Technical Memorandum: Parking Management Plan (final)

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Summary

The Canal Area Transportation Study (CATS) is a collaborative effort of the New York Metropolitan Transportation Council (NYMTC), a Steering Committee, and key stakeholders from the community. The study area covers the neighborhoods of SoHo, TriBeCa, Chinatown, Little Italy and Lower East Side. The study objective is to identify transportation alternatives that will improve quality of life, accessibility, mobility, and safety (CATS, 2005).

An important component of the study includes collecting data and developing parking management strategies that help improve parking conditions. There are concerns about how additional development, demographic and land use changes are going to impact traffic and parking in the study area. There are issues and challenges involving multiple constituents such as residents, visitors, local businesses, commercial and trucking and government agencies in the project area.

While parking studies can focus on reasons to increase off-street supply, land values and uses, parking regulations and unique neighborhood characteristics in the CATS study area make this very difficult and require a much more in-depth financial and feasibility study. Instead, this technical memorandum focuses on the development of shorter term parking management processes and strategies that can increase the availability and better use on-street (curb) and off-street parking. The parking data collected in CATS is a valuable resource that may be used to develop a plan for further dealing with parking issues in the area.

Parking management involves techniques and tools that impact demand, location, time, cost, and supply of parking. Parking management strategies and improvements that will be discussed in subsequent sections include:

1. Create a 90% curb parking utilization criteria as a trigger to implement parking management strategies.
2. Continue to reduce impact of government parking placards on the adjacent community.
3. Convert underutilized commercial on-street parking spaces into on-street customer spaces.
4. Examine potential peripheral parking opportunities out of the core study area.

5. Improve wayfinding and signage to make it easier to travel between parking facilities and destinations in the Canal Area.
6. Use advanced parking reservation and Park Smart systems to better use parking supply.

The following section provides background information on the Canal Area Transportation Study.

Background

The Canal Area Transportation Study (CATS) focuses on the Canal Street corridor, from Houston Street to Chambers Street and from the East River to the Hudson River. Canal Street is the major east-west artery in Lower Manhattan and is a critical link between Manhattan Bridge and the Holland Tunnel.

FIGURE 1: MAP OF THE STUDY AREA

The CATS study area covers the neighborhoods of SoHo, TriBeCa, Chinatown, Little Italy and Lower East Side. According to a user study conducted in December, 2007, more than 50 percent of the respondents took the subway or walked to their destination. A study of workers residing in New York City (U.S. Census, 2006) and working in Manhattan found that only 13.9% drive or carpool to work (2009). According to the New York City Department of Transportation (NYCDOT) (2008), 93% of all legal on-street parking spaces in Lower Manhattan are occupied during the peak hours (9 am to 5 pm). Most of the on-street curb spaces are full and used by commercial vehicles, which often double park because they cannot find parking near their destinations. While the project team identified

92 off-street parking facilities (see appendix), there are very few municipal parking facilities in the study area.

Overall the use of the subway decreased and walking increased during the weekends as compared to a weekday.

SoHo

SoHo is primarily known as an upscale shopping area with art galleries and artist lofts (Urbitran/Parsons Brinckerhoff, et al, 2006). In SoHo during the week, 56.2% use the subway and 7.9% drive. During the weekend, 44.7% use the subway and 8.2% drive. The area is growing, with increases in traffic and parking issues.

TriBeCa and Civic Center

This neighborhood has been experiencing a very rapid increase in residential development. Many former manufacturing buildings have been converted to residential uses (Urbitran/Parsons Brinckerhoff, et al, 2006). Many of these new residents do not have off-street parking located in their building; therefore if they have cars, the cars are parked in other off-street facilities or on-street. Finding on-street parking in this area is even more difficult due to the number of government buildings in the area with limited or no off-street parking facilities.

