Amenity or Necessity? Street Standards as Parking Policy

MTI Report 11-23

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REPORT 11-23

AMENITY OR NECESSITY? STREET STANDARDS AS PARKING POLICY

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June 2012

A publication of
Mineta Transportation Institute
Created by Congress in 1991

College of Business
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San José, CA 95192-0219

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. CA-MTI-12-1001-Part II	**2. Government Acession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle Amenity or Necessity? Street Standards as Parking Policy		**5. Report Date** June 2012 **6. Performing Organization Code**
7. Authors Zhan Guo, PhD, Charles Rivasplata, PhD, Richard Lee, PhD, David Keyon and Luis Schloeter		**8. Performing Organization Report** MTI Report 11-23
9. Performing Organization Name and Address Mineta Transportation Institute College of Business San José State University San José, CA 95192-0219		**10. Work Unit No.** **11. Contract or Grant No.** DTRT07-G-0054
12. Sponsoring Agency Name and Address California Department of Transportation Office of Research—MS42 P.O. Box 942873 Sacramento, CA 94273-0001 U.S. Department of Transportation Research & Innovative Technology Admin. 1200 New Jersey Avenue, SE Washington, DC 20590		**13. Type of Report and Period Covered** Final Report **14. Sponsoring Agency Code**
15. Supplemental Notes		

16. Abstract

This paper explores the rationales underlying the use of minimum street width requirements to mandate street parking. A survey of 97 cities reveals that this mandate is not a technical necessity based on safety concerns or an amenity reflecting market demand, two common beliefs held by decision-makers. Many residents are likely unwilling to pay for street parking if it is unbundled from housing. The hidden parking policies should be made transparent and subject to public oversight, the double standard between private and public streets should be eliminated, and parking on residential streets should be optional.

17. Key Words Street standards; Street width; Parking policy; Private communities; Subdivisions	**18. Distribution Statement** No restrictions. This document is available to the public through The National Technical Information Service, Springfield, VA 22161		
19. Security Classif. (of this report) Unclassified	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 50	**22. Price** $15.00

Form DOT F 1700.7 (8-72)

Library of Congress Catalog Card Number:
2012936938

To order this publication, please contact:

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070212

ACKNOWLEDGMENTS

The research conducted for this article was supported by grants from the Mineta Transportation Institute at San José State University and New York University; the authors are grateful for this support. Special thanks are extended to the engineers, developers, and homeowners association representatives who participated in our interviews and surveys. The views presented and any errors or omissions are the sole responsibility of the authors and not those of the funding agencies.

The authors also thank MTI staff, including Deputy Executive Director and Research Director Karen Philbrick, PhD; Director of Communications and Technology Transfer Donna Maurillo; Student Publications Assistant Sahil Rahimi; Student Research Support Assistant Joey Mercado; and Webmaster Frances Cherman. Additional editorial and publication support was provided by Editorial Associate Cathy DeLuca.

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EXECUTIVE SUMMARY

This research investigates the rationale behind the parking mandate in the minimum street width requirement for residential streets adopted by most local U.S. governments. For example, a minimum width requirement of 36 feet for a residential street automatically provides two 10-foot traffic lanes and two 8-foot parking lanes, making it a de facto parking policy. Such a street standard provides a large amount (between 740 million and 1.5 billion) of parking spaces on residential streets, in addition to abundant off-street parking spaces (garage and driveway), and it costs trillions of dollars in road investments. This research explores the two common beliefs underlying the parking mandate: that it is an amenity reflecting market demand, and that it is a technical necessity based on traffic safety concerns.

This research surveyed the decision makers of street standards in the United States: directors of departments of public works or transportation in local governments. It targeted the 283 cities with populations over 50,000 from the most populous 52 metropolitan areas in the United States. Decision makers in these cities were asked 36 questions in the following four categories: rationale for the minimum street width requirement, rationale for the parking mandate, the double standard between private and public streets, and the construction and maintenance costs of streets. Ninety-seven cities (34 percent) completed this survey. In addition, 11 developers and representatives from 9 homeowners associations were interviewed to provide supplemental information.

The study found that local decision makers have an inconsistent and ambiguous understanding of the rationale for mandating parking through the minimum street width requirement. Decision makers believe that parking is provided because it is needed by residents and visitors, but in actuality it is provided through the minimum width requirement under the guise of technical necessity. This inconsistency calls into question both the amenity and necessity arguments. In addition, decision makers fail to adequately explain the double standard in parking requirements, in which the minimum width is much narrower for private streets than public streets. Respondents used the same amenity and necessity arguments to explain the requirement differences, which suggests that the parking mandate is likely neither an amenity nor a necessity.

The report suggests two policy reforms. The first is to surface the “submerged” parking mandate by making it a stand-alone policy, so that it no longer hides behind the technical street standards, avoiding public oversight. Street parking should be addressed separately in development regulations with a detailed analysis of both residents’ and visitors’ demand. The minimum width requirement should be based on considerations related to traffic movement and access rather than parking. The second suggested policy reform is to eliminate the double standard between public and private streets and make parking optional for residential streets. These policy initiatives would eliminate excessive parking spaces, mitigate associated externalities, correct market distortions, and avoid shifting risks from local governments to families.

I. INTRODUCTION

Local governments adopt street standards for the design and construction of local streets. These standards, which define key street parameters such as minimum width and cross-section design, often provide parking on one or both sides of the street in residential neighborhoods. Local residential streets typically require no more than two traffic lanes between a total of 18 and 20 feet wide. Parking lanes are typically between 6 and 8 feet wide. Therefore, any minimum street width requirement greater than 24 to 26 feet automatically produces at least one parking lane on the street, making the minimum width requirement a de facto parking policy.

This parking mandate can provide a sizable parking stock and requires a huge investment. According to the Bureau of Transportation Statistics (BTS 2010), there were 2.8 million miles of local public streets (representing 70 percent of all public roads) in the United States in 2009. If a single parking space is assumed to be 20 feet long, this provides between 740 million and 1.5 billion residential parking spaces, which would provide enough parking for the world's 781 million passenger vehicles in 2009 (DOE 2011). Local residential streets normally cost between $8.20 and $11.10 per square foot to construct and between $0.17 and $0.75 per square foot to maintain annually (a detailed breakdown of costs is included in the section "Residents' Willingness to Pay"). If a single parking lane is assumed to be 8 feet wide, these parking spaces would require between $1 trillion and $21 trillion in capital costs, as well as annual maintenance costs between $20 and $177 billion or 1 to 11 percent of annual local government spending in the United States (U.S. Census 2011). Although these numbers are somewhat artificial because the 2.8 million miles of U.S. streets were constructed over the course of many years and because costs differ from year to year, they provide a reasonable estimate of the scale of the investment. In comparison, the total capital and operational spending on public transit in the United States in 2009 was only $57 billion (APTA 2011).

The public is largely unaware of the parking mandate implicit in street standards, despite its scale and impact. In addition, the theoretical and practical rationales underlying this government mandate are often not well explained.

From a theoretical perspective, street parking does not qualify as a public good that justifies governmental intervention. Ver Eecke (1999) claims that a public good exhibits two essential features: the opportunity for collective gain and the difficulty of optimal financing due to the nonexclusion possibility. Neither of these features applies to residential street parking. The mandate may benefit residents by enhancing the perception of spaciousness and privacy through wider streets or by providing a cheap supply of on-street parking. However, these parking spaces are more often associated with social costs than benefits. Parking spaces can occupy between 25 and 45 percent of the street pavement area and up to 10 percent of the land in a development. These spaces reduce the availability of developable land, increase the cost of infrastructure (e.g., higher sewage capacity), and diminish housing affordability. They encourage urban sprawl, reduce the water infiltration rate, increase the heat island effect (Golden and Kaloush 2006), and degrade ecosystems (Frazer 2005). By reducing the cost of car ownership, abundant and free street parking

encourages dependency on automobiles and contributes to increasing congestion, air pollution, and greenhouse gas emissions.

From a practical perspective, the minimum street width policy provides on-street parking spaces above and beyond off-street parking, which is also mandated by its own set of minimum requirements. Because off-street parking standards alone meet parking demand, the two sets of minimum requirements appear to be redundant.

In conclusion, the parking mandate implicit in street standards might be the single largest source of free, excessive parking in the United States. Given the widespread criticism of the oversupply and/or underpricing of parking (Shoup 2005), it is surprising that this parking mandate has attracted little attention.

This research utilizes a series of surveys and interviews of local government officials, developers, and homeowners associations to examine the rationales behind the parking mandate implicit in residential street standards. An additional goal of the research was to encourage discussion of this important but generally overlooked policy. The surveys and interviews investigated two common beliefs regarding the parking mandate: that it is a technical necessity based on traffic safety concerns and that it is an amenity reflecting market demand. The findings from the study's survey of 97 U.S. cities revealed that the parking mandate implicit in street standards was not based on safety concerns or market demands. This policy exhibits considerable ambiguity and inconsistency, and it distorts both the parking and housing markets. For example, many residents would choose not to pay for street parking if its costs were separated, or unbundled, from housing costs.

Thus, the report concludes with two policy suggestions. First, the hidden parking mandate implicit in street standards should be explicitly identified as a distinct policy and made subject to public oversight to assess its legitimacy. Second, the flexible street standards developed for private streets should be applied to public streets, and residential street parking should be optional rather than required in new subdivisions.

II. STREET STANDARDS AND STREET PARKING

Street standards are normally developed by engineers in departments of public works or transportation, based on various guidelines provided by county, state, or professional organizations, such as the Institute of Transportation Engineers and the American Association of State Highway and Transportation Officials. The standards are either published as a separate document or as part of a jurisdiction's development ordinance. Although the street standards address many characteristics of streets, two are particularly relevant to street parking: minimum street width requirements and cross-section design. The former specifies the minimum curb-to-curb distance, while the latter specifies the segments of the right-of-way and pavement area and designates sidewalks, curbs, gutters, plantings, easements, traffic lanes, and parking lanes.

