Understanding the Role of Parking Lots for Urban Redevelopment

Interim Uses or Permanent Presence?

by David A. King & Jesse M. Keenan
CURE identifies, shares, and advocates solutions for a rapidly urbanizing world. CURE redefines sustainability as dense, mixed-income, mixed-use, transit-based urban development. From climate change and energy dependence to the socioeconomic and political upheaval they engender, CURE addresses emerging and current global issues through the lens of urbanization.

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Executive Summary

Redevelopment of land in urban areas is desirable for social, environmental and economic reasons. This research examines two of the challenges associated with redevelopment in New York City: (i) land assembly; and, (ii) the challenge of maintaining economic value of existing underutilized real estate to foster redevelopment, specifically parking lots and parking garages. The analyses presented herein suggest that land assembly confers substantial benefits for new development and should be encouraged through public policy. Most importantly, the role of parking supply was examined and it was found that parking lots were commonly redeveloped, accounting for approximately twenty percent (20%) of all prior uses on parcels that were developed during the study period. Those developments that previously included parking as a prior land use also resulted in significantly greater rates of building density ranging from sixteen percent (16%) in Lower Manhattan to forty-six percent (46%) in Midtown Manhattan. The conclusions drawn from this research suggest that the costs of restrictive land use policies that may reduce easily assembled soft sites must be weighed against the benefits of land assembly which indirectly promotes scaled urban redevelopment.
Redevelopment of urban land is a critical issue for cities. Underutilized land in core areas of central cities leads to an inefficient distribution of resources and distorted policy outcomes. One of the main challenges to urban redevelopment, however, is land assembly. Land assembly is important not just in terms of securing a minimum threshold for adjacent development, but also for the purpose of achieving a greater scaled intensity of use which is commensurate with the contextual urbanism of the site. Assembling multiple parcels increases the transaction costs and the uncertainty of development, and stakeholders are rightly concerned about improving and streamlining the land assembly process. At the same time many cities—New York City, in particular—are considering additional limits on new surface parking in business districts to achieve transportation, environmental and social goals. Planners and local officials are concerned that too much surface parking degrades the built environment relative to the immediate low intensity of the use.

This research examines how underutilized land uses, including parking lots, can help facilitate new development. This research questions the extent to which restrictions on parking development may, in limited circumstances, inhibit scaled urban redevelopment by making land assembly more difficult than it need be. Surface parking lots may act as a self-supporting interim land use that facilitates new development by creating soft sites that are more easily combined and developed. The results of this work will have implications for development policy in New York City and suggests approaches for other urban and suburban jurisdictions.

In most cities in the United States, minimum parking requirements increase the supply of parking to inefficient levels. In areas of parking oversupply, efforts at urban redevelopment may be harmed through reduced building sizes and distorted land values. However, in areas such as Manhattan, where parking supply is severely constrained through zoning regulations, parking lots potentially serve two distinct purposes. The first is that parking lots simply provide places to park, which indirectly improves auto accessibility, as is the conventional expectation. Yet improving automobility is not an unambiguous good and may conflict with mass mobility, accessibility and sustainability goals of the city. The second purpose is that parking lots are potential “soft sites” that facilitate future land assembly for scaled economic development. Surface lots also provide valuable locations for commercial vehicles to use for deliveries, food truck locations and programmed events. By providing space for trucks off-street, surface lots can actually enhance pedestrian safety, traffic flow and mitigate localized pollution.

In the context of an interim land use, parking lots and other soft sites complement land assembly, even though the expansion of parking may not be optimal over the long run. Prohibiting new parking may cause unintentional harm to land assembly and make redevelopment even more difficult. Of course, there are caveats for these potential conclusions. First, we assume that companies that develop and manage parking lots are willing participants in the land assembly process. This is a reasonable assumption, which we discuss later in this report, because parking lots are often targets of redevelopment by third-parties. Second, if interim parking uses increase the permanent supply of parking spaces, transportation and environmental goals may be undermined. Short-term costs from increased parking supply must be weighed against long-term benefits. Lastly, the value of real estate is dependent on primary and secondary transportation access, as the relative supply of parking will influence land values. Parking as an interim use may be internalized into proximate land values which may directly impact the timing of publically planned and prioritized development. Too much or too little surface parking may distort values in such ways as to add additional risk premiums and transactional costs to the development process.

