the peak use. Taking into account the maximum parking reduction allowed by code, the towns still require on the order of one and three-quarters more parking than peak usage.

While most major cities manage parking with a comprehensive plan, few smaller cities and towns enforce much more than the standard regulations. Parking ordinances in New England rarely vary from town to town, yet town centers exhibit diverse design qualities and parking arrangements. Communities often overlook the possibility that a parking surplus, like a parking shortage, may have undesirable consequences. Land unnecessarily consumed by parking is an opportunity lost for a more beneficial use, and uncalled for parking also extends distances between points of interest, diminishing the ability of a town center to be pedestrian friendly.

Businesses want to provide cheap and convenient parking as an incentive to shop. Towns usually take the stance that parking should be regulated, and off-street parking should be required according to use so not to negatively impact traffic or disturb adjacent uses. Parking regulations typically require a minimum number of spaces dependent upon the various land use considerations such as retail square footage or the number of seats in a restaurant. The results in this study suggest that as an alternative, parking regulations should take into account issues such as parking fees, the character and density of the development, street characteristics, the level of public transportation, and the mixed-use component. Instead of parking requirements shaping the development of a town center, it should be the character and vision of the town center that impacts the parking policies.

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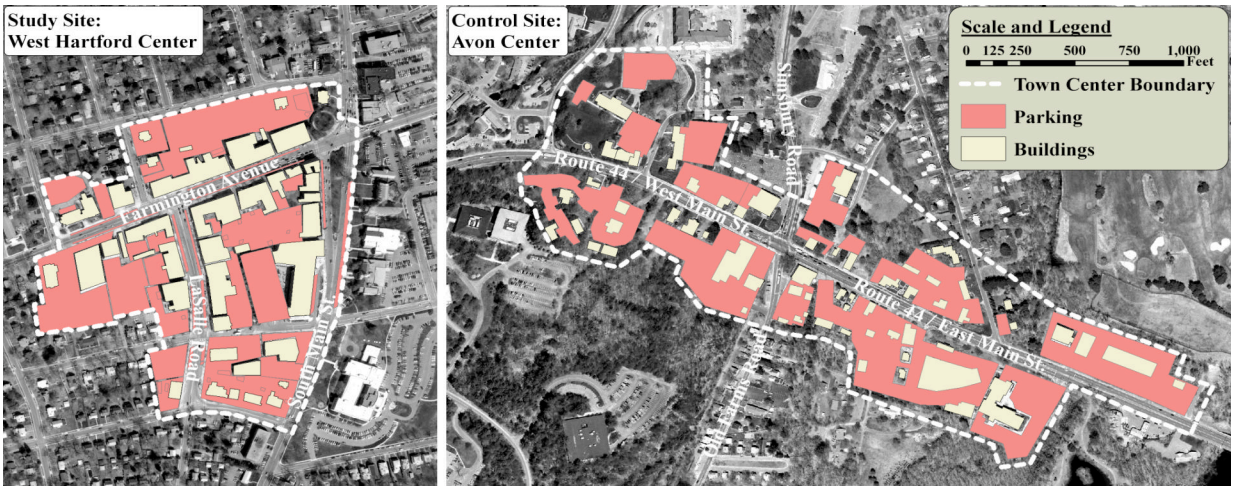
FIGURE 1 Typical Study Site (West Hartford) Versus Typical Control Site (Avon) Summary

TABLE 1 Land Use and Parking Demand Summary

	BUILDING SPACE & LAND USE			PARKING LAND USE		
	Avg. Town Center Area	Avg. Building Space	Avg. Building Footprint Area	% of Town Center Occupied by Buildings	Avg. Total Parking Lot Area	% of Town Center Occupied by Parking
Study Sites	2,010,601 SF	869,487 SF	492,239 SF	24.5%	763,590 SF	38.0%
Control Sites	2,573,432 SF	460,598 SF	392,065 SF	15.2%	1,114,359 SF	43.3%
Difference	28.0%	-47.0%	-20.4%	-37.8%	45.9%	14.0%
	PARKING PROVIDED			**PARKING LAND USE**		
	Avg. No. of Parking Spaces Provided	No. of Spaces per 1,000 SF Building Space	No. of Spaces per 1,000 SF Building Footprint	Avg. Land Area per Parking Space	Avg. Multi-Story Garage Footprint & No. of Spaces	Avg. Land Area Minus Multi-Story Garage Spaces
Study Sites	2,002	2.30	4.07	381 SF	39,356 SF; 454	468 SF
Control Sites	2,119	4.60	5.40	526 SF	4,417 SF; 23	530 SF
Difference	5.8%	100.0%	32.9%	37.9%	-88.8%; -94.9%	13.2%
	PARKING REQUIRED - BASE REGULATIONS			**PARKING REQUIRED - MAX. REDUCTIONS**		
	Avg. No. of Parking Spaces Req'd Base Regulations	% of Req'd Spaces Provided Base Regulations	Spaces Req'd per 1,000 SF Building Space Base Regulations	Avg. No. of Parking Spaces Req'd Max. Reductions	% of Req'd Spaces Provided Max. Reductions	Spaces Req'd per 1,000 SF Building Space Max. Reductions
Study Sites	4,457	44.9%	5.13	2,815	71.1%	3.24
Control Sites	2,682	79.0%	5.82	1,878	112.8%	4.08
Difference	-39.8%	75.9%	13.5%	-33.3%	58.7%	25.9%
	PEAK PARKING DEMAND			**NON-PEAK USAGE**		
	Avg. Peak No. of Parking Spaces Used	Avg. Peak Occupancy	Peak Usage per 1,000 SF of Building Space	Avg. Non-Peak No. of Parking Spaces Used	Avg. Non-Peak Occupancy	Non-Peak Usage per 1,000 SF of Building Space
Study Sites	1,597	79.8%	1.84	1,331	66.5%	1.53
Control Sites	1,057	49.9%	2.29	791	37.3%	1.72
Difference	-33.8%	-37.5%	24.5%	-40.6%	-43.9%	12.4%



LAND USE						
	Building Land Use			Parking Land Use		
	Total Town Center Area	Total Building Space	Building Footprint Area	% of Town Center Occupied by Buildings	Total Parking Lot Area	% of Town Center Occupied by Parking
Study Site						
West Hartford	1,775,331 SF	1,143,606 SF	411,785 SF	23.2%	742,693 SF	41.8%
Control Site						
Avon	2,496,505 SF	231,834 SF	305,395 SF	12.2%	910,762 SF	36.5%
Difference	40.6%	-79.7%	-25.8%	-47.3%	22.6%	-12.8%

PARKING REQUIREMENTS						
	Parking Provided		Base Regulations		Max. Reductions	
	No. of Spaces Provided	No. of Spaces per 1,000 SF Building Space	No. of Spaces Required	% of Req'd Spaces Provided	No. of Spaces Required	% of Req'd Spaces Provided
Study Site						
West Hartford	2,506	2.19	6,201	40.4%	3,101	80.8%
Control Site						
Avon	1,371	5.91	1,667	82.2%	1,167	117.5%
Difference	-45.3%	169.9%	-73.1%	103.5%	-62.4%	45.4%

FIGURE 1 Typical Study Site (West Hartford) Versus Typical Control Site (Avon) Summary.