A Street Management Framework for Lower Manhattan: The Downtown of the 21st Century

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Submitted for Presentation and Publication
88th Annual Meeting
Transportation Research Board
Submitted July 31st, 2008

WORD COUNT: 5498 Words + 6 Figures + 2 Tables = 7498 Words

ABSTRACT

Lower Manhattan (LM) is America's fourth-largest central business district and one of the oldest and densest areas in New York City. It is also its fastest growing residential neighborhood and contains some of the highest levels of pedestrian, transit, and vehicular activity in America. Since September 11th, redevelopment has dramatically transformed the area into a vibrant 24/7 live-work-visit community. The changes present an unprecedented opportunity to create a more livable and environmentally sustainable neighborhood by reducing traffic and managing parking, while giving residents and employees better, greener mobility options. Consequently, the City is focused on finding new ways to manage competing demands for different uses of limited street space. Improving street management is paramount to improving the quality of public space and speeding LM's revitalization.

In 2004, the Lower Manhattan Development Corporation (LMDC) funded the New York City Economic Development Corporation (NYCEDC) and the New York City Department of Transportation (NYCDOT) to contract Arup to undertake a multi-year comprehensive planning study to consider ways to reduce traffic congestion, manage placard parking, and create complete streets and engaging public spaces in LM. This paper discusses the necessity for and development of a proposed street management framework to help guide the City in meeting the transportation and public realm needs of LM's residents, employees, tourists, and businesses. As of October 2008, the project is still ongoing and the proposed framework is still conceptual and has not yet been implemented.

ACKNOWLEDGEMENTS

The authors would like to thank the following firms and individuals who have provided extensive support to the overall project. These include: Andrew Salkin, Josh Kraus, Josh Rosenbloom, and Meghann Rowley (NYCDOT); Phil Plotch (LMDC); Joan McDonald, Michael Taylor (NYCEDC); Ken Hausman and Matt Jukes (StumpHausman); Georges Jacquemart, Elena Patarini (BFJ); Umesh Avadhani (B-A Engineering); Rachel Weinberger; and Adam Millard-Ball (Nelson-Nygaard).

We would like to thank our current and former Arup colleagues who have been extensively involved in the project: Andrew Wisdom, Brian Huey, Daniel Peterson, Jonathan Drescher, Josh Sperling, Lawrence Nassivera, Peter Dunn, Olivia Ryan, Thomas McGuire, Tim Bryant, Varanesh Singh, Vincent Riscica, and Zuxuan Deng.

BACKGROUND

Since September 11th, New York City (NYC) has taken great strides towards realizing Mayor Bloomberg's Vision for Lower Manhattan (LM). When the vision was unveiled, the Mayor said "No matter how magnificent the best design for the World Trade Center (WTC) site proves to be, it must be complemented by an equally bold vision for all of LM - a new beginning - that meets the needs of all of New York City and of the entire region. The time has come to restore LM to its rightful place as a center of innovation and make it a 'Downtown for the 21st Century." *(1)* Government incentives were successfully provided for a short time after September 11th to encourage new LM residents and businesses and support the area's redevelopment. Today, streets hum with new construction, and long-range plans for the revitalization of Fulton Street are underway. Baby strollers and dog walkers on Wall Street are a testament to a burgeoning residential community downtown. Soon, all of LM will be able to enjoy the full potential of the East and Hudson Rivers. However, the tremendous growth of LM means new demands on the region's transportation system, especially once the WTC is completed. At the same time, the City is competing to attract more of the world's most innovative firms and individuals. To meet these challenges, LM must offer a secure, sustainable, high-quality urban environment that is accessible to all.

LM is the fourth-largest central business district in the US and one of the oldest and densest areas of New York City. It is also its fastest growing residential neighborhood and contains some of the highest levels of pedestrian, transit, and vehicular activity in America. *(2)* **FIGURE 1** provides a map of LM with key transit stations for reference.