In this research, we test multiple hypotheses. We are specifically examining how underutilized parcels can aid land assembly processes in downtown areas of Manhattan and Brooklyn in New York City.\textsuperscript{5} The first hypothesis is that real estate development that involves land assembly is more likely to have parking as a prior use than sites that do not require land assembly. Second, in areas where new development has occurred rapidly, underutilized lots will develop first and at a rate greater than other low intensity uses. The third hypothesis is that because of the advantages that underutilized lots confer in favor of land assembly, development that occurs on parking lots will be larger than conventional alternative developments.

Lastly, we frame the “paradox of intensification” with regard to off-street parking supply in dense urban areas.\textsuperscript{6} While reducing the number of parking spaces in vibrant areas is attractive public policy—since land permanently devoted to parking cannot be used for other development—there is a need for physical space to park delivery trucks, shared vehicles and other support systems for the homes, restaurants, shops and businesses that make the community vibrant in the first place. Without off-street space, package deliveries, shared vehicles, food trucks and other uses compete for scarce curb space (or simply double park), which ends up blocking traffic, creating noise, and degrading the streetscape. We will suggest that contextual allowances for easily accessible parking, such as surface lots, may be a new benefit to the community by reducing friction and contested space on a public street.

\textsuperscript{5} See Appendix for Maps.
\textsuperscript{6} See Mella, S., G. Parkhurst, et al., The Paradox of Intensification, 18 TRANSPORT POLICY 1, 46-52 (2011).
In vibrant urban areas, land values are influenced by access, regulations and available developable areas, among other important factors. Public policy can influence access through transport investments, zoning regulation and taxation. Cities regulate the supply of off-street parking as an indirect means of controlling traffic, or in the case of Manhattan, to achieve attainment of federal clean air standards. An alternate conception of parking lots in urban areas is that parking lots are a function of the real estate markets, and represent underutilized land which can be easily developed as the market allows. As cities struggle to manage traffic, development, environmental and safety concerns, the role of parking remains contentious. However, contention does not mean that parking should be ignored. While severe reductions in auto traffic and parking supply are advocated by planners and officials in many cities, the costs of restricting economically productive yet underutilized land uses must be weighed against the potential benefits of encouraging land assembly that fosters desirable urban scaled development.

In urban areas, the need for large parcels on which to build is of particular concern. In many cases, developers seek to maintain economic value on soft sites while assembling land, weathering a recession or planning a project. Due to highly asymmetrical land markets in urban cores, there is increasing pressure on land prices which works to make appropriate scaled development cost prohibitive. If land acquisition and assembly proves too expensive, developers will seek cheaper land in other locations to satisfy their preferences—often at the expense of certain planned urban intensities. Yet large scale development favored and needed by cities requires large parcels to realize desired densities.

Voluntary land assembly is inherently problematic. Strategic actions by property owners impede cooperation and encourage hold-outs who often scuttle the best laid plans. The most commonly used alternative to voluntary assembly is eminent domain, which is a crude but effective method for coercing land assembly. Other suggested policies include graduated density zoning, zoning budgets and land assembly districts. These concepts will be explained in more detail later in this report. Ultimately, policies that encourage voluntary cooperation among landowners and also support long-term municipal goals should be encouraged.

Land Assembly Districts and Strategies to Promote Density

Key problems for voluntary land assembly include high transaction costs for negotiating with individual landowners and the prospect of holdout landowners who seek to extract economic rents. While eminent domain is legally available to require the sale of private land for development, the deeply unpopular process remains one of coerced land assembly and is not commonly used in New York City. Strategies, albeit underutilized, do exist for improving voluntary land assembly, but they tend to ignore potential interim land uses that can also assist land assembly by offering cash-flows which often, at the very minimum, mitigate the property tax liability associated with the subject parcel(s).