Chinatown

Chinatown comprises one of the oldest neighborhoods in Manhattan. It is approximately two square miles in area, located on the lower east side near the Manhattan Bridge and consists of a variety of businesses with nearly $6 billion in capital (Phillips Preiss Shapiro Associates, 2004). It is considered the largest Chinatown in the United States, with an estimated population of 80,000 and is home to 55 percent of all Lower Manhattan residents. Only one out of five households owns a car. Historically, approximately half of Chinatown's employed residents walk to local job. However, the decline of the garment industry will likely cause this proportion to decrease (Phillips Shapiro Associates, 2004).

According to the 2007 user survey (Urbitran/Parson Brinckerhoff et al, 2008), 41.8% travel to Chinatown by subway and 19.5% drive on weekdays and 47.5% travel by subway and 17.4% drive on weekends.

Many people use different types of bus service that links Chinatown to other Chinatowns throughout the New York area. This also includes private vans that offer service at a rate competitive with public transit.

As Chinatown has changed and become more of a service and retail center, there is a greater need for customer parking in the area (Mourad, Warnke & Associates, 2002). Much of the area does not have enough metered parking, especially for visitors and customers.

The shortage of customer parking spaces is exacerbated by Chinatown's proximity to municipal and federal buildings (near Chatham community. Government officials use placards that allow them to park in curb spaces. In addition, there is very limited municipal parking available for public use. The approximately 400 spaces at Police Plaza have not been available for public use since 9/11. Despite recent reforms of parking placards, perhaps the biggest issue involves federal agencies and court officers who still use curb side parking in the community (Transportation Alternatives, 2007).

In Chinatown, there are also issues with commercial deliveries. On many streets, there is limited curb parking, resulting in commercial vehicles double parking and blocking travel lanes. Still another issue involves parking for tour buses and local jitneys that connect Chinatown to other communities.

CHINATOWN

LITTLE ITALY

Little Italy

Little Italy is centered on Mulberry Street between Canal Street and Houston Street. While much of the neighborhood has been absorbed by Chinatown, there are about two dozen Italian restaurants and shops in the area.

Lower East Side

Nearly half of the study area's residential units are located in the Lower East Side (Urbitran/Parsons Brinckerhoff, et al, 2006). In the Lower East Side during a weekday, 44.3% use the subway and 8.5% drive. On weekends, 35% use the subway and 12.8% drive.

Parking Management Overview

Parking management strategies can be used to improve mobility, access and efficiency of a transportation system.

Further complicating the development of a parking management program is the need to balance parking and transportation needs with local business and resident issues. This includes development of programs that contribute to local economic vitality, creating market housing opportunities while maintaining affordable housing for local residents in the project area.

PARKING GOALS AND OBJECTIVES

The first step is to develop a set of achievable goals and objectives. These goals and objectives become the base to create a comprehensive parking management framework that can be used to establish policies and criteria for a more effective, efficient and comprehensive parking management program. For this program, the proposed goals and objectives are listed in the following table.

Goals	Objectives
• Develop a comprehensive and integrated on-street and off-street parking program. • Identify and develop policies and program to increase parking options for the priority user(s) in the project area. • Support business first policies in the commercial core. • Maximize use of existing parking resources. • Maximize use of alternative modes to increase customer parking and access to the project area. • Develop parking pricing policies that reduce demand and maximize use of alternative modes while establishing prices low enough to attract customers who usually will not come to the area unless they drive.	• Use 90% on-street trigger. • Reduce cruising for parking. • Reduce impact of government parking placards. • Encourage higher on-street turnover. • Increase parking utilization by converting underutilized commercial parking spaces into customer spaces.

PRIORITY PARKERS

The second step is to prioritize parking resources. It involves the identification of priority parking users or target markets, segmenting the population into priority target markets such as retail customers, commercial vehicles, residents or employees. The following seems to be the current parking priority groups.

Field observations and discussions with stakeholders seem to indicate that agencies with placards are perceived as the number one priority primary users of on-street parking (especially in Chinatown). The placards allow for unrestricted curb side parking in otherwise restricted zones, such as by time and user. This has created controversy and recent efforts to reduce the number and impact of government issued parking placards (Transportation Alternatives, 2007). In most communities throughout the United States, vehicles with government placards are not the priority on-street parker in an urban area. However, most cities in the United States have off-street parking facilities for government agency vehicles and often times, for their employees.