As a result of LM's redevelopment, the New York City Economic Development Corporation (NYCEDC) and the New York City Department of Transportation (NYCDOT) contracted with Arup to undertake a multi-year comprehensive planning study to consider ways to achieve the goals set forth by the Mayor and LM stakeholders. This project was made possible by a grant from the Lower Manhattan Development Corporation (LMDC), which is funded through the U.S. Department of Housing and Urban Development's Community Development Block Grants. The project includes identifying opportunities to reduce traffic congestion, manage parking, and create complete streets and engaging public spaces in LM. As of October 2008, the project is ongoing and the paper covers only a few of the many projects happening in LM.

This paper discusses the necessity for and development of a proposed street management framework to help guide the City in meeting the transportation and public realm needs of LM's residents, employees, tourists, and businesses. The framework is still conceptual and has not yet been implemented. Additional outreach will be necessary to finalize the framework. The paper begins by outlining the existing on-street conditions, summarizes two key data collection projects that quantified the magnitude of the problem, reviews two international cities that have implemented interesting street management techniques, and finally, provides the framework and a method for testing street management measures in LM.

Changes in LM

LM is a place long associated throughout the world with business and commerce. It was the birthplace of the stock market and continues to be the home of the global financial services sector. However, after business hours, it previously lacked activity – streets were empty, businesses were shuttered, and the residential population consisted of a hardy few. Since 2001, LM has changed significantly and is becoming a vibrant live-work-visit community. By 2011, more than 17,000 new residential units, 800,000 square feet of new retail, and 12,500,000 of new Class A commercial space will be available. *(3)* In addition, when the WTC is completed, it will bring another 10,000,000 square feet of office space and 500,000-600,000 square feet of retail space. South Street Seaport and the Battery Maritime Building, both on the East River, will also be undergoing redevelopment and increasing the retail, hotel, and commercial space in the near future. By 2011, it is anticipated that over 70,000 people will LM home and over 350,000 will work there. *(4)*

FIGURE 1 LM map with select transit stations

To compliment the extensive real estate investments, the public sector is supporting new transportation and infrastructure investments. When complete, the Fulton Street Transit Center and the WTC PATH Station will enable more efficient movement of hundreds of thousands of daily commuters by providing connections between six subway stations, twelve subway lines, and the PATH trains to/from New Jersey. The East River Waterfront project will extend Hudson River Park's west side bike and pedestrian greenway around the Battery north along the East River. This will provide access to the waterfront, create a green necklace around LM, and provide a new multimodal boulevard along LM's east side. Fulton Street's reconstruction will create a pedestrian friendly thoroughfare, with streetscape improvements and public spaces, which will greatly improve the east/west connection between the East and Hudson Rivers.

With the multitude of changes to develop a 24/7 community, people will be able to use alternative forms of transportation to experience this new center of sustainability. These realities present an unprecedented opportunity to create a more livable and environmentally sustainable LM by reducing traffic, managing placard parking, and optimizing delivery access while giving pedestrians better, greener spaces. Thus LM can demonstrate globally how streets, complemented with a robust urban design plan and an expanded transit network, can weave the dense urban fabric into a greater whole and make it one of the world's most unique, vibrant, and sustainable urban districts.

ISSUES AFFECTING LM STREET MANAGEMENT

Existing Conditions

LM is unlike most American central business districts or even others in the metropolitan area such as Midtown. In comparison, its tall buildings, dense land use, quantity of tourist destinations, and narrow streets and sidewalks help to create a unique sense of place, but also result in high congestion, friction between vehicles and pedestrians, dark streets with little natural light, and little dedicated green space. Because of this, the street system must serve a dual purpose – streets move vehicles and pedestrians while also serving as the majority of public space. The high amount of ongoing construction activity also adds another challenge to street management.

Consequently, the City is identifying new policies and focusing on finding new ways to manage the competing demands of different uses for the limited street space. Improving the management of these streets is paramount to improving the quality of the public space and speeding the revitalization of LM. Reprioritizing the allocation of street space to include pedestrians, greener open space, and a more attractive public realm will help to differentiate LM as the Downtown of the 21st Century.