8. New York City projects population growth of nearly one million residents by 2030. In order to accommodate this growth, the city will need to realize substantial growth in its housing stock. Most of the growth will by necessity happen through the construction of large apartment buildings on lots larger than 10,000 square feet, all of which will represent assembled parcels.

9. Large scale development is desirable for many reasons, but one major obstacle of land assembly is the sometimes large difference between the “fair market value” under eminent domain jurisprudence and the alternative value of assembled land. While eminent domain is relatively rare in New York City, a dramatic example of how it is used is the site of the current New York Times building in Manhattan. To assemble the site for private development, the city condemned twelve buildings and paid the property owners $85 million. Yet the assembled land was valued at $250 million. The difference between what the public paid and what the actual value of the land was enormous and helps illustrate the risk and return dynamic of land assembly. See Heller, M. and R. Hill, Land Assembly Districts, 121 HARVARD L. REV. 6, 1467-1527 (2008).
Land assembly districts (hereinafter, “LAD(s)”) have been promoted by legal scholars as a voluntary mechanism to avoid eminent domain.\(^{10}\) Heller and Hills describe LADs as special districts, authorized by the state, where a majority vote by landowners can authorize “the sale of the neighborhood to a developer or municipality seeking to consolidate the land into a single parcel.”\(^{11}\) The advantages of larger parcels for development do not accrue strictly to landowners who realize higher sales prices than through eminent domain. The premise is that larger lot development also supports higher densities and more efficient public services than fragmented development.

Higher density development can also be achieved through graduated density zoning, where allowable densities increase with the size of the assembled parcel.\(^{12}\) Graduated density zoning increases the allowable buildable area as the size of the assembled site increases, resulting in greater property values for existing landowners. The effect is that graduated density zoning diminishes the bargaining power of holdouts by increasing their incentives to cooperate. Both LADs and graduated density zoning promote voluntary cooperation for land assembly, but a shared weakness is that they do not encourage local participation in designing the zoning code or deciding what uses should be promoted. Likewise, self-governing functions are still susceptible to hold-out scenarios, if only politically, and do not acutely address minority rights, as borrowed from the law of corporate governance.

A third approach that takes a more positivist approach to land assembly and zoning is termed the neighborhood zoning district.\(^{13}\) Legal scholar Kenneth Stahl argues that neighborhood zoning districts are functionally identical to special assessment districts as mechanisms to devolve power to neighborhood scales. In a neighborhood zoning district, property owners would vote to enact particular zoning restrictions and allowances. Stahl notes that, at present, cities are legally prohibited from devolving zoning control to neighborhoods; but, in practice, a neighborhood zoning district is equally capable as—and in some cases superior to—alternatives such as special assessment districts or business improvement districts (BIDs). This legal prohibition is one which traces its origins to the original state constitutional delegatory principles of the last century.

These three strategies are useful for conceptualizing how cities can encourage voluntary cooperation from landowners in order to achieve planning and development goals. Neighborhood districts can enhance municipal efforts, but there are potential concerns that deserve attention. Daniel Kelly takes issue with LADs by arguing that transaction costs from bargaining among landowners may increase developer costs beyond the imputed benefits.\(^{14}\) Further he argues that LADs and similar neighborhood governance structures are primarily legal classifications rather than exercises in neighborhood self-governance. Because of these concerns, Kelly suggests that there may not be many advantages over eminent domain for land assembly. As a matter of execution, land assembly promoters often shield themselves from greater pricing pressures through the use of anonymity which is antithetical to notions of transparency in community self-governance.

Kelly’s critique is certainly worth considering, and may very well be true, but does not resolve the use of land or offer a clear understanding of urban land redevelopment. Regardless of any zoning changes or density increases, cities should promote land redevelopment over greenfield development. As such, addressing impediments to assembling fragmented sites is a critical task for a city. Though LADs may increase the transaction costs for developers, these private costs are still likely cheaper than the public costs associated with eminent domain.