The second priority users of parking spaces appears to be commercial vehicles who can park on-street at muni-meters at a rate of $2 for one hour, $5 for two hours and $9 for three hours to load and unload. Generally, there are limited or no off-street loading/unloading facilities in most of the study area, often resulting in the need to use curb spaces to meet commercial parking needs. Therefore, many streets in the area are reserved for commercial vehicles during weekdays.

The third priority users of parking are customers. While most customers use public transportation to access destinations in the study area, many drive to the area and need to find parking. However, inexpensive parking is very limited throughout most of the area (off-street parking at higher rates is usually available).

The fourth priority users of parking are residents. Some of the residents have access to accessory parking in their building. Others can find parking in off-street facilities located near their homes or find parking on-street in evening hours (although it may take time cruising for parking).

There are others who use parking in the study area. These secondary parking users in the area seem to be employees and long term parkers. Some employees arrive early and can find parking in the study area

(although they probably have to walk long distances to reach their employment site). Others can pay higher rates for off-street parking located close to or in the Canal Street corridor.

Of the four priority parking groups (placards, commercial vehicles, customers and residents), policies should be examined that can increase customer access to additional parking resources. This is especially true in areas with underutilized or empty curb spaces that may be appropriate for other uses. Traditionally, customers are the number one priority on-street parker in most urban areas.

PARKING INFORMATION

To be able to determine the correct mix of parking management tools, it is important to have the necessary parking inventory and occupancy data to create a better understanding of the local conditions. The project team conducted an on-street parking study in the project area on selected dates in May and June, 2009. This included:

- Allen Street
- Avenue of the Americas
- Baxter Street
- Bayard Street
- Bowery Street
- Canal Street
- Centre Street
- Chrystie Street
- Delancey Street
- Division Street
- East Broadway
- Forsyth Street
- Grand Street
- Hester Street
- Lafayette Street
- Market Street
- Mott Street
- Mulberry Street
- Pike Street
- Spring Street
- Varick Street
- Walker Street

The parking data collected in CATS is a valuable resource that can be used to address specific parking issues in the area.

Data and field observations indicate that parking utilization is high in many locations. It seems that the peak parking weekday period is between 11 am and 1 pm (with curb parking over 100% in many locations due to double parking and illegal parking). Some commercial and passenger vehicles double park in the area. There are others who drive in the area,

looking for more convenient and inexpensive parking. Some visitors drive ("cruise") in the area while waiting for people to finish conducting business in the area. This cruising for parking creates unnecessary additional vehicle miles traveled in the corridor, causing even more congestion. A study in Brooklyn suggested that 45% of traffic in the area was related to cruising for parking (Transportation Alternatives, 2007). In another study (Shoup, 2007; Schaller, 2006), 28% of those surveyed at a traffic signal in the SoHo District were cruising for parking.

Another issue is bus layover parking. Some of these buses cruise in neighborhoods before finding layover parking spaces. Some buses have such a difficult time finding parking, that they travel outside of the area and come back later to pick up people.

Further, results from the curb street parking study and field observations indicate that there are streets in the core that are underutilized and could provide parking for retail customers. In this case, the on-street regulations can be examined, looking to see if it is possible to create more customer and short term parking in the area.