A residential-street traffic lane is normally between 9 and 12 feet wide, with a typical width of 10 feet, while a parking lane is normally between 6 and 8 feet wide, with a typical width of 8 feet. Most local residential streets require a maximum of two traffic lanes, giving them a total width of between 18 and 24 feet. Therefore, streets between 24 and 32 feet wide automatically include at least one parking lane, while streets more than 32 feet wide have two parking lanes. For narrower streets, parking might still be possible, depending on the section design. For example, in Olympia, Washington, the minimum curb-to-curb width for local streets is only 20 feet, but this width includes a one-way traffic lane that is 12 feet wide, which allows a 6-foot-wide parking lane to be added to one side of the street. In other municipalities, parking might explicitly be prohibited on narrower streets. For example, parking is not allowed on streets less than 24 feet wide in Tucson, Arizona, or on streets less than 29 feet wide in Phoenix.

The parking mandate implicit in street standards is a recent phenomenon. Street standards were established prior to the automobile era and date back to ancient times (Benson 2003). Even after cars became prevalent in the early twentieth century, parking was not required by street standards. Street pavement widths in the early 1900s were typically between 18 and 24 feet (Dale and Sharn 1995). A standard published by the U.S. Bureau of Industrial Housing and Transportation in 1919 recommended a minimum width of 20 to 24 feet for residential streets without specifying parking lanes (Southworth and Ben-Joseph 1995). The 1929 New York Regional Plan suggested a minimum width of 18 to 20 feet for local streets (NYRPA 1929). The Federal Housing Administration's standards for subdivisions, which were first published in 1936, established a width of 24 feet for local streets, which was increased to 26 feet in 1941. Even the Institute of Transportation Engineer's influential Traffic Engineering Handbook set a narrow standard at that time (Southworth and Ben-Joseph 1995): the second edition of the Handbook, published in 1950, suggested a minimum width of 26 feet for local streets, and parking was not a required component of street design (ITE 1950). However, in the third edition of the Handbook, published in 1965, the minimum width was increased to 32 and 34 feet, which provided parking on both sides of local streets (ITE 1965). Figure 1 shows a typical street in a California subdivision built between 1960 and 1980, which illustrates this increasing width.

Figure 1. Typical Street Width in a Suburban Subdivision Built between 1960 and 1980 (Fountainhead Dr. in San Lorenzo, CA, 36 feet)

Source: Google Maps, street view.

The parking policy underlying the evolving street standards has generated little controversy and has remained invisible. The rationale has never been explicitly explained by engineers or documented in the literature. Conversations with the interviewed engineers identified two primary beliefs regarding the parking mandate implicit in street standards. The first belief is that the mandate is a technical requirement because it addresses traffic safety concerns. Wide streets with parking are believed to be better able to accommodate peak traffic flows, remove safety hazards, and guarantee access to emergency vehicles. The second belief is that the mandate addresses market demand for extra parking, which is provided as an amenity to residents and visitors.

The variation in street widths in different neighborhoods is consistent with these two beliefs. Streets tend to be wider in denser neighborhoods and in areas with potentially greater traffic. For example, in Las Vegas, Nevada, local streets must be 37 feet wide when the lot width is less than 40 feet (small lots mean a denser neighborhood); when the lots are 40 feet or wider (less dense neighborhood), the minimum street width is 31 feet. In Newport News, Virginia, local streets without through traffic (e.g., cul-de-sacs) must be 30 feet wide, while those with through traffic must be 36 feet wide. In Vancouver, Washington, loop streets can be 28 feet wide, while those with outlets that connect single streets or adjoining streets must be 32 feet wide. Denser areas may have more traffic flow as well as more limited off-street parking, which seems to support the notion that these areas should have wider streets. However, the width differences do not always validate the two beliefs that wide streets are needed to meet traffic safety standards and parking demand, because the differences are often not large enough to change the number of traffic lanes or parking lanes. The next section describes how the validity of these two beliefs was assessed by directly asking decision makers about parking mandate rationales.

III. A SURVEY OF DECISION MAKERS

The present study surveyed engineers in public works and transportation departments in 283 cities nationwide. Engineers typically have complete control over street standards without political intervention because these standards are regarded as technical requirements. The sample includes all cities with populations greater than 50,000 from the 52 most populous metropolitan statistical areas in the United States. The city population criterion was included because smaller cities often do not have in-house engineering departments responsible for determining street standards. The focus was on major metropolitan areas because they tend to have more diverse street standards and to be more innovative.

The final survey included 36 questions organized into the following four sections: (1) reasons for establishing minimum street width standards, (2) reasons for mandating street parking, (3) street standards in private communities, and (4) construction and maintenance costs for residential streets. To pretest the survey, the questions were used to interview engineers from 11 cities randomly selected from the sample. The interviews, which took place between April and May 2011, were conducted over the phone and lasted between 45 and 80 minutes each. One or more engineers from either the department of public works or transportation participated, and revisions were made to the survey as needed.

From June to October 2011, the final version of the survey (see Appendix A) was emailed to engineers in public works and transportation departments in the remaining cities in the sample. Individuals receiving the survey were provided with a URL so they could respond to the survey online. Participants received follow-up phone calls and emails to increase the survey response rate, which resulted in approximately 70 hours of phone contact, more than 600 emails, and more than 100 faxes. No incentives were provided. Engineers in public works and transportation departments in 97 cities (86 cities in addition to the 11 cities initially interviewed) completed the survey. The response rate was 34 percent, which is similar to the response rate for other national surveys of local governments on specific planning topics. From the communication with the engineers during the survey pretesting, several reasons may explain the low (but typical) response rate: lack of time due to busy schedules, lack of sufficient knowledge to answer questions, the difficulty to organize a multidisciplinary team to complete the survey, vacation, etc. The first two reasons were more common to relatively small cities with a small transportation or public works department.

Approximately half of the cities participating in the survey were located on the West Coast and in the Rocky Mountains (referred to as “West” in this report), one-third were located in the South, and the rest were located in the Midwest and the Northeast. Table 1 presents the major characteristics of participating cities by region, and Figure 2 presents their geographic locations.

Table 1. Characteristics of Participating Cities by Region

Region	Median Pop. (2010)	Avg. Density (Sq. Miles)	Median Year of Establishment	Pop. Growth (1990–2010)	Median Household Income	Avg. Household Car Ownership	Median Street Width
All Regions (97)	115,903	5,029	1886	40%	$60,149	1.64	30 feet
West (48)	103,340	5,159	1902	41%	$66,445	1.76	36 feet
South (29)	180,719	3,727	1872	57%	$49,853	1.53	27 feet
Northeast (8)	63,194	10,889	1829	-5%	$52,984	1.31	30 feet
Midwest (11)	141,853	3,616	1893	26%	$63,519	1.65	28 feet

Source: U.S. Census 1990–2012; Street width surveyed by authors.

Figure 2. Location of Cities Participating in the Survey

Source: Map created by authors.

To add further perspective to the survey findings, we also interviewed representatives from 9 homeowners associations nationwide in May 2011 and 14 developers from Houston, Atlanta, California, Nevada, and Washington, DC, in May 2012. Information from these interviews is included anecdotally throughout the report.

The survey asked decision makers to indicate the standard minimum width for local residential streets in new developments in their jurisdictions. Figure 3 presents the distribution of minimum street widths in the 97 cities. The average minimum street width was 30.6 feet, and the median minimum width was 30 feet. Eighty-four percent of cities had a minimum street width of 26 feet, while 50 percent had a minimum width of at least 32 feet. The two most common street widths were 36 feet and 28 feet. In the West, the standards for minimum street width were greater (32.8 feet) than in the other regions (28.4 feet). However, this width difference was primarily due to cities in California, which had an average minimum street width of 34.8 feet. Excluding California, the average standard width was 27.5 feet in the West Coast and Rocky Mountains region. The wider local

streets in California reflected a state mandate. The California Streets and Highways Code (Section 1805) explicitly states:

> The width of all city streets, except state highways, bridges, alleys, and trails, shall be at least 40 feet, except that the governing body of any city may, by a resolution passed by a four-fifths vote of its membership, determine that the public convenience and necessity demand the acquisition, construction and maintenance of a street of less than 40 feet and, after such determination, proceed with the acquisition, construction or maintenance of any such street. The width of all private highways and by-roads, except bridges, shall be at least 20 feet.

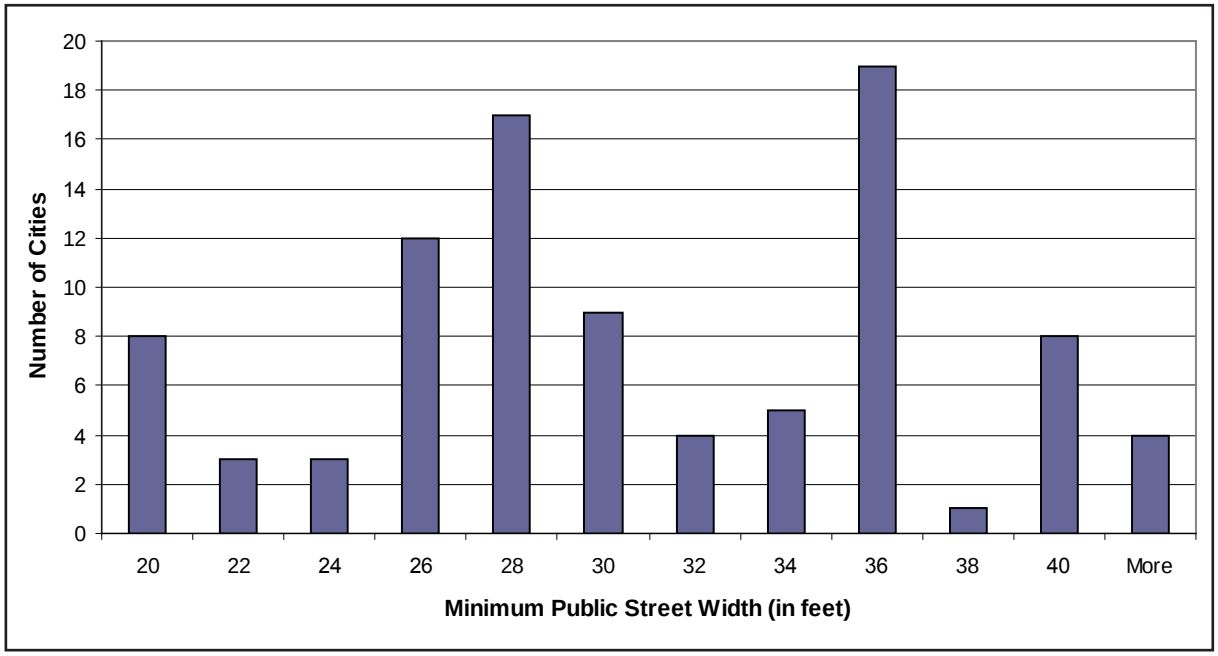

Figure 3. Distribution of Standard Minimum Street Widths (n=97)

IV. AMENITY OR NECESSITY?

Because this study focused on the parking policy implicit in street standards, only cities with a minimum street width requirement of at least 26 feet were analyzed. The reduced sample included 82 of the original 97 cities. Because the minimum width standard was the de facto street parking requirement for these cities, determining the reason for the parking mandate was essentially equivalent to determining the reason for the minimum width standard. Both questions are asked in the survey and the responses from the 82 cities are summarized and compared.