From a pedestrian perspective, 350,000 people use transit daily to directly access or travel through LM, including 65,000 commuters on the Staten Island Ferry. *(5)* Annually, 5.9 million tourists visit the area to see the WTC site, Wall Street, the New York Stock Exchange, and other key tourist attractions. *(6)* Combined, this places many pedestrians on LM's streets every day, especially during the midday period. Vendors, pedestrians, and street furniture must share the narrow sidewalks, which present serious limitations to mobility and overall livability in the area. During the afternoon peak period, waiting bus passengers and other pedestrians collide to create numerous bottlenecks on sidewalks and at crosswalks. In many instances, pedestrians walk on the street, as the sidewalks are overcrowded. **FIGURE 2** shows a typical sidewalk in LM.

For drivers, there is a strong desire to park close to building access points. Further, because of the density, most buildings are not equipped with adequate off-street parking and loading/unloading areas. As a result, there is large amount of curbside activity attributed to double-parked cars, taxis and delivery vehicles on top of the regular on-street parking and bus activity.

The streets and sidewalks of LM are a valuable public asset where different user groups compete for limited road space. With the disparity of land uses and user groups, public space will be used differently at different times of day. Street management practice should reflect these differences – streets

whose capacity is needed for mobility in peak hours can be used for commercial loading, or resident parking during off-peak periods.

FIGURE 2 Example of crowded sidewalks in LM

As part of the study, the team has undertaken a range of projects to assess existing conditions and issues affecting the City's ability to manage LM's streets. These issues include:

- Congested sidewalks and pedestrian areas;
- Conflicts between pedestrians and vehicles;
- Limited green public space;
- Difficult East River waterfront access;
- Parking – double parking, parking in crosswalks/bus stops, few available on-street spaces;
- Congested streets

Specifically, two studies on on-street parking, placards and bus layover space, and their impacts on pedestrian facilities, traffic movement, and overall mobility and access were conducted to quantify the impacts on street activity in LM. These analyses are outlined below.

Placard Parking *(7)*

Competition for high value on-street parking negatively impacts streets and sidewalk capacity. On any given day, commercial vehicles making deliveries, construction vehicles at job sites, public and private employees, and city agencies' fleets are all competing for limited on-street parking. The constant circulation and illegal parking drastically impacts the public realm. Pedestrians are besieged, public space is diminished, and friction between all road users is increased.

This is not abnormal in urban areas, except that a significant portion of LM's curb space is allocated to authorized users – vehicles with placards or permits in their windshield allowing them to park in designated areas. An example of a placard is shown in **FIGURE 3**. An earlier City study estimated that there are 142,000 parking permits in circulation, given free to government employees. *(8)* LM stakeholders perceived the quantity of placards to be excessive and that their existence impeded the use by other legitimate users.

FIGURE 3 Example of a placard in LM.

To quantify problem, the Team surveyed and analyzed on-street parking south of Canal Street. Additionally, a second goal of the study was to gather data to support future planning and policy decisions. Initially, to understand parking supply, a base map of existing parking spaces and corresponding regulations was developed using NYCDOT's STATUS application, a comprehensive database of all city curb regulations. To understand parking demand, a survey was conducted from September 19th – November 15th, 2006 and entailed the survey of every blockface over two consecutive days between 7am – 9pm. Detailed data was collected on every parked or double-parked vehicle.

The map in **FIGURE 4** summarizes the extent of placard parking, in vehicle-hours, between 7AM – 9PM. A vehicle hour is one vehicle parked for one hour; thus one vehicle parking for three hours equals three vehicle hours. From the map, it is clear that the majority of streets in Chinatown (northeast corner), TriBeCa (northwest corner), and the Financial District are heavily inundated with placards and there is little curb space remaining for other users.