The Importance of Soft Site Development

The concept of special districts to promote development is extended by allowing exceptions for allowable uses as part of the special district designation. For instance, development of underutilized sites is something that cities encourage. Underutilized parcels represent soft sites that are particularly desirable for real estate development. Without regard for land assembly, soft sites are those that offer clear economic benefits for development. As Manhattan (and the rest of New York City) declined in population throughout the 1970s and 1980s, many soft sites were created as the city shrank.\(^{15}\) Over the past twenty

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11. Id., Heller and Hills, pg. 3.
15. Lower Manhattan and downtown Brooklyn were not as afflicted with building abandonment and burnings as the Bronx and Harlem. In many parts of the South Bronx and Harlem, vacant lots that do exist are not even economically viable as a parking lot.
years, many of these soft sites have been developed, and a lack of soft sites is a challenge to land assembly for larger parcel development and for potential redevelopment opportunities in the future. Figure 1 shows the average lot size for development in Manhattan for the period 1983 to 2010.\textsuperscript{16} The average lot size of development has fallen by about half and this potentially reflects a lack of land assembly possibilities.

To illustrate why these trends are important for planning and policy, consider a scenario where current residential developments in Manhattan were built to the same unit density per area of land as in 1983. A linear regression line suggests that for each year the number of units built per area of land declines by about .5 units, meaning overall each development is about one-half a unit smaller than the prior year, holding land area constant. Over 28 years (1983-2010), this means that a building built in 2010 will have about ten percent (10%) fewer units than an equivalent development in 1983. Some of the reduction in the number of units built reflects an increase in the average size of units, but overall the trend is toward smaller buildings on smaller lots. In order to accommodate expected population growth, larger lot development should be encouraged through policy where possible.

In New York City, a majority of new housing units are built in large developments (five or more units) than in smaller buildings.\textsuperscript{17} According to the Department of City Planning, in 2005, the city issued 31,731 permits for new units, 16,209 of these were in larger multifamily buildings. The closer the development occurred to the central core of Manhattan and Brooklyn, the more pronounced the balance shifted toward large apartment buildings. In the inner ring around the Manhattan core, seventy-two percent (72%) of the new housing units were in large multifamily buildings and these types of buildings are virtually the only way residential units are built in Manhattan.\textsuperscript{18} For many buildings of these sizes, the relative size of the site is a significant constraint on the programmatic intensity of any given proposed building.

A related challenge to land assembly challenges are brownfield sites. Brownfields are sites that have prior uses that have left the site unused or underutilized due to pollution or other factors. Within city planning there is great interest in brownfield development as it reduces development pressure on suburban greenfield sites and confers many benefits for municipal services and goals. Specifically, the risk associated with taking on the non-insurable risk in a project is reflected in lower land prices, which is a principle driver in determining project feasibility. The primary benefits are that brownfield development occurs in areas that are served by public utilities and infrastructure and can improve the available tax base for maintaining such facilities. More recent research has shown that brownfield development leads to reduced auto travel trips and vehicle miles traveled (VMT) compared with greenfield development.\textsuperscript{19} Taken together, these results suggest that planning efforts should prioritize brownfield development as a sustainability and financial strategy. For instance, to encourage brownfield development in New York City the Mayor's Office for Environmental Remediation has made great strides in engaging the private market for remediation and subsequent development in a one-stop administration plan.

Even though brownfield development is preferable, in practice it remains difficult and costly. In a series of papers, Adair et al. explored the factors influencing urban regeneration and showed that leveraging private sector investment and alleviating risk were primary drivers of private partnerships with public agencies.\textsuperscript{20} Land assembly districts and similar policies are ways of leveraging private sector investment with public interests. Adair et al. notes that urban regeneration projects are generally viewed as riskier than greenfield development, which suggests that public sector and planning assurances provide value beyond the time value of money otherwise expended in a less streamlined and hence more conventional approvals process.\textsuperscript{21} Mutual assurance for future development is a designed outcome of LADs.