BASIS FOR MANDATING PARKING

Preliminary interviews with the engineers identified six reasons to mandate street parking. Two reasons — traffic calming and emergency vehicle access — were categorized as based on technical necessity, and three — extra parking for residents, visitors, and service vehicles (e.g., cable service trucks, mail vans, and school vehicles) — were categorized as based on market demand. A sixth reason — following regulations established by higher levels of government — did not fall under either category. These six reasons for mandating street parking were then used in the survey. Respondents were asked to rank the importance of each reason on a scale from 1 (most important) to 10 (least important). If a reason was not ranked, it was assumed to be irrelevant. Although respondents were allowed to add reasons other than the six provided, only a few did so.

As Table 2 indicates, the predominant rationale for mandating street parking was to provide extra parking spaces for residents. For 76 percent of the respondents, providing extra parking for residents was among the top three reasons for mandating street parking, and 50 percent of the respondents identified it as the most important reason. The second most frequent reason was providing visitor parking; 29 percent of the respondents identified this as the primary reason, and 83 percent included it among the top three reasons. Safety concerns were less prominent; for example, 75 percent of respondents believed that emergency vehicle access was unimportant or irrelevant to the parking mandate implicit in street standards. No respondents mentioned traffic safety or traffic capacity as a reason to provide street parking. These results supported the claim that street parking is mandated because it is an amenity that reflects market demand.

Table 2. Ranking of Reasons for Mandating Street Parking

Rank	Market Demand			Technical Necessity		Follow Regulations
	Resident Parking	Visitor Parking	Service Vehicles	Emergency Vehicles	Traffic Calming	
Most important	41 (50%)	24 (29%)	8 (10%)	10 (12%)	16 (20%)	12 (15%)
Second most important	12 (15%)	34 (41%)	6 (7%)	5 (6%)	7 (9%)	5 (6%)
Third most important	9 (11%)	11 (13%)	18 (22%)	6 (7%)	14 (17%)	11 (13%)
Relevant but not important	15 (19%)	8 (11%)	31 (38%)	31 (38%)	25 (30%)	17 (22%)
Irrelevant	5 (6%)	5 (6%)	19 (23%)	30 (37%)	20 (24%)	37 (44%)
Total	**82 (100%)**	**82 (100%)**	**82 (100%)**	**82 (100%)**	**82 (100%)**	**82 (100%)**

BASIS FOR ADOPTING A MINIMUM WIDTH

Because street parking is essentially mandated through the minimum street width requirement, one would expect that providing the amenity of parking would be a major reason for the width requirement. Note that the question is not about width requirements in general, but rather the specific width requirement adopted by each city in the sample. Preliminary interviews with the engineers identified five reasons for adopting a minimum street width standard. Because four of these reasons — improving traffic safety, enhancing traffic capacity, avoiding liability in the case of accidents, and providing access for emergency vehicles — primarily involved safety concerns, they were categorized as reflecting a technical necessity. One of the five reasons was classified as involving the amenity of extra parking. Table 3 summarizes the results.

Table 3. Ranking of the Reasons for Minimum Street Width Requirements

Rank	Technical Necessity				Amenity
	Traffic Safety	Traffic Capacity	Liability	Emergency Vehicles	Extra Parking
Most important	39 (48%)	6 (7%)	2 (2%)	22 (28%)	14 (17%)
Second most important	13 (16%)	15 (18%)	4 (5%)	16 (20%)	18 (22%)
Third most important	10 (12%)	11 (13%)	6 (7%)	12 (14%)	18 (22%)
Relevant but not important	5 (6%)	28 (35%)	32 (40%)	12 (14%)	18 (22%)
Irrelevant	15 (18%)	22 (27%)	38 (46%)	20 (24%)	14 (17%)
Total	**82 (100%)**	**82 (100%)**	**82 (100%)**	**82 (100%)**	**82 (100%)**

As Table 3 indicates, study respondents believed that the minimum width requirement was primarily adopted due to safety concerns and was a technical necessity, although a small but significant number of respondents also thought that it was an amenity provided to meet market demand. For 76 percent of the respondents, traffic safety was among the top three reasons for adopting a minimum width standard, and 48 percent identified it as the most important reason. For 61 percent of the respondents, emergency vehicle access and extra parking were ranked among the top three reasons. However, only 28 percent of the respondents identified emergency vehicle access as the most important reason, and 38 percent believed that this reason was unimportant or irrelevant to the street width requirement. Similarly, only 17 percent of the respondents identified extra parking as the most important reason, and 39 percent believed that this reason was unimportant or irrelevant to the street width requirement. These results support the claim that the minimum width requirement is necessary primarily due to safety concerns.

The results presented in Tables 2 and 3 indicate that participants provided distinctly different rationales when responding to essentially equivalent questions. Decision makers believed that the parking mandate was designed to provide extra parking, but this was accomplished through the minimum width requirement in the name of traffic safety. In other words, technical necessity was an excuse for providing the amenity of street parking, and street parking was provided under the guise of traffic safety. A review of the street standards from 22 cities in the sample indicates that 33 percent actually do not even

mention parking in the minimum width requirement; this suggests that such a requirement is based solely on technical necessity.

This circuitous rationale is also at odds because the parking mandate and traffic safety concerns might be contradictory. When parking lanes are occupied with cars, they "generally decrease through-traffic capacity, impede traffic flow, and increase crash potential" (AASHTO 2011, 4-20). When parking lanes remain largely empty, they encourage speeding. The survey asked decision makers to rank problems for residential streets in their city. As shown in Table 4, speeding was overwhelmingly regarded as the most severe problem; 72 percent of the respondents identified it as the greatest problem, and 87 percent included it among the top three problems. Not surprisingly, wide streets are regarded as the major cause of speeding in residential neighborhoods (Daisa and Peers 1997; Farouki and Nixon 1976; Keck 1998).

Table 4. Ranking of Residential Street Problems

Rank	Speeding	Through Traffic	Lack of Parking	Child Safety	Pedestrian Crossings
Greatest problem	69 (72%)	5 (5%)	15 (16%)	6 (6%)	2 (2%)
Second greatest problem	11 (11%)	47 (49%)	17 (18%)	9 (9%)	10 (10%)
Third greatest problem	4 (4%)	16 (17%)	23 (24%)	13 (14%)	16 (17%)
Problematic but not major	8 (9%)	20 (21%)	19 (19%)	39 (41%)	34 (36%)
Not a problem	4 (4%)	8 (8%)	22 (23%)	29 (30%)	34 (35%)
Total	**96 (100%)**	**96 (100%)**	**96 (100%)**	**96 (100%)**	**96 (100%)**

Note: Of the 97 cities that completed the survey, 96 responded to this question.

In summary, most respondents believed that the purpose of mandating parking was to provide extra parking, which was accomplished through the minimum street width requirement under the guise of traffic safety (rather than parking demand). In other words, street parking is an amenity, but it is provided in the name of necessity. Such "flip flop" reasoning reflects local decision makers' ambiguous understanding of the basis for mandating parking in street standards. This lack of clarity calls into question the validity of both the amenity and necessity arguments. As described in the next section, evidence of an apparent double standard between public and private streets amplifies this concern.

V. THE PUZZLE OF DOUBLE STANDARDS

Figure 4. Private and Public Streets in Las Vegas (28 feet wide versus 37 feet wide)

Source: Map from Google Earth; Data provided by Las Vegas Department of Transportation, 2011.

Figure 4 above displays two adjacent subdivisions in Las Vegas. The streets in the subdivision on the left are approximately 30 percent more narrow than the streets in the subdivision on the right (28 feet wide compared to 37 feet wide). This difference in width is due to differences in street ownership. The neighborhood on the left is a private community with streets that are owned and maintained by the homeowners association, while the one on the right is a community with streets that are owned and maintained by the local government. Las Vegas's street standards require that public streets must be at least 37 feet wide, while private streets are allowed to be 24 feet wide.

This double standard is prevalent throughout the United States. In the study survey, 84 percent of participating cities had private communities within their jurisdictions, and 80 percent of these cities (*n*=68) permitted different street standards for private streets. Figure 5 presents the distribution of the minimum width standards for private streets in the 68 cities that provided this information. The average width was 24.3 feet, and the median was 24 feet, which was 6 feet less than the average standard width of public streets — exactly the minimum size of one parking lane. For 69 percent of the respondents, the width standard for private streets was less than 26 feet, which potentially eliminated street parking. Although some private streets might be accessible only to residents or visitors, most are open to the general public.