PARKING REQUIREMENTS

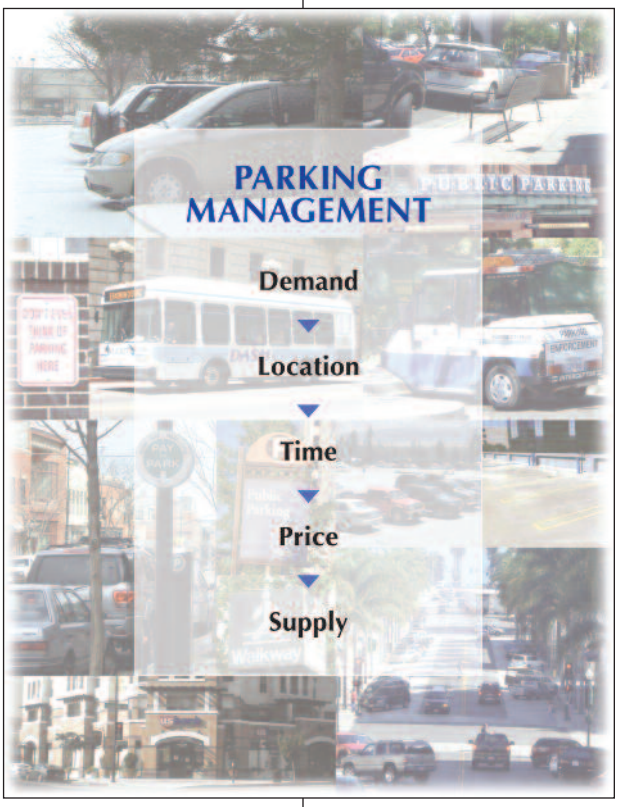
Generally, in New York, parking requirements vary depending on access to mass transit. Therefore, accessory parking is not required throughout most of the Manhattan core (Manhattan Community Districts 1 through 8 are located south of West 110th Street on the West Side and East 96th Street on the East Side) which includes the CATS study area (New York, Department of City Planning, 2010).

PARKING MANAGEMENT BARRIERS

This attitude and perception about parking spaces and parking pricing is a barrier to effective parking management. Many people believe there is a lack of parking when it costs too much (any amount can be perceived as too much) or if convenient parking may be available near their destination. Combined with a lack of understanding of land use policies and transportation alternatives, these perceptions and attitudes greatly impact how people view parking and accessibility to an area.

Parking Strategies

While most of the area (specifically on-street parking) can be considered full, there are streets with available parking resources. This is true on some streets that reserve muni-meter parking for commercial vehicles. Therefore, it seems appropriate to examine parking demand, looking for locations with underutilized parking resources. Then, strategies can be implemented sequentially, building upon demand, then location, then time and finally price and supply strategies.



DEMAND

Since parking utilization and parking pricing are very high, many people already use alternative modes to reach destinations in the project area. Still, it seems the demand for parking spaces is increasing in the study area. Strategies that reduce demand (e.g. elimination of excess government placards) are extremely important to reduce impacts and increase mobility in the project area. Specifically, it is important to identify any areas with available parking supply and to determine if this parking can be used to meet demand in the project area.

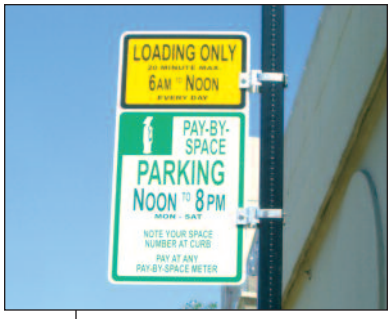
LOCATION

After implementation of strategies to reduce parking demand, the next level is to use location strategies that spread out parking in a wider area. This includes shared use or peripheral parking lots, thus reducing parking demand in the prime parking areas. It also can include peripheral parking policies, directing parkers to facilities outside of the core and reducing cruising time in the CATS study area. This also requires improvements to the walking environment, wayfinding and signage to reduce "perceived" time spent reaching a destination.

TIME

Time strategies are used in the study area to encourage turnover. For example, commercial vehicles are limited to three hours at muni-meters and there are one-hour and two-hour curb spaces for passenger cars in the

area. Perhaps it may be feasible to permit the use by non-commercial vehicles of underutilized commercial parking spaces, thereby creating additional customer parking. Another option is to develop combination zones (areas that are used for loading and unloading for part of the day and used for customer parking for part of the day). This is already in use in midtown and has been successfully implemented in other cities such as Redwood City, California and Pasadena, California.