\begin{flushleft}
\textsuperscript{16} 1983 is the first year after the U.S.E.P.A. required the city to address local air quality by restricting off-street parking. Earlier efforts to restrict curb parking failed.
\textsuperscript{17} Department of City Planning, New York City, \textit{Annual Report on Social Indicators} (2005).
\textsuperscript{18} Id. at p. 32.
\textsuperscript{19} Handy, S., X. Cao, et al., \textit{Correlation or Causality Between the Built Environment and Travel Behavior? Evidence from Northern California}, 10 TRANSPORTATION RESEARCH PART D: TRANSPORT AND ENVIRONMENT 6, 427-444 (2005).
\textsuperscript{21} Id., Adair, A., J. Berry, et al. (2003).
\end{flushleft}
Figure 1: Average Lot Size of Manhattan Development by Year

\[ y = -367.63 \times \text{x} + 745899 \]

Source: Authors’ calculations based on data from the Department of City Planning, New York City.
Factors Influencing the Demand for Parking

Since 1982, there have been fewer parking spaces built in lower Manhattan than the number of parking spaces removed. Figure 2 shows the residential growth that has occurred since 1980 in parts of Manhattan and Brooklyn. In absolute and percentage terms, the Battery Park City and Tribeca areas of lower Manhattan have realized the largest gains, though growth has been robust everywhere during this period. Figure 3 shows the number of units permitted and the average number of units per building by the year the buildings were built for Manhattan south of Central Park. Despite a substantial variation in the data, there is a significant trend toward fewer numbers of units per building even though the total number of buildings has increased. Connecting this to the data shown in Figure 1, there is a definite trend toward smaller buildings with fewer units in each when the population trends suggest that more units should be encouraged. To encourage larger developments with more units, the city needs to assist with land assembly, and one way to assist is making soft sites economically viable for land assembly.

Figure 2: Changes in Residential Population in Lower Manhattan and Downtown Brooklyn 1980 - 2010 (corresponds to Table 2, p. 18)

Source: Authors’ calculations based on data from the Department of City Planning, New York City.
Figure 3: Residential Construction Trends 1983 - 2010

Source: Authors’ calculations based on data from the Department of City Planning, New York City.
Analysis of Land Assembly and Soft Site Absorption in New York City

The redevelopment of Manhattan and downtown Brooklyn has frequently involved the use of land assembly and soft site development. Table 3 shows the characteristics of assembly for all buildings built in Manhattan south of 59th Street and Downtown Brooklyn for the period 1996-2010. The largest number of new developments were built in lower Manhattan (defined here as south of 23rd Street) and nearly one-third of these developments were built on sites that featured surface parking in 1996. This is a high rate of absorption of soft sites with about thirteen percent (13%) of the sites developed involving land assembly. In a dense area like lower Manhattan, these are noteworthy figures.

Maps 1 through 3 show the locations of the developments included in this study. Our analysis suggests that between twenty and thirty percent (20-30%) of all development occurred on parcels that featured surface parking as an immediate prior use. No counterfactual exists to estimate how development would have occurred with land assembly districts aimed at developing soft sites and parking lots, but this is clear evidence that parking lots were redeveloped frequently even though there were restrictions on new parking construction.

Figure 4: Lower Manhattan and Downtown Brooklyn Development 1996-2010
(corresponds to Table 3, p. 18)

22. The data points were collected from New York City’s PLUTO GIS data, Automated City Register Information System and DOITT Orthoimagry for select years between 1996-2010.
In Figure 5, the data shows that for developments where parking was a prior use, the lot area and building area were substantially larger across all study areas. In Midtown Manhattan (north of 23rd Street and south of 59th Street) lot areas for developments built between 1996 and 2010 featured eighty-six percent (86%) more square feet on average than development that were not built on parking as a prior use. Larger lot areas for developments that were built on prior parking uses held true across all areas of study. The buildings built on former parking lots were also substantially larger than those that were built through more conventional redevelopment. Obviously, these results do not suggest a causal relationship where the presence of parking lots leads to future dense development. However, in the study sample sites, parking lots were frequently redeveloped. This suggests that parking lots are rarely the highest and best use in a well-functioning real estate market in a vibrant city. Further, the fact that parking lots are redeveloped as a matter of course suggests that a new surface parking lot at some point in the future would not become a permanent fixture.