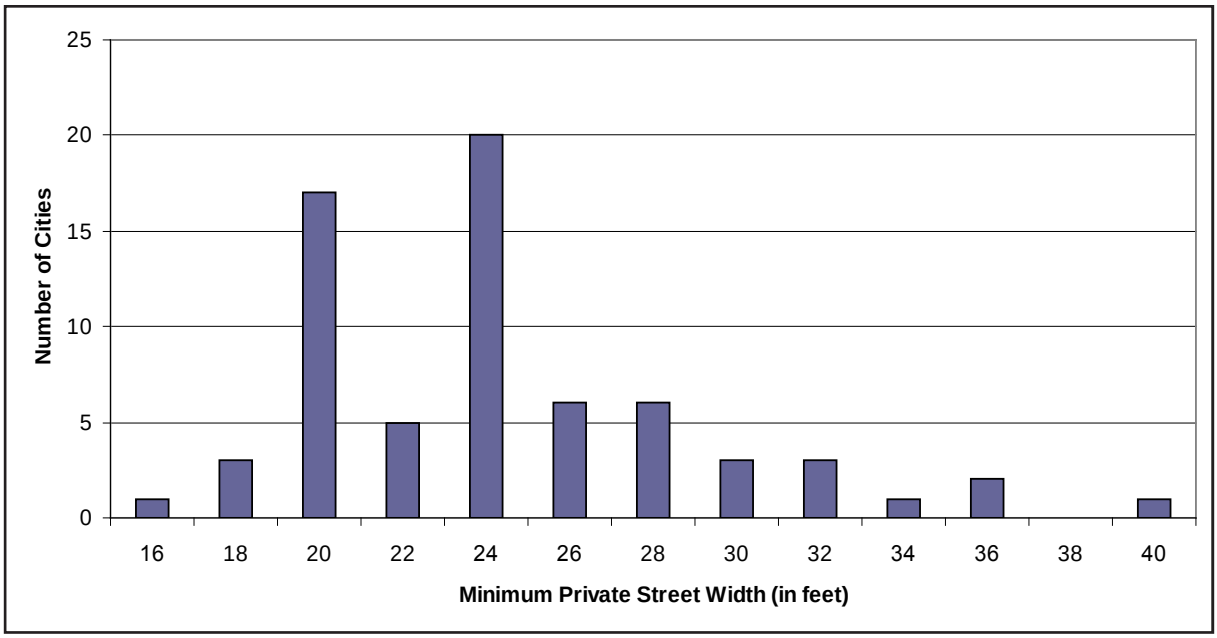

Figure 5. Distribution of Minimum Width Standards for Private Streets (n=68)

Figure 6 presents the three types of residential street ownership — public, nongated private, and gated private — in a residential area in Las Vegas, Nevada. There appear to be no significant differences in the street pattern and layout between private streets and public streets. Figures 7 and 8 show narrow streets in two private developments in California and North Carolina.

Figure 6. Street Ownership in a Residential Area in Las Vegas (blue = public streets, red = nongated private, orange = gated private)

Source: Las Vegas Department of Transportation, 2011.

Figure 7. Narrow Street in a Private Development (California Ridge, San José, CA)

Source: Google Maps, street view.

Figure 8. Narrow Street in a Private Development (Trailwood Springs, Raleigh, NC)

Source: Google Maps, street view.

WHY THE DOUBLE STANDARD?

To understand why this double standard exists, respondents were asked two related survey questions: (1) why private streets were permitted to be narrower than public streets, and

(2) why public streets were required to be wider than private streets. Approximately 50 percent of the participating cities with a double standard for street widths were unable to explain these differences. Many participants did not respond to either question. Many who did respond simply described the double standard without providing an explanation.

The remaining cities attempted to employ the necessity and amenity rationales to explain the double standard. For example, approximately 20 percent of the cities mentioned street maintenance as the reason and claimed that the streets in private communities could be narrower because the city did not pick up garbage, clean streets, or remove snow in those communities. However, because private communities often contract with professional companies for street maintenance, it is not clear why narrower streets would impede street maintenance only for local governments but not private companies, which use the same technology and equipment as local governments.

Although 20 percent of the cities mentioned that private communities tended to have plenty of off-street parking and public streets tended to have more traffic, these claims did not appear to be accurate. Many respondents mistakenly confused public residential streets with arterials. For example, one respondent stated that “public streets assume a multitude of purposes and are accessed by a multitude of users — delivery trucks, private cars, transit vehicles, bicycles, etc.” Figure 6 indicates that there is little evidence that public residential streets systematically carry more traffic than private residential streets.

These results suggest that decision makers do not appreciate the nature of the double standard and that the necessity and amenity rationales do not explain the double standard. In fact, the double standard for private streets defies both the necessity and amenity rationales for the parking mandate implicit in street standards for public streets. Private communities certainly function well with narrow streets without street parking: 60 million Americans lived in approximately 300,000 private communities in 2009, and the number has been growing rapidly over the past two decades. The homeowners associations and residents are unlikely to feel that their safety is at risk, street maintenance is impeded, emergency vehicle access is compromised, parking is insufficient, and their liability is increased because of road accidents, all due to the narrower streets. If the narrow width standards work for private streets, they may work for public streets too.

Many decision makers actually agree with this conclusion. When asked whether their street parking was excessive, 43 percent of the participants responded “yes.” In contrast, 38 percent believed that their parking supply was appropriate. This is interesting, given that the minimum street widths in these two groups were essentially identical (an average of 30 feet).

VI. RESIDENTS' WILLINGNESS TO PAY

The above analysis suggests that the parking mandate in street standards is neither a necessity nor an amenity. Instead, it is likely to be an arbitrary decision, which is often the case with off-street parking standards (Shoup 2005). If this is true, who bears the cost of such arbitrary decision making? And are they willing to pay for it? Since the excessive street standards increase development costs, both developers and residents could bear the cost. Developers have long fought excessive street standards in subdivisions. The Urban Land Institute and the National Association of Home Builders proposed their own street standards in 1947 (ULI 1947), which suggested a maximum — rather than a minimum — street width of 26 feet. A 2002 national survey of 86 developers identified street width as the most excessive physical standard in subdivision regulations (Ben-Joseph 2003, 33). Many local governments in this study were aware of developer attitudes. When asked whether developers would provide street parking if it were optional rather than required, survey responses were equally split between "yes" (42 percent) and "no" (42 percent), with 16 percent providing no response.

However, despite developers' resistance, they rarely file lawsuits against excessive street standards, although these standards could be challenged in court based on the argument of arbitrariness (Heyman and Gilhool 1964). This lack of objection from developers suggests that they might be able to shift the cost of streets to consumers, who seem to be inelastic to street costs. This inelasticity is likely due to the prevalence of excessive street standards and the practice of bundling street costs with housing costs,[1] which reduces the salience of the cost (Chetty, Looney, and Kroft 2009; Finkelstein 2009). This section focuses on residents' willingness to pay for street parking if it is unbundled, or separated, from housing. Although residents' preferences alone do not justify a government mandate, a high level of preference might help explain the lack of objection towards the seemingly arbitrary government policy of street width standards.[2]

UTILITY AND COST OF STREET PARKING

Based on residential energy consumption surveys conducted by the Energy Information Administration (2003), the average garage size of a single-family home is 525 square feet, which fits 2.6 cars; when driveway space is included, the home has off-street parking for approximately four to five cars. With regard to street parking, the U.S. Census (2010) found that the average lot size for a new single-family home in metropolitan areas between 1970 and 2010 was 0.34 acres. If a frontage-depth ratio of 2:3 is assumed, the average lot provides approximately 110 feet of street line in front of the home, which is equivalent to approximately four or five parking spaces, depending on the length of the curb cut. Therefore, these additional spaces would double the amount of off-street parking available to a typical single-family home. As a result, the average single-family home has access to approximately eight to ten parking spaces, although average household car ownership in the United States is approximately 2.3 cars. The marginal utility offered by the extra street parking might be limited.

With regard to the cost of street parking for the typical household in a single-family home, 50 cities in the study provided information regarding construction costs, and 55 cities

provided information regarding maintenance costs for local residential streets per square foot. Figure 9 presents the distribution of construction costs, and Figure 10 presents the distribution of maintenance costs.

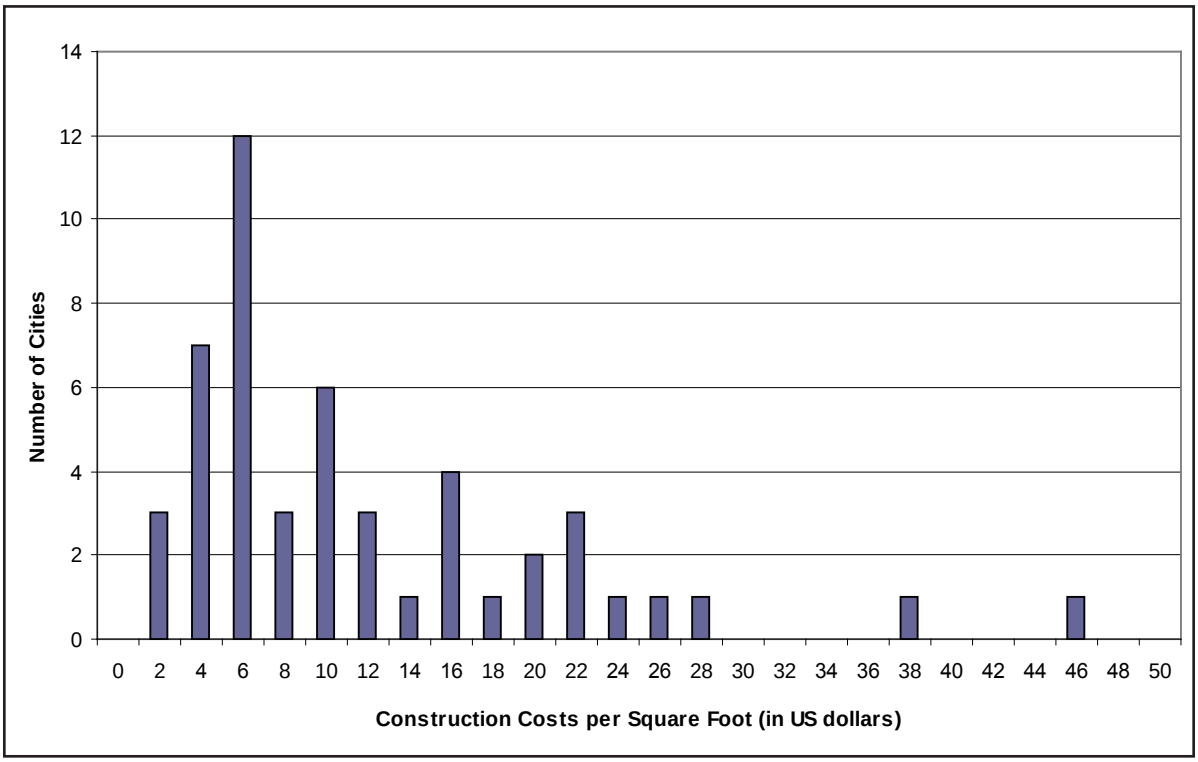

Figure 9. Distribution of the Construction Costs of Local Streets (n=50)