PRICE

There is limited free parking in the area (much of which is available off-peak and on Sundays). Many of the curb spaces are priced (although often limited to commercial vehicles).

Results from the 2007 intercept survey (Urbitran/ Parsons Brinckerhoff, et al, 2008) indicate that a substantial portion of the parkers in the survey area who park off-street on weekdays (91%) and weekends (77%), pay more than $10. At the same time, there are many people who are willing to search for free or low cost on-street curb parking, with most of the curb parkers (80%) spending less than $5 on both weekdays and weekends.

The high price of parking discourages driving in the project area. Of respondents willing to switch to driving, a higher percentage was willing to pay less than $5 for parking on weekdays and a higher percentage was willing to pay more than $20 for parking on weekends (Urbitran/Parsons Brinckerhoff, et al, 2008). If prices are reduced in the project area, this may result in additional traffic that can negatively impact the CATS study area. Parking pricing policies need to be balanced to reduce demand and maximize use of alternative modes while establishing prices low enough to attract customers who usually will not come to the area unless they drive.

SUPPLY

The high land values and land uses in the project area make it very difficult to build additional parking supply. In addition, it seems that the amount of off-street parking in the study area is declining (supply decreasing) while vehicle ownership is increasing (demand increasing). Further, parking policies and development opportunities are reducing parking in the project area.

CATS Track II: Parking Management Plan

The recommended parking management plan is a comprehensive on-street and off-street system. The on-street curb parking is prioritized for use by commercial vehicles and short term customers. Off-street parking facilities are priced higher for longer term parking for residents and employees. The system is based on understanding and monitoring parking demand. Many communities are now using a utilization standard, criteria or "trigger" for development of parking strategies. This approach also can be used in the study area, perhaps setting a 90% parking utilization trigger as an indication that curb parking is full, therefore identifying a need for implementation of applicable parking management strategies. In other cases, some streets with less than a 90% parking utilization rate may indicate that parking spaces are available on the street for other uses.

The location strategies need to support the reduction of cruising for parking. Many parkers spend significant time looking for parking in the project area. Among those parking off-street, 39% (weekday) and 31% (weekend) spent more than 20 minutes looking for a parking space. Among those parking on-street, the time spent cruising for parking is even greater; with 54% (weekday) and 41% (weekend) searching more than 20 minutes to find a parking space (Urbitran/ Parsons Brinckerhoff, et al, 2008). The location strategies must work together to reduce cruising for parking. This includes effective use of off-street spaces used by customers who are visiting multiple locations or with people who need longer timestays in the study area to visit families or participate in cultural activities.

There are many parking strategies that can be used to address parking issues. However, programs need to be customized and created to meet specific criteria. The following table summarizes program components recommended for the study area.

Parking Management Program	Demand	Location	Time	Price	Supply
1. Parking strategies based upon 90% utilization trigger	✔				
2. Reduce impact of government parking placards	✔				
3. Convert excess commercial on-street parking into customer parking spaces	✔		✔	✔	✔
4. Examine potential of peripheral parking program		✔			
5. Improve signage and wayfinding		✔			
6. Advanced parking reservation and Park Smart systems		✔	✔	✔	

DEMAND:
90% Parking Utilization Trigger

The recommended parking program establishing a 90% utilization rate as a "trigger" for the use of parking management strategies. The 90% Rule is a measure of parking utilization that acts as a benchmark. To be able to use this "trigger" will require regular updates and analysis of parking demand in the area. This may be accomplished by regularly scheduled parking utilization studies or by use of some new technology systems for monitoring on-street parking utilization. For example, most new parking pay station systems provide an estimate of use based on paid real-time paid parking receipts. Another option is to install wireless information systems that can monitor use of curb spaces.

For example, the Port of San Francisco installed 200 sensors at on-street parking spaces in the Port's jurisdiction. The system recorded usage and violation information. This included results showing that 45% of the metered parking was unpaid, for a total of $2,400 per meter in lost revenue (Streetline, 2008).