During the study period, parking lots have been redeveloped and new parking construction has been restricted. This led to a change in the quantity and use of parking spaces. An encouraging outcome of the redevelopment of parking is that parking operators have changed the way they lease spaces. Prior to the parking restrictions of 1982, all construction was required to include new parking, even in Manhattan and downtown Brooklyn. Since then, the Department of City Planning estimates that the number of public parking spaces in the Manhattan core has declined from about 127,000 to 102,000 spaces while traffic to the core has increased only slightly. This is not an absolute reduction in the number of spaces as some of the spaces were replaced by structured parking, but the total number of spaces has stayed stable or declined somewhat. The same is true for downtown Brooklyn. Table 1 shows the results of a study by the Downtown Brooklyn Partnership where the change in the parking supply was measured.

In downtown Brooklyn, many of the surface spaces, or public spaces, were on land that was redeveloped. This resulted in the total number of spaces in the area remaining at about 11,000, while the spaces that were previously public were replaced with accessory spaces. However, just as in Manhattan, the building managers in Brooklyn altered the way the parking spaces were managed.

The change in parking management was a shift from accessory parking that was only used for the tenants of the building to which it was attached to public parking that was available at hourly, daily, or monthly rates. While technically illegal under current zoning, these arrangements result in more efficient use of existing parking supply and allow a parking space to service multiple cars per day. The average cost of a parking space has also increased to an average of $550 per month, which is not surprisingly the highest rate in the nation.

Table 1: Off Street Parking Changes in Downtown Brooklyn

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<tr>
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<th>2002</th>
<th>2011</th>
<th>Change</th>
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<tr>
<td>Public Spaces</td>
<td>10,590</td>
<td>8,385</td>
<td>-21%</td>
</tr>
<tr>
<td>Accessory</td>
<td>210</td>
<td>2,741</td>
<td>1205%</td>
</tr>
<tr>
<td>Total Spaces</td>
<td>10,800</td>
<td>11,126</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: Downtown Brooklyn Partnership

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24. The Department of City Planning has proposed to make this practice allowable.
Policy Proposal:
Land Assembly Districts

Land assembly districts can improve soft site development through temporary allowances that provide additional flexibility for specific land uses. With regard to parking, new parking lots or structures may be allowed for a prescribed period of time, but with covenants that the land will be assembled for redevelopment or converted to another use at the end of the time period. For instance, a municipality could designate an area as a priority development area and create a land assembly district for a period of fifteen years. Within that district, if all property owners sign on, then the landowners enjoy relaxed land use restrictions for a given period of time. In Manhattan, it may work that landowners in a land assembly district are able to build parking as a temporary or interim use so that they can maintain the economic value of their land, with the requirement that the land be assembled with other parcels. Any parking built will be held to the city’s landscaping regulations, or if the parking is structured, then the structure must be convertible to other uses. The advantage of allowing suboptimal uses, such as parking, will be offset by the benefits of larger and denser future development.

A land assembly district with parking allowances will be self-regulating in terms of the parking supply. Because the value of the assembled land will increase the potential size and scale of development, we can expect that developers will voluntarily build on assembled sites. In the current New York City real estate market, parking is being redeveloped into residential uses in large part because of consumer demand for housing is high. In 2010, the Wall Street Journal reported on a SoHo residential conversion where a parking garage was made into one of the priciest rental buildings in the city. Reporter Josh Barbanel explains:

After years of wrangling with local preservationists and the city’s Bureau of Standards and Appeals, the developer—Manhattan Skyline, founded by Donald Zucker—won permission to tear down the sprawling two-story garage and to put up an apartment building with 38 units and a large ground-floor retail space.

In a well-functioning real estate market there is no need for the city to prohibit uses that are not highly valued in the marketplace. In the case of the Manhattan Skyline, local regulations worked against desirable development and actually encouraged the maintenance of parking. In 2011, Crain’s Business Daily reported on a property flip of a parking lot across from Bryant Park, where a 12,000 square foot lot was asking $85 million. This was a premium price for the property and reflects the advantages of a site ready for development. These are just a few of a number of significant transactions where parking located close to or in landmark sensitive districts command prices out of line with generally expected long-run rates of appreciation for alternative non-parking programmatic uses.