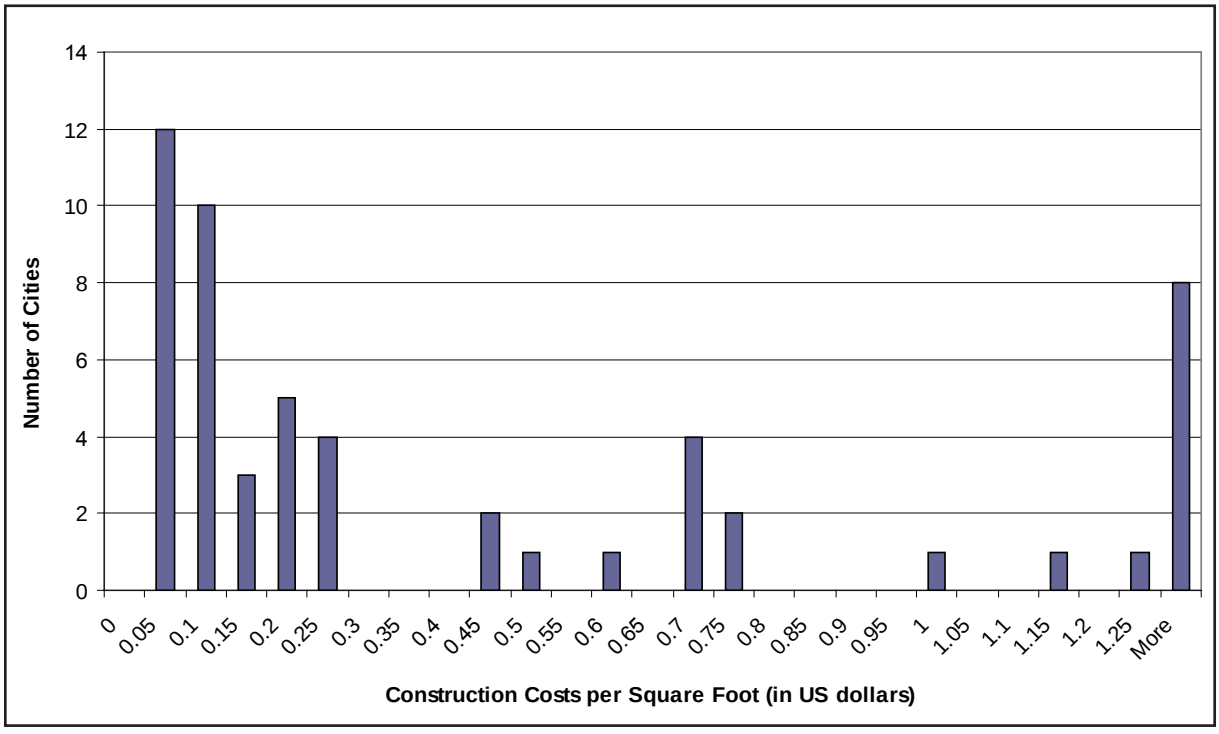

Figure 10. Distribution of the Maintenance Costs of Local Streets (n=55)

The average and median costs were $8.20 and $11.10 per square foot for construction and $0.17 and $0.75 per square foot for annual maintenance. If a single parking lane is assumed to be 6 to 8 feet wide, a single-family home has between 660 and 880 square feet of street pavement along its front lot line. As discussed previously, it is assumed that the street cost is capitalized into the housing price, which produces a construction cost (excluding land costs) between $5,390 and $9,730 and a maintenance cost between $111 and $662 annually (see Table 5). Based on an interest rate of 6 percent over a 20-year period, the annualized construction cost would be between $467 and $848. With annual maintenance, the total annual cost for the 110-foot street segment would be between $581 and $1,510, with an average cost of $1,000, or $200 to $250 per space. This number is a bit lower than the estimate by Litman (2012), which is $531 per suburban on-street space, but his estimate includes land costs.

Table 5. The Annual Cost of Street Parking for an Average Size Lot (0.34 acres)

Parking Lane Width	Construction			Annual Maintenance Cost	Total Annual Cost
	Unit Cost (per square foot)	Total Cost	Annualized Cost		
6 Feet	Median = $8.1	$5,390	$467	Mean = $496	$966
				Median = $111	$581
	Mean = $11.2	$7,298	$636	Mean = $496	$1,133
				Median = $111	$748
8 Feet	Median = $8.1	$7,187	$626	Mean = $662	$1,288
				Median = $149	$775
	Mean = $11.2	$9,730	$848	Mean = $662	$1,510
				Median = $149	$997

Is an average middle-income household willing to pay $1,000 per year for four to five street parking spaces in front of their house? The answer may depend on the household's level of car ownership, the availability of off-street parking, housing size, parking habits, and household attributes. However, it is reasonable to assume that a significant portion of households would say "no," as the median property tax for an owner-occupied housing unit in 2010 was only $1,981 (ACS 2010). The majority of decision makers surveyed in this study agree. Participants were asked their opinion regarding residents' willingness to pay for a parking space between 160 and 200 square feet based on the cost information they provided; 55 percent believed that residents would be unwilling to pay these costs, compared to 16 percent who believed that residents would be willing to pay.

One caveat of the above analysis is that residents often use garages as storage space if they can park their cars in the driveway or on the street. In the study survey, 88 percent of the respondents believed that using garages for storage was very common or common in their jurisdiction. For example, the transportation manager for the City of Ontario, California, stated that "The joke is that only in California do owners fill their garages with worthless junk and park their luxury cars and SUV's in the street." Not surprisingly, participants who responded that garages were very frequently used for storage tended to have wider streets than those who responded that garages were frequently used for storage (32 vs. 29.7 feet, respectively), although this difference was not significant (t=1.54). The motivation of using garages for storage could be partly explained by the market distortion caused by excessive

street standards. The bundling of street parking and housing shifts the cost of parking to housing, which leads residents to overconsume parking and underconsume housing. In order to correct this distortion, residents could reclaim parking space for housing purposes by parking on the street and using the garage as extra storage space.

If this argument is true, the value of street parking could be measured by the value of storage space. According to Spiekeman (2003), the average annual self-storage rental cost is $1,308 for a 10-by-20-foot unit (equivalent to one garage space), which is higher than the annual street parking cost. Thus, residents might be willing to pay for street parking if they regard it as equivalent to heavily discounted storage space. One caveat of this rationale is whether street parking is required in order for residents to "convert" their garage. Many could park on the driveway and would not need to park on the street.

In summary, the utility gain of having extra street parking is limited while the cost is not trivial. Many residents may not be willing to pay for street parking if it is unbundled from housing. If this is true, the excessiveness in street standards could not be sustained in the long run. Emerging trends over the past two decades suggest that the tipping point might have already arrived.

VII. POLICY DISCUSSION

Over the past two decades, governments have begun to not only revise regulations to allow more private development but also to reduce width standards for public streets. In 1981, the Institute of Transportation Engineers' standard for curb-to-curb width changed from 32/34 feet to 28/34 feet (ITE 1981). The present survey also revealed a decline in the minimum width, which began in the 1990s. In the survey, 50 percent of the cities have current street standards that were adopted prior to the 1990s, and 50 percent were adopted after 1990. The average minimum width was 32.2 feet for the first group, but only 29.1 feet for the second group. The difference was statistically significant (t=2.38).

After 2000, 21 cities in the sample updated their street standards, and the majority (71 percent) made street widths narrower or more flexible. Of the 21 respondents (22 percent) who considered eliminating street parking, 16 actually implemented this change, although not all of the eliminated parking was on local residential streets. Although 45 percent of the respondents had converted street parking to bike or bus lanes, only 18 percent of the cities made this conversion on residential streets. The primary motives for this conversion were the need to develop a bike lane network, underutilized street parking, and demand from cyclists. Four cities explicitly noted that their bicycle master plan encouraged conversion of street parking to bike lanes.

All in all, Americans have started rethinking excessive street standards, and street parking has often become the target, albeit indirectly, of other policy initiatives such as bike lane planning, skinny streets, complete streets, or New Urbanism. A critical analysis of the fundamental problems in street standards policies would certainly facilitate this movement. Below, we discuss these issues and present two policy recommendations.

HIDDEN PARKING POLICY

The key problem for the parking mandate implicit in street standards is its hidden nature. As the previous analysis revealed, street parking policy has typically been buried in street width requirements, which are supposedly based on safety concerns rather than parking demand. Many street standards do not even mention parking in descriptions of the minimum width requirement, creating the impression that these requirements solely address street needs and technical issues.

This "camouflage" makes parking policy invisible to the public and precludes public oversight. In sharp contrast to minimum off-street parking requirements, the street parking mandate has rarely been publicly discussed or debated in the United States. Even New Urbanism supporters do not oppose street parking but allow it on narrow residential streets (Bray and Rhodes 1997; Ewing, Stevens, and Brown 2007). The hidden nature of this parking policy grants it legitimacy because providing streets has been widely acknowledged as a key government function. The issue could become more controversial if this function of providing streets was modified to include "providing parking," as manifested by the heated debate on off-street parking regulations.