Within the parking industry, it is assumed that when an inventory of parking exceeds 85% to 90% occupancy in the peak hour, the supply becomes constrained and may not provide full and convenient access to its intended user. This is particularly important for managing parking supplies that support tourist, customer and visitor trips. This standard can be used to determine other potential uses of on-street parking supply, specifically better use of underutilized commercial loading zones.

For this study area, some of the streets in the study area that reserve parking for commercial vehicles have occupancies far below 90% utilization. These streets can be considered for change to allow for customer parking. Data collected for this study of on-street parking spaces in the study area may be useful in this assessment. This is discussed in more detail later in the technical memo.

DEMAND:
Reduce impact of government parking placards

Recent studies have documented the misuse of government placards in Manhattan and in the study area. For example, in July 2006, a study found that there were 1,217 cars parked illegally on the streets around One Police Plaza and that 1,012 were private cars with city-issued permits (Transportation Alternatives, 2007). Reform efforts have reduced the impact of placards on the community. Approximately 9% of all agency and law enforcement permitted vehicles were inauthentic or illegitimate in some way (New York, 2008).

A key issue regarding placards is the value of a parking space to a retail establishment. If each parking space is valued at $150,000 per year (see computation below), a government vehicle parked in this space not only costs the community $150,000 per year, but also results in a loss of government revenue (taxes on sales). Vehicles with government parking placards cover a substantial portion of spaces. In Lower Manhattan, 22% of loading zone spaces and 18% of general public metered parking is used by vehicles with government placards. Further, these vehicles park longer on average than other vehicles, parking on average for 4.0 hours versus the 2.7 hours for privately owned vehicles. In the course of an average weekday, over 3,300 vehicles in Lower Manhattan display a government placard, resulting in nearly 14,000 vehicle hours, which represents almost 25% of the total observed vehicle hours in Lower Manhattan (New York, 2008). By early 2008, efforts resulted in a 20% reduction of government parking placards (Lethco et al, 2008).

Value of a Parking Space in Front of a Retail Store			
Customers	10 sales per parking space and $50 profit per sale	Parking space is worth $500 per day in sales	$150,000 per year

There should be a continuous effort to move these vehicles out of priority parking areas and convert these spaces into retail customer spaces.

DEMAND, TIME, PRICE AND SUPPLY:
Convert Excess Commercial Parking into Customer Parking

Current policy in the study area allocates priority parking spaces for commercial vehicles. Currently, parking regulations prohibit commercial vehicles in excess of three hours, Monday through Friday from 7 am to 6 pm, unless otherwise posted. Rates for commercial vehicles are $2 for one hour, $5 for two hours and $9 for three hours of parking for loading and unloading. Beginning March 1, 2010, the commercial rate for the first hour increased to $2.50 (New York, 2010).

Some streets in the area allow for customers and visitors to park on street (with parking rates posted). Passenger car rates at muni-meters are $2.50/hour effective March 1, 2010 (New York, 2010).

While data and field observations indicate that parking utilization by commercial vehicles is high in many locations, it also concluded that there are streets in the core that are underutilized and could provide additional parking for retail customers to supplement current on-street customer vehicle parking. In this case, the on-street regulations will need to be adjusted to convert commercial parking into time restricted parking for all vehicles using muni-meters that can create more customer retail parking. At this time, the first criteria for conversion are streets with less than 50% utilization.

LOCATION:
Peripheral Parking

Manhattan is one of the most walkable and transit rich communities in the world. However, it may be possible to develop parking facilities to supplement this walkable environment in locations outside of the core. Peripheral parking employs satellite parking lots located outside of the core and can intercept people before they enter the corridor or the central business district. These facilities may be located within a reasonable walk of the core area or near transit with access to the core area. Many of these programs were implemented in the 1970s and 1980s. Facilities were generally located within 1 mile of the Central Business District and often served by shuttle transit (Kuzmyak, Weinberger, Pratt and Levinson, 2003).