For land assembly districts to work, all property owners within the district must agree to participate, similar to a BID or graduated density zoning. In the context of graduated density zoning, allowable density is directly related to the size of the assembled parcels. In a land assembly district, property owners enter into sale contracts only upon a majority approval of subject landowners. Internal mechanisms of the LAD are not immune from minority hold-outs, but formalization of covenants recorded against all parcels from the start could mitigate such scenarios, which add undue expense to larger aggregate scaled projects.

Conclusions and Future Research Directions

This research explored trends in Manhattan and Downtown Brooklyn real estate development and the role of parking provision as a tool for land assembly. The results presented do not suggest a causal relationship that parking lots cause future development. However, the results do confirm that land assembly is desirable and should be pursued through planning policy. Over

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27. Agovino, T., Owner Seeks to Flip Lot Across From Bryant Park, CRAIN’S BUSINESS DAILY. (January 21, 2011).
twenty percent (20%) of new real estate development in the core of the city was built on land that had previously been surface parking. Soft sites—including parking lots—do redevelop in a robust real estate market. Unfortunately, development trends in the study area show that building and lot size are getting smaller over time. These trends will make it difficult for the city to achieve stated goals for residential growth without policies that assist land assembly. Land assembly districts that encourage or incubate soft sites with the intent of redevelopment parcels should be encouraged.

Land assembly districts and other similar policies should be designed in ways that balance short term costs with long term benefits. Districts that encourage land assembly can include sunset clauses that ensure underutilized land or parking lots are redeveloped within a reasonable number of years. Voluntary assemblage through special districts helps developers and the city achieve a broad set of goals while providing regulatory certainty required for real estate risk taking. Perhaps even budgeting for the allowable number of parking spaces could be developed as a means of providing flexibility and regulatory certainty to developers, who would be able to develop parking within a described total number of parking spaces in the downtown core which supports the city’s interest in reducing the externalities associated with driving.

There are two factors that need to be explored in future research to better understand how the supply of parking influences development. The first and perhaps largest factor is that in Manhattan the supply of parking declined while demand increased. This is directly related to the growth of public parking facilities at the expense of accessory parking. Public spaces are a much more efficient use of scarce space, but little is known about how the availability of public parking affects driving to and within the city’s core.

A secondary inquiry relates to the extent to which surface parking plays a role in the movement of goods. A larger share of traffic is related to goods movement today than was the case in 1982 and goods movement is expected to be the area of growth for overall transportation trips and miles traveled. Online sales now account for about ten percent (10%) of total retail sales, and most of these sales are ending up in residential buildings. For instance, the Solaire apartment building in lower Manhattan has 293 apartments and receives about 35,000 packages annually. While the Solaire is a new building that has loading space for trucks, most residential and many commercial buildings do not. Older buildings often do not have any type of loading facilities where commercial trucks can park for their deliveries. As a result, delivery trucks are forced to either park or double park on the street. These activities put significant stress on local streets at a time when cities are promoting pedestrian safety and cycling. Therefore, it is critical for cities to better understand how to accommodate increased commercial travel. In many areas of New York City, new cycling lanes are filled with parked trucks and cars cruising for parking, and clashes between residents, shops and deliveries are likely to get worse in the future. New off-street parking facilities are one option for managing these commercial activities by providing secure and convenient space for such activities.

Overall this research has shown that parking lots do redevelop with a measurable and significant frequency, and that land assembly is an increasingly significant long-term problem in New York City. City policies need to promote land assembly as a strategy for achieving social, environmental and economic goals, and in some cases short-term allowances may help achieve long-term goals. Looking forward, research and policy will need to address ways to maintain a robust real estate market while minimizing the negative externalities associated with driving, commercial truck traffic and congested streets.