This problem is not unusual in the policy arena. In *The Submerged State*, Suzanne Mettler (2011, 4) described invisible federal policies that "lay beneath the surface of U.S. market institutions and within the federal tax system." According to Mettler, tax credits and breaks provide "incentives, subsidies, or payments to private organizations or households to encourage them or reimburse them for conducting activities deemed to serve a public purpose" (4). The problem created by these invisible government operations also characterizes street parking:

> [Tax credits and breaks] obscure the role of the government and exaggerate that of the market, leaving citizens unaware of how power operates, unable to form meaningful opinions, and incapable, therefore, of voicing their views accordingly. (Mettler 2011, 6)

In *A Government Ill Executed*, Light (2008, 4) provided other public administration examples targeting "the vast, growing, and mostly hidden workforce of contractors, grantees, and state and local government employees who work for the federal government under mandates." This hidden workforce "disguises the true cost of the federal agenda" and is "unaccountable for what goes right or wrong in the execution of the laws" (4).

The above critiques can all be applied to the case of the parking mandate in street standards. Therefore, our first policy recommendation is to unmask the hidden parking policy to make it visible to the public. Street parking regulation should become a separate and distinct policy rather than a hidden agenda implicit in street standards. The minimum width requirement should be limited to considerations based on traffic movement and access rather than parking. Street parking should be addressed separately in development regulations with a detailed analysis of both residents' and visitors' demand.

ARE PRIVATE COMMUNITIES A SOLUTION?

The double standard for private communities allows more flexibility in subdivision regulations and diminishes excessive street standards, which has resulted in many innovative neighborhood designs (Ben-Joseph 2004). However, it is doubtful that private communities would correct the problems associated with street standards as parking policy, for two reasons.

First, the option of developing private communities is not always available to all subdivision developments (Levine and Inam 2004). Developers often have to file a request for variance or rezoning in order to build a private community. For example, in Atlanta private developments fall under the category of Planned Housing Development (PDH). PDH is not designated to any particular area in the city, so developers must petition to rezone the land from one of the seventeen residential districts to the PDH,[3] which is time-consuming and costly. According to Harold Cunliffe, the former president of a home builders association in Atlanta, only one out of ten subdivisions in the Atlanta region went private over the past 30 years. Many developers often choose to do private development only when the expected return is guaranteed by a higher density not allowed in existing subdivision regulations.[4]

Second, the "private community" solution might bring two types of market failures. One is the possible underinvestment in community facilities, including streets. These facilities are

maintained using homeowners association (HOA) fees, which are initially determined by developers, and then by property owners when the community ownership is transferred from the developer to the HOA. Developers tend to underprice the fees at the beginning in order to promote sales, and HOAs may not increase the fees to the level necessary to keep up with maintenance costs, especially for major repairs that will occur in 15 or 20 years.[5] As a result, it is not uncommon for a private community to lack adequate funds when it is time to make major street improvements. Consequently, these communities often ask the local government to step in. As the director of the Transportation and Engineering Division in the City of Hoffman Estate in Illinois stated:

> Now we do not allow narrower streets in private communities because they [HOA] will eventually come to us asking for the take-over of their deteriorated streets. We got such a request every four to five years over the past twenty to thirty years.

This concern is quite prevalent. McKenzie (2006) examined recent changes in state regulations for homeowners associations and found that most of the changes aimed to enhance the financial viability of HOAs to avoid financial collapse.

The other possible failure of relying on private communities is information asymmetry: residents in private communities might not fully understand the responsibilities and risks they face. According to the former president of a home builders association in Texas, residents may know their responsibilities and risks literally or intellectually, but not emotionally. One extreme example is the Le Parc development in Southern California. This private community lost a binding arbitration in a dispute with a contractor in 1999 and was required to pay $6.6 million plus 10 percent annual interest. This HOA could not go bankrupt to avoid the debt, and insurance normally does not cover such costs. Because the association's budget was only $100,000, it had to impose a special housing assessment of approximately $25,000 per unit, and homeowners who failed to pay the assessment faced foreclosure (Gutai 1999).

Therefore, the private community solution may represent another example of the "great risk shift" described by Jacob Hacker (2006, ix), in which "more and more economic risk has been offloaded by government and corporations onto the increasingly fragile balance sheets of workers and their families" in the name of enhanced individual responsibility and control. This shift, which has resulted in the rising volatility of family income over the past 30 years, has dramatically increased the economic insecurity of all families, and, according to Hacker, will eventually harm economic prosperity. Although Hacker focused on pension, healthcare, unemployment benefits, foreclosures, and social security, embracing the private community as a solution to excessive street standards could also result in the same shift of risk.

Therefore, private communities may replace an old problem with new ones. Instead of encouraging private communities, we recommend a change to street and parking standards. Our second policy recommendation, which is consistent with our first, is to eliminate the parking double standard by (1) applying private street standards to public streets, (2) reducing the minimum street width, and (3) making street parking optional

rather than required. These changes echo the same unbundling rationale discussed in the off-street parking policy field (Shoup 2005).

VIII. CONCLUSION

This paper has explored an important but generally overlooked parking policy, street standards for new subdivisions, which have provided an enormous number of street parking spaces nationwide. Despite the substantial cost and externalities involved in this policy, the public remains largely unaware of it, which has prevented public discussion and oversight. The present study investigated the rationale underlying the parking mandate implicit in street standards and tested two commonly held beliefs: that these requirements were a technical necessity based on safety concerns and/or an amenity based on market demand for extra parking. Decision makers from 97 U.S. cities responded to a survey of street standards; the analysis found considerable ambiguity and inconsistency regarding these two beliefs and demonstrated that the parking mandate was neither a necessity nor an amenity.

The present study reveals the fundamental problems associated with this parking policy. We believe that the prevalence of street standards as parking policy is a political choice among many interest groups, supported by the ambiguous nature of this policy (technical argument bundled with housing policy), which has successfully obscured the terms of the debate from the victims — homeowners. The report presents two policy proposals. The first proposal is to unmask the hidden parking policy and subject it to public debate and oversight. The second is to eliminate the double standard between public and private streets and make parking optional for residential streets. These policy initiatives would eliminate excessive parking spaces, mitigate associated externalities, correct market distortions, and avoid shifting risks from local governments to families. Residents may still park on streets occasionally, but the provision of residential street parking should respond to the benefit and cost in the development market instead of government mandates. Such proposals are of course more relevant in places with wide street requirements, such as California or Nevada, than in areas that already allow narrow streets, such as Atlanta or Houston.

APPENDIX A:
NATIONAL RESIDENTIAL ON-STREET PARKING SURVEY

A research initiative supported by:

The purpose of this survey is to identify the best practice on residential streets with a particular interest in how local governments allocate street space to parking. It should be completed by a government official responsible for street planning and regulation from the department of transportation, department of public works, or a related agency. The survey may take 15 minutes to complete. If some questions are better answered by other units in your agency, please feel free to circulate.

Questions: Please contact Dr. Zhan Guo at NYU at (212) 998-7510 or by email: zg11@nyu.edu

Survey return: Please return the survey by email to: parkingprojectnyu@gmail.com

Survey Starts Here:

Please tell us who your are	
Name	Title
Agency	
City	State
Phone	E-mail

Section 1: Why Minimum Street Width Standard?

1. What is the standard minimum width (curb to curb) for local residential streets in *new* developments in your jurisdiction? _____ feet

2. When was the current standard adopted?
   - Before WWII
   - 1950s-1960s
   - 1970s-1980s
   - 1990s
   - After 2000
   - Don't know

3. If you have adopted street width standards in the past, how would you describe how they have changed over time?
   Street width standard has become wider
   Street width standard has become narrower
   No change
   Other

4. Why set up this minimum street width standard? (please rank those that apply, 1 being most important)

	Rank
Traffic safety	
Traffic capacity	
Liability concern	
On-street parking	
Emergency vehicles	
Others	
Don't know	

5. Which city agency or agencies make decisions on street width standard? (check all that apply)
   Department of Transportation
   Department of City Planning
   Department of Public Works Others

6. When this standard was developed, what were the sources of reference? (check all that apply)
   Developed by the city itself
   Guideline from the county
   State roadway design manual
   Urban Land Institute's *Residential Streets*
   Institute of Transportation Engineers design guidelines
   American Association of State Highway and Transportation Officials (AASHTO)
   Others (please specify)
   Don't know

7. Has your agency ever considered changing the street width standard in residential neighborhoods in the past 20 years?
   Yes, narrow it down
   Yes, widen the width standard
   Yes, keep the same width but change the composition (traffic lanes, parking lanes, etc.)
   Yes, make it flexible for particular streets and areas
   No, have not considered changes

8. If you answer "Yes" to Question 7, please explain why (motivation, who initiate it, current status, etc.)? Otherwise skip this question.

9. Do any of the following problems occur on residential streets in your jurisdiction? If so, please rank them.

	Rank
Speeding	
Through traffic	
On-street parking	
Children playing on streets	
Pedestrian crossing	
Others (please specify)	

Section 2: Why On-Street Parking?

10. From what you are able to tell, why provide on-street parking to residents? (Please rank those that apply based on their importance)

	Rank
Traffic calming (buffer zone between traffic lanes and pedestrians)	
Visitors (e.g., parties, family gatherings, etc.)	
Deliveries and service vehicles (e.g., utility vehicle, mail service)	
Emergency vehicles (e.g., fire trucks, ambulance, etc.)	
Extra parking spaces to residents	
Following existing practices	
Don't know exactly	
Others	

11. From what you are able to tell how many off-street parking spaces (garage + driveway spaces) are available at an average size single-family home in your jurisdiction?
    - 2 spaces
    - 3 spaces
    - 4 spaces
    - 5 spaces
    - Others

12. From what you are able to tell, how many cars are owned by an average household?
    - 1 car
    - 1.5 cars
    - 2 cars
    - 2.5 cars
    - 3 cars
    - 3.5 cars
    - 4 cars
    - Others

13. How would you rate the amount of on-street parking available compared to car ownership, especially in low density single-home neighborhoods in your jurisdiction?
    - On-street parking is very excessive
    - Somewhat excessive
    - Not excessive, just right
    - No opinion
    - Don't know

14. In terms of visitor parking, have you done any demand analysis?
    Yes
    No
    Don't know

15. From what you are able to tell, what is the best way to provide parking spaces for visitors?
    On-street parking
    Off-street parking on one's own property
    Centralized parking in the neighborhood (e.g., at a communities center)
    Others

16. Does your agency prohibit over-night parking on public streets?
    No
    Yes | time period: _____

17. Has your agency ever considered eliminating on-street parking from the street standard when off-street parking is sufficient (e.g., large garage and long driveway)?
    Yes, it is in discussion now
    Yes, but it was not implemented
    Yes, it is implemented in some parts of the city
    No
    Don't know

18. If you answer "Yes" in Question 17, please explain why in detail (under which condition, current status, etc.).

19. Has your agency ever converted on-street parking lanes for bike and transit uses?
    Yes, on some commercial streets in urban centers
    Yes, on some major arterials outside urban centers
    Yes, on some residential streets
    No
    Don't know

20. If you answer "Yes" in Question 19, please explain why in detail (on which roads, under which condition, current status, etc.).