However, results are mixed. A Canadian study concluded that surface parking on the periphery of central business districts in Canadian cities can be counterproductive to achieving higher peak-hour mode splits to the downtown and may encourage unnecessary long-stay parking near downtowns (Morrall and Bolger, 1996). Cities such as Atlanta, San Diego, Minneapolis and Pittsburgh eliminated their peripheral parking programs (Kuzmyak, Weinberger, Pratt and Levinson, 2003; Samsten, 2010).

A more recent report written for the Community Redevelopment Agency of Los Angeles (2007) recommends removal of the peripheral parking program. The Peripheral Parking Policy was developed in 1981 as a way to address concerns that Downtown Los Angeles commercial development would create significant congestion on the circulation system. It required that new office buildings over 1.5 million square feet provide at least 40% of their code required parking at a remote off-site location. Proposals to replace this requirement include elimination of parking requirements or creation of a parking trade program that allows more flexibility in developing parking on-site and sharing parking off-site (Wilbur Smith, Michael Kodama, Urban Solutions, Kumamoto Associates, Rick Williams Consulting and Richard Willson, 2007).

Still, there are successful examples. Many specific development sites have incorporated peripheral parking into their programs ((Kuzmyak, Weinberger, Pratt and Levinson, 2003). This can be included as part of the development or entitlement process. For example, the Glendale Galleria partnered with the Los Angeles Zoo and uses their excess parking in November and December as a satellite parking area. In other cases, the peripheral parking lots can be located at strategic sites to serve many different developments or even an entire commercial business district. This has been successful in Seattle, Washington, which has a peripheral parking lot located on Jackson Street at the outskirts of the downtown Seattle free transit zone.

The key for successful peripheral parking programs is to locate the parking lots in areas with lower land values and uses, yet near to transit that has easy access to the CATS study area. If land is available and affordable, sites can be selected at key locations with access to the study area. It is very difficult to implement these types of programs without public investment and control of off-street parking facilities.

Parking management also includes use of potential parking resources in and out of the study area. It should continue to use policies to

encourage retail customers and employees to park and then ride transit or walk throughout the area. This may include policies that expand walkability and create linkages to parking include "clean and safe" concepts along pedestrian corridors, as well as signage and wayfinding systems designed to direct patrons to their destinations. This can intercept people before they reach the core and reduces cruising for parking in the study area.

LOCATION:
Signage and Wayfinding

Signage and wayfinding support should guide and inform customers and visitors to and from parking areas. This improves the customer parking experience and creates greater efficiencies in circulation and movement, reducing cruising for parking (which can be over 20 minutes in the study area).

Wayfinding systems should be coordinated in the public right of way and at specific parking sites. These systems can also be enhanced by advanced parking information and reservation systems that provide real-time information to users. Display signs may indicate whether levels are open, full or closed or how many spaces are available in real time in locations such as Downtown San Jose, California. However, this may be difficult to implement due to the small to medium sized, privately owned parking facilities common in the study area.

Another concept is to link the wayfinding and signage program to private parking facilities willing to meet certain city signage, appearance and maintenance standards. The City of Los Angeles has proposed developing a public-private coalition of city agencies, parking operators and community representatives to develop and implement a mutually beneficial amenities' rating program that promotes self-regulation and provides marketing incentives (signage, wayfinding and public information) to the private operators to meet city standards (Wilbur Smith Associates, Michael Kodama. Urban Solutions, Kumamoto Associates, Rick Williams Consulting and Richard Willson, 2007).

LOCATION AND PRICE:
Advanced Parking Reservation and Variable Pricing Systems

The City of New York, Department of City Planning also shows location of parking facilities in Manhattan. Parkers in New York City also have available to them a system (e.g. nyc.bestparking.com or iconparkingsystems.com) to compare off-street parking facilities by price and location. Parkers can assess the website and look at data for private parking facilities in New York City. It also offers parking reservations and discounted rates. There are also new information systems that pay Manhattan parkers to identify the availability of on-street parking and pay to use the service (Kaminer, 2010).