Appendix

Map 1: Midtown Manhattan Land Assembly

Buildings Built on Parking Lots Where Land Assembly Occurred
Buildings Built on Parking Lots Where No Land Assembly Occurred
Developed Lots Not Used as Parking Since 1996
Existing parking lots (since 1996)
Map 3: Downtown Brooklyn Land Assembly

- Green: Buildings Built on Parking Lots Where Land Assembly Occurred
- Red: Buildings Built on Parking Lots Where No Land Assembly Occurred
- Blue: Developed Lots Not Used as Parking Since 1996
- Yellow: Existing Parking Lots Since 1996

0 0.25 0.5 Miles
Table 2: Changes in Residential Population in Lower Manhattan and Downtown Brooklyn 1980 - 2010
(corresponds to Figure 2, p.8)

<table>
<thead>
<tr>
<th>Community Districts</th>
<th>1980</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
<th>Number</th>
<th>Percent</th>
<th>Share of Residential Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1    Battery Park City, Tribeca</td>
<td>15,918</td>
<td>25,366</td>
<td>34,420</td>
<td>60,978</td>
<td>45,060</td>
<td>283%</td>
<td>40%</td>
</tr>
<tr>
<td>2    Greenwich Village, Soho</td>
<td>87,069</td>
<td>94,105</td>
<td>93,119</td>
<td>90,016</td>
<td>2,947</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>3    Lower East Side, Chinatown</td>
<td>154,848</td>
<td>161,617</td>
<td>164,407</td>
<td>163,277</td>
<td>8,429</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>4    Chelsea, Clinton</td>
<td>82,164</td>
<td>84,431</td>
<td>87,479</td>
<td>103,245</td>
<td>21,081</td>
<td>26%</td>
<td>19%</td>
</tr>
<tr>
<td>5    Midtown Business District</td>
<td>39,544</td>
<td>43,507</td>
<td>44,028</td>
<td>51,673</td>
<td>12,129</td>
<td>31%</td>
<td>11%</td>
</tr>
<tr>
<td>6    Stuyvesant Town, Turtle Bay</td>
<td>127,554</td>
<td>133,748</td>
<td>136,152</td>
<td>142,745</td>
<td>15,191</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>Total Brooklyn Heights, Fort Greene</td>
<td>92,732</td>
<td>94,534</td>
<td>98,620</td>
<td>99,617</td>
<td>6,885</td>
<td>7%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 3: Lower Manhattan and Downtown Brooklyn Development 1996-2010
(corresponds to Figure 4, p.10)

<table>
<thead>
<tr>
<th>Location</th>
<th>Total Development</th>
<th>Number of Developments with Parking as Prior Use</th>
<th>Number of Developments with Land Assembly</th>
<th>Share of Development with Parking as Prior Use</th>
<th>Share of Development with Land Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midtown</td>
<td>330</td>
<td>62</td>
<td>11</td>
<td>19%</td>
<td>3%</td>
</tr>
<tr>
<td>Lower</td>
<td>506</td>
<td>159</td>
<td>68</td>
<td>31%</td>
<td>13%</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>221</td>
<td>47</td>
<td>11</td>
<td>21%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 4: Average Square Foot Size of Development 1996-2010
(corresponds to Figure 5, p.11)

<table>
<thead>
<tr>
<th>Location</th>
<th>Lot Area</th>
<th>Building Area</th>
<th>% Difference in Size when Parking was Prior Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Developments</td>
<td>Parking as Prior Use</td>
<td>No Prior Parking</td>
</tr>
<tr>
<td>Midtown</td>
<td>330</td>
<td>25,284</td>
<td>13,580</td>
</tr>
<tr>
<td>Lower</td>
<td>506</td>
<td>11,317</td>
<td>10,279</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>221</td>
<td>9,789</td>
<td>6,769</td>
</tr>
</tbody>
</table>
This research was funded through a generous grant from Edison Properties, LLC.

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David A. King is an Assistant Professor of Urban Planning in the Graduate School of Architecture, Planning and Preservation at Columbia University. In his research, Professor King explores local transportation planning and finance, with particular attention to parking, taxi service and informal transit. He has written about the phenomenon of cruising for parking, the politics of pricing and developer responses to local land use controls. His current research explores supply-side constraints on parking regulation reform and the complementary role of taxi services to convention fixed-route transit. Other recent research includes the historical co-development of transportation systems and land uses in New York City and the equity implications of road pricing. Professor King received a Masters of Urban and Regional Planning from the Humphrey Institute of Public Affairs at the University of Minnesota and earned a Ph.D. in Urban Planning from the University of California, Los Angeles.

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