21. If on-street parking were to become optional in the street standard, do you think developers would provide it anyway in new developments?
    Yes
    No
    Don't know

Section 3: Different Standard for Private Streets?

22. Are there any private communities in your jurisdiction, where streets are owned and maintained by homeowners associations (HOA)?
    Yes
    No (please skip to Question 31)

23. What is the narrowest street width that could be allowed in private communities?
    _____ feet

24. Can private streets be narrower than public streets?
    Yes
    No

25. If you answered "Yes" to Question 24 (if "No" skip to Question 26):
    a. Why are different street widths allowed in private communities?

    b. Why must public streets be wider than private streets?

26. Some argue that the reason to allow narrower standards on private streets is that the local government does not bear the liability burden in case of road accidents. Is this true in your jurisdiction?
    Yes
    No
    Don't know

27. Has the city ever been sued by drivers because of the street width (either too narrow or too wide)?
    Yes
    No
    Don't know

28. From what you are able to tell, how does the local government perceive private communities in your jurisdiction?
    Beneficial to the city
    Negative to the city
    Indifferent
    Not applicable since the city is built out
    Don't know

29. If a private community decides to transfer the streets back to the city, are there any requirements [processes] to allow that to happen?
    Yes
    No
    Don't know

30. If you answered “Yes” to Question 29, please explain the requirements in detail.

Section 4: Will Residents Pay for On-Street Parking?

31. What is the approximate construction cost for residential streets?

    $ _____ per square foot of pavement, OR
    $ _____ per mile (given a typical width of _____ feet), OR
    in a unit specified by yourself $ _____ per _____

32. What is the annual maintenance cost for residential streets?
    $ _____ per square foot of pavement, OR
    $ _____per mile (given a typical width of _____ feet), OR
    in a unit specified by yourself $ _____ per _____

Note: If you are not the right person to answer these questions, please recheck with your colleagues who are responsible for street construction and maintenance.

33. Assuming an on-street parking space is around 160-200 square feet, you can calculate the construction and maintenance cost for one on-street parking space. Do you think homeowners in a typical neighborhood in your jurisdiction are willing to pay this amount of money through their housing price to access to the space (remember that they do not have ownership over the space)?
    Yes
    No
    Don’t know

34. Some residents may use their garage for other purposes while parking their cars on driveways or on streets. In your opinion, is this common in your city as well?
    Very common, most residents do that
    Common, many residents do that
    Not very common, some residents do that
    Not common, only a few residents do that
    No, never heard of that

35. If you answered Very Common or Common to Question 34, what do you think residents are using their garages for? (check all that apply)
    Use garage as storage
    As living space/ extra room
    Work place
    Play area for children
    Others

36. How often do you clean residential streets in your jurisdiction?
    Twice a week
    Once a week
    Once every other week
    Once per month
    Twice per year Never
    Others

This is the end of the survey. Thank you very much for taking time to complete it. If there are any issues that you would like us to know but are not covered by the survey, please include it in the blank area below:

ENDNOTES

1. Local roads refer to those that directly connect residences and do not include interstates, principal and minor arterials, or major and minor collectors. If private roads were also included, local roads would comprise more than 70 percent of all public and private roads because most private roads are local. For example, in Las Vegas, private roads comprise approximately 15 percent of all roads within the city's boundaries (data provided by Las Vegas Department of Transportation, 2011).

2. This number includes all private passenger cars registered worldwide as well as light trucks (SUVs, pickups, and minivans) in the United States.

3. These numbers are consistent with statistics indicating that 6.8 percent of local government expenditures in 2009 were spent on transportation services (U.S. Census 2011).

4. The theory of public goods includes definitions of several terms, such as public goods, club goods (Adams and McCormick 1993), common pool resources (Ostrom and Ostrom 1991), and merit goods (Musgrave 1959), which exhibit features such as nonrivalness, nonexclusion, decreasing costs of production, indivisibility, and lumpiness (Head 1974). Ver Eecke (1999) identified 18 attributes, which were consolidated into two crucial properties. Residential street parking displays some features of private goods, such as excludability and rivalry. Although governments do provide certain private goods, such as healthcare and education (Poterba 1996), either to redistribute income to low-income households (Epple and Romano 1996) or to extract consumer preferences to better provide public goods (Fang and Norman 2008), these reasons do not apply to street parking.

5. According to Frazer (2005), pavement area contributes to approximately 20 percent of development with a lot size between 0.33 and 0.5 acres. The U.S. Census reports that for new homes sold from 1976 to 2008, the average lot size of a single-family home in the United States was 0.42 acres (including both metropolitan and nonmetropolitan areas).

6. Most residential street parking is excessive because it adds to off-street parking in private garages or driveways, which already meets or exceeds residents' demand for parking. The minimum off-street parking requirement is another major source of excessive parking, although not all off-street parking spaces are excessive, particularly when developers respond to market demand and provide more than the minimum. Ben-Joseph (2012) noted that there are 800 million parking spaces in nonresidential parking lots, which is less than the total number of parking spaces on residential streets.

7. The 11 cities were Long Beach, CA; San José, CA; Las Vegas, NV; Fort Lauderdale, FL; Hoffman Estates, IL; Minneapolis, MN; Naperville, IL; Phoenix, AZ; Los Angeles, CA; Mesa, AZ; and Atlanta, GA.

8. To construct a database with contact information, the email address of the department director was first identified through the department website or using search engines such as Google. If the director's email address was not available, the department was contacted to obtain the email address or arrange for a phone interview.

9. A list of the 86 cities is available upon request. A list of the 11 cities appears in a previous endnote.

10. Edwards and Huddleston's (2010) national survey of planning directors to obtain information on fiscal impact assessment in 2006 yielded a response rate of 26 percent, and Ben-Joseph's (2004) survey of local street standards in 2002 produced a response rate of 31.8 percent.

11. The 9 homeowners associations were Arbor Pointe, MI; Burgundy Park, CO; Doral, FL; Kiawah Island, SC; Cambridge Heights, TX; Eaglemont, WA; Hillsdale, San Mateo, CA; Shores on Lake, TX; and Trailwood Springs, NC.

12. These values are smaller than those obtained by Ben-Joseph (1995), who found that 70 percent of cities had streets between 36 and 40 feet wide. However, in that survey, 75 percent (56 of 75) of the participating cities were located in California.

13. Developers are responsible for building local streets within a development. Initially, governments provided these internal streets, and developers did not bear the infrastructure costs, which led to excessive subdivision development and widespread tax delinquency (Smith 1987). Local governments are increasingly requiring developers to provide streets, sidewalks, and sewage systems and then dedicate them back to the government. As early as the 1920s, courts maintained these requirements (Smith 1987). For example, a Michigan case (Ridgefield Land Co. v. Detroit, 241 Mich. 468, 217 N.W. 58 [1928]) maintained the dedication of subdivision streets, and other cases maintained the inclusion of sidewalks in subdivision development (e.g., Allen v. Stockwell, 210 Mich. 488, 178 N.W. 27 [1920]). By the end of the 1950s, these mandates predominated in subdivision approvals (Smith 1987). For example, a 1958 survey of 880 cities found that 615 cities had street or sewage requirements for subdivisions (ICMA 1958, cited in Smith 1987).

14. Other reasons why this arbitrary policy has been widely implemented might include (1) the concern with peak demand and the tendency for excessive standards in the transportation field, (2) the concept that engineers are experts, objective, and above politics (Seely 1987), (3) the support from multiple industries and businesses (Rose 2003), and (4) the policy's compatibility with a larger exclusionary strategy endorsed by many suburban communities to mitigate growth and reduce development density (Wehrly 1957).

15. To some extent this might be a strong assumption. Construction costs of streets could be capitalized into housing prices as manifested by the impact fee literature (Dresch and Sheffrin 1997; Mathur, Waddell, and Blanco 2004; Mullen 2008). Maintenance

costs might not be easily capitalized into housing prices because they are often subsidized by state or federal assistance.

16. Phone interview with Harold Cunliffe, past president of the Greater Atlanta Home Builders Association and cofounder of Pacific Group, Inc., on April 10, 2012.

17. Phone interviews with subdivision developers at Gracepoint Homes and Leigh Customer Homes in Houston; Bridgewater Homes and the Pacific Group, Inc., in Atlanta, GA; Kettler Forlines Homes in Montgomery Village, MD; HomeFed Corporation in San Diego, CA; and Brett Primack in Las Vegas, NV.

18. Phone interview with Randall Birdwell, past president of the Greater Houston Builders Association and the Texas Association of Builders, on April 12, 2012.

BIBLIOGRAPHY

AASHTO (American Association of State Highway and Transportation Officials). 2011. *A Policy on Geometric Design of Highways and Streets.* 6th ed. Washington, DC: AASHTO.

ACS (American Community Survey). 2010. “5-Year Estimates: Mortgage Status by Median Real Estate Taxes Paid, Owner-Occupied Housing Units.”

Adams, Roy. D., and Ken McCormick. 1993. “The Traditional Distinction between Public and Private Goods Needs to Be Expanded, Not Abandoned.” *American Journal of Political Science* 5 (1): 109–116.