Santa Monica, California and Glendale, California have developed similar programs that move towards the integration of pricing with dynamic and real-time parking information that guide users with car navigation systems to specific locations based on traffic and parking data (Fretheim, 2010). These traffic/parking information systems can be transmitted via cell phone, digital displays, or via a webpage. Real-time parking information helps drivers to quickly locate a parking space. These systems reduce traffic congestion and also lower the need for extra parking spaces that serve as a buffer for drivers in search of parking. However, these cities have a different organizational framework than New York City. These cities use a municipal parking operation and control on-street and off-street parking.

An example of a city that has minimal off-street parking facilities in its downtown and is creating an advanced parking reservation system is the Los Angeles. The Los Angeles Downtown "ExpressPark" program uses vehicle sensors in parking spaces, new parking meter technology (pay stations), and a real-time parking guidance system to optimize utilization of curb parking and off-street parking and reduce cruising for parking (City of Los Angeles, 2009). The program will also use a concept similar to New York's PARK Smart, to allow the Los Angeles Department of Transportation to increase or decrease parking meter rates up to 50 percent to achieve a 70% to 90% occupancy in their parking meter zones.

For on-street parking, new systems can interface with existing street parking pay stations (similar to New York muni meters), recording and reporting real-time availability of on-street parking. GIS-based on-street parking systems allow users to interface via the Internet, their vehicle's on-board computer, PDA or mobile phone. For example, Boulder,

Colorado (Jobert, 2010) and Glendale, California (Dombroski, 2010) use this information to manage on-street and off-street parking resources.

Note that some communities are looking at refurbishing older pay station technology. For example, Toronto, Ontario, Vancouver, British Columbia, and Denver, Colorado are refurbishing, retrofitting and upgrading older pay stations similar to those used in New York to match the capabilities of some of the newer pay stations (Mackin, 2010; Precise ParkLink, 2010).

New on-street pay station systems can be integrated into these systems, showing the availability of on-street parking on a map. These new pay station systems also can use variable pricing which have been implemented in Redwood City, California and later this year in Ventura, California (Mericle, 2010) that consider parking utilization and economic vitality as key indicators of parking pricing, with the ability to monitor parking with real-time data and information.

These programs are similar to the New York City PARK Smart Program that has higher meter rates during peak demand times and lower rates at other times. The PARK Smart program is designed to make it easier to park. This is accomplished by having higher meter rates during times with higher demand and to reduce price during times with lower demand. For example, 71 muni-meters in the West Village (Greenwich Village) operated at $3 per hour from 12 pm through 4 pm and $2 per hour during all other hours. During the first six month test period, parking space occupancy declined from 77% to 71% on Tuesdays and from 75% to 69% on Fridays during the noon to 4 pm peak period. Most merchants (57%) and drivers (61%) reported that parking became easier or remained the same as compared with pre-pilot conditions (New York City, Department of Transportation, 2009). This program may be applicable at locations in the study area.

Systems are also under development that allow for parking payments by cellular phones. For example, in Miami, Florida, the Miami Parking Authority has over 8,000 parking spaces suited for pay by phone transactions. Customers call a number and key in the location number (posted on the pay station or on nearby signs) and the amount of parking time desired. In Europe, some communities no longer use parking meters or pay stations, relying exclusively on pay-by-phone technology.

Summary and Conclusion

The City of New York has implemented a variety of programs and projects that have improved the study area. For example, recent efforts include a street management framework for Lower Manhattan (Lethco et al, 2008).

This technical memorandum on parking management is designed to support these achievements. Most importantly, it includes a process that can be used to develop parking management strategies, tools and programs that can support the short term and long term transportation and mobility goals and objectives established for CATS. Specific strategies and recommendations are designed for immediate consideration and potential implementation in a short time frame. Longer term and more specific strategies can be created using the parking data collected in this study.

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