APTA (American Public Transportation Association). 2011. *2011 Public Transportation Fact Book.* Washington, DC: APTA. http://www.apta.com/resources/statistics/Documents/FactBook/APTA_2011_Fact_Book.pdf. (accessed on June 19, 2012).

Ben-Joseph, Eran. 1995. *Residential Street Standards & Neighborhood Traffic Control: A Survey of Cities’ Practices and Public Officials; Attitudes*. Institute of Urban and Regional Planning, University of California at Berkeley.

———. 2003. “Subdivision Regulations: Practices & Attitudes; A Survey of Public Officials and Developers in the Nation’s Fastest Growing Single Family Housing Markets.” Working paper, Lincoln Institute of Land Policy, Cambridge, MA.

———. 2004. “Double Standards, Single Goal: Private Communities and Design Innovation.” *Journal of Urban Design* 9 (2): 131–151.

———. 2012. “When a Parking Lot Is So Much More.” Op-ed, *New York Times*, March 25.

Benson, Bruce L. 2003. *Are Roads Public Goods, Club Goods, Private Goods, or Common Pools?* Tallahassee, FL: Florida State University. http://www.coss.fsu.edu/economics/sites/coss.fsu.edu.economics/files/users/bbenson/roads_public.pdf. (accessed on June 19, 2012).

Bray, Terrence L., and Victor F. Rhodes. 1997. “In Search of Cheap and Skinny Streets: Old Paradigm, New Investment.” *Places* 11 (2): 32–39.

BTS (Bureau of Transportation Statistics). 2010. “State Transportation Statistics, Table 1.1: Public Road Length, Miles by Functional System, 2009.” http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2010/html/table_01_01.html. (accessed on June 19, 2012).

Chetty, Raj, Adam Looney, and Kory Kroft. 2009. “Salience and Taxation: Theory and Evidence.” *American Economic Review* 99 (4): 1145–1177.

Daisa, James M., and John B. Peers. 1997. “Narrow Residential Streets: Do They Really Slow Down Speeds?” ITE 6th Annual Meeting Compendium of Technical Papers.

Dale, C. Gregory, and Jennifer Sharn. 1995. “The Residential Street: Part I.” *Planning Commissioners Journal*, no. 20. http://www.plannersweb.com/articles/trans20.html. (accessed on June 19, 2012).

DOE (Department of Energy). 2011. *Transportation Energy Data Book.* Table 3.1: Car Registrations for Selected Countries, 1960–2009; Chapter 4: Light Vehicles and Characteristics. http://cta.ornl.gov/data/index.shtml. (accessed on June 19, 2012).

Dresch, Marla, and Steven M. Sheffrin. 1997. *Who Pays for Development Fees and Exactions?* San Francisco: Public Policy Institute of California. http://www.ppic.org/content/pubs/report/R_697SSR.pdf. (accessed on June 19, 2012).

Edwards, Mary M., and Jack R. Huddleston. 2010. “Prospects and Perils of Fiscal Impact Analysis.” *Journal of the American Planning Association* 76 (1): 25–41.

Energy Information Administration. 2003. “2001 Residential Energy Consumption Survey: Square Footage Measurements and Comparisons.” http://www.eia.doe.gov/emeu/recs/sqft-measure.html. (accessed October 12, 2010).

Epple, Dennis, and Richard E. Romano. 1996. “Public Provision of Private Goods.” *Journal of Political Economy* 104 (1): 57–84.

Ewing, Reid, Ted Stevens, and Steven J. Brown. 2007. “Skinny Streets and Fire Trucks.” *Urban Land,* August: 121–123.

Fang, Hanming, and Peter Norman. 2008. “Toward an Efficiency Rationale for the Public Provision of Private Goods.” NBER Working Paper 13827. Cambridge, MA: National Bureau of Economic Research.

Farouki, Omar, and William Nixon. 1976. “The Effect of the Width of Suburban Roads on the Mean Free Speed of Cars.” *Traffic Engineering and Control* 17 (2): 508–509.

Finkelstein, Amy. 2009. “E-ZTAX: Tax Salience and Tax Rates.” *Quarterly Journal of Economics* 124 (3): 969–1010.

Frazer, Lance. 2005. “Paving Paradise: The Peril of Impervious Surfaces.” *Environmental Health Perspectives* 113 (7): A456–A462.

Golden, Jay S., and Kamil E. Kaloush. 2006. “Mesoscale and Microscale Evaluation of Surface Pavement Impacts on the Urban Heat Island Effects.” *International Journal of Pavement Engineering* 7 (1): 37–52.

Gutai, Ference. 1999. “Le Parc Community Faces Financial Crisis.” *Ventura County Star*. August 15, Section B, p. 8. http://leparc.tripod.com/News_Clips/211881.html. (accessed on June 19, 2012).

Hacker, Jacob. 2006. *The Great Risk Shift: The Assault on American Jobs, Families, Health Care and Retirement and How You Can Fight Back*. New York: Oxford University Press.

Head, John G. 1974. *Public Goods and Public Welfare*. Durham, NC: Duke University Press.

Heyman, Ira M., and Thomas K. Gilhool. 1964. “The Constitutionality of Imposing Increased Community Costs on New Suburban Residents through Subdivision Exactions.” *Yale Law Journal* 73 (7): 1119–1157.

ICMA (International City Managers Association). 1958. *Municipal Yearbook 253–60*. Cited in Smith 1987, 6.

ITE (Institute of Transportation Engineers). 1950. *Traffic Engineering Handbook*. 2nd ed. New Haven, CT: ITE. http://www.archive.org/details/trafficengineeri00instrich. (accessed on June 19, 2012).

———. 1965. *Traffic Engineering Handbook*. 3rd ed. New Haven, CT: ITE.

———. 1981. “Recommended Guidelines for Subdivision Streets.” *ITE Journal*, August. http://www.ite.org/traffic/documents/JHA81A27.pdf. (accessed on June 19, 2012).

Keck, J. Kevin. 1998. “Caught in the Middle: The Fight for Narrow Residential Streets.” Proceedings of the ITE 14th International Conference.

Levine, Jonathan, and Aseem Inam. 2004. “The Market for Transportation–Land Use Integration: Do Developers Want Smarter Growth than Regulations Allow?” *Transportation* 31 (4): 409–427.

Light, Paul C. 2008. *A Government Ill Executed: The Decline of the Federal Service and How to Reverse It*. Cambridge, MA: Harvard University Press.

Litman, Todd. 2012. “Parking Costs, Pricing and Revenue Calculator.” *Victoria Transport Policy Institute.* http://www.vtpi.org/parking.xls. (accessed on June 19, 2012).

Mathur, Shishir, Paul Waddell, and Hilda Blanco. 2004. “The Effect of Impact Fees on the Price of New Single-Family Housing.” *Urban Studies* 41 (7): 1303–1312.

McKenzie, Evan. 2006. “Emerging Trends in State Regulation of Private Communities in the U.S.” *GeoJournal* 66:89–102.

Mettler, Suzanne. 2011. *The Submerged State: How Invisible Government Policies Undermine American Democracy*. University of Chicago Press.

Mullen, Clancy. 2008. “National Impact Fee Survey, 2008.” Presentation at the National Impact Fee Roundtable, Orlando, FL. http://growthandinfrastructure.org/proceedings/2008_proceedings/mullen_survey.pdf. (accessed on June 19, 2012).

Musgrave, Richard A. 1959. *The Theory of Public Finance*. New York: McGraw-Hill Book Company.

NYRPA (New York Regional Plan Association). 1929. *Regional Plan of New York and Its Environs*. New York: NYRPA.

Ostrom, Vincent, and Elinor Ostrom. 1991. “Public Goods and Public Choices: The Emergence of Public Economies and Industry Structures.” In *The Meaning of American Federalism*, edited by Vincent Ostrom, 163–197. San Francisco: Institute for Contemporary Studies.

Poterba, James M. 1996. “Government Intervention in the Markets for Education and Health Care: How and Why?” In *Individual and Social Responsibility: Child Care, Education, Medical Care, and Long-Term Care in America,* edited by Victor R. Fuchs, 277–308. University of Chicago Press. http://www.nber.org/chapters/c6566.pdf. (accessed on June 19, 2012).

Rose, Mark H. 2003. “Reframing American Highway Politics, 1956–1995.” *Journal of Planning History* 2 (3): 212–236.

Seely, Bruce. 1987. *Building the American Highway Systems: Engineer as Policy Maker.* Philadelphia, PA: Temple University Press.

Shoup, Donald. 2005. *The High Cost of Free Parking.* Chicago: APA Planner’s Press.

Smith, R. Marlin. 1987. “From Subdivision Improvement Requirements to Community Benefit Assessments and Linkage Payments: A Brief History of Land Development Exactions.” *Law and Contemporary Problems* 50 (1): 5–30.

Southworth, Michael, and Eran Ben-Joseph. 1995. “Street Standards and the Shaping of Suburbia.” *Journal of the American Planning Association* 61 (1): 65–81.

Spiekeman, Ryan. 2003. “Self-Storage Research Report.” Produced by Marcus & Millichap Real Estate Investment Brokerage Co. http://www.insideselfstorage.com/articles/2003/07/self-storage-research-report.aspx. (accessed on June 19, 2012).

State of California. *California Streets and Highways Code.* Division 2.5: City Streets, Chapter 1: Construction and Maintenance. http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=shc. (accessed on June 19, 2012).

ULI (Urban Land Institute). 1947. *The Community Builders Handbook*. Washington, DC: ULI.

U.S. Census. 2010. “Lot Size of New One-Family Houses Sold.” http://www.census.gov/const/C25Ann/medavgsoldlotsize_cust.xls. (accessed on June 19, 2012).

U.S. Census. 2011. “State and Local Government Finances Summary: 2009.” *Governments Division Briefs*, October. http://www2.census.gov/govs/estimate/09_summary_report.pdf. (accessed on June 19, 2012).

Ver Eecke, Wilfried. 1999. “Public Goods: An Ideal Concept.” *Journal of Socio-economics* 28 (2): 139–156.

Wehrly, Max S. 1957. *Are Modern Subdivision Regulations Pricing Moderate Income Groups Out of the New Housing Market?* [No additional publication information is available.]

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