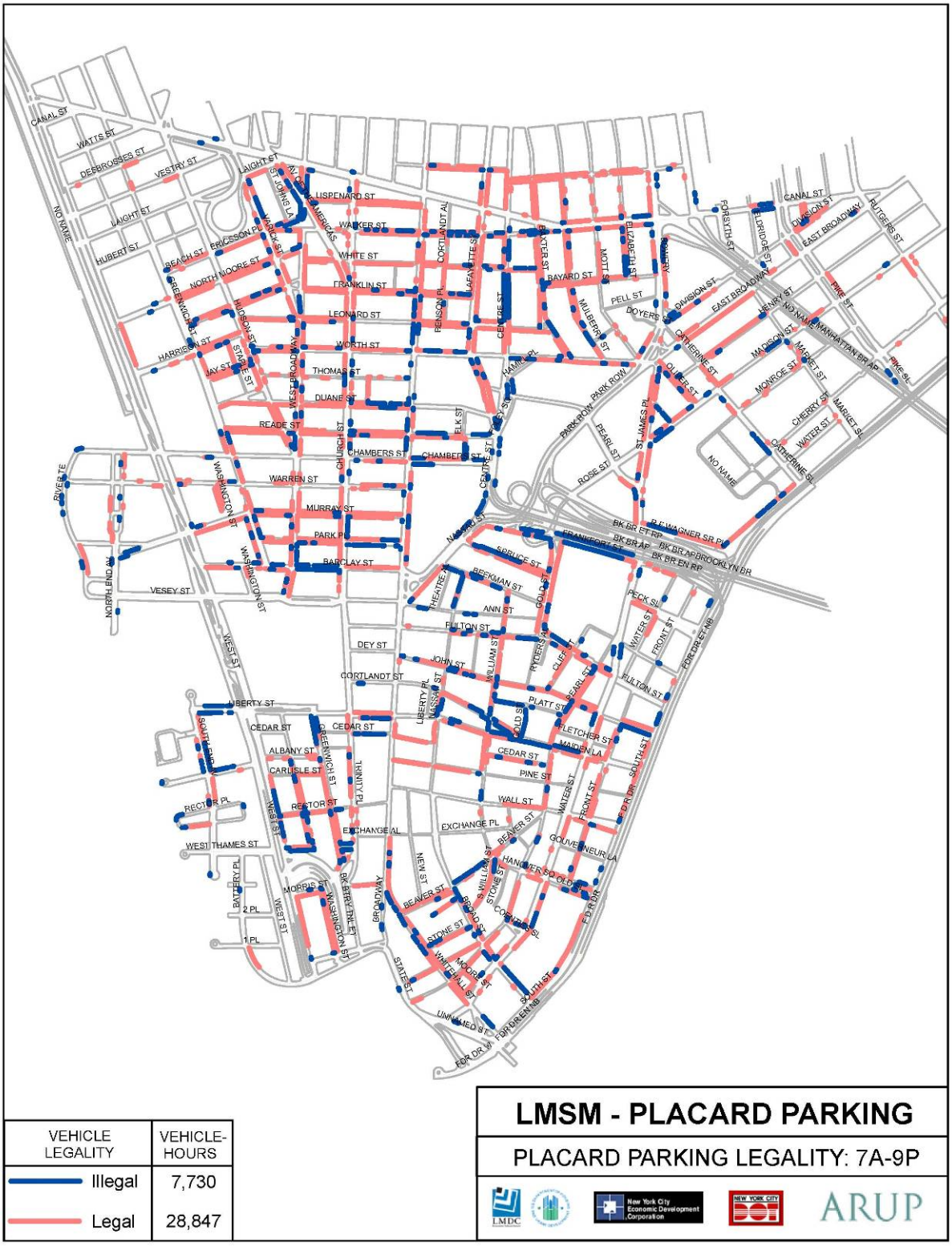

FIGURE 4 Extent of legal and illegal placard parking in LM.

Below are some highlights that further show the extent of placard parking and its impact on overall street management in LM:

- 93% of all legal on-street parking spaces are occupied between 9AM-5PM;
- Nearly 13% of placard vehicles were illegally parked at a bus stop, crosswalk, fire hydrant, driveway, or were double-parked;
- Vehicles with agency and law enforcement placards plus marked official vehicles comprised 43% of vehicle-hours from 9AM-5PM;
- Vehicles with agency and law enforcement placards use 49% more spaces than are allocated to them between 9AM-5PM;
- 9% of placards were fake;
- 22% of loading zones were used by placard vehicles, removing them from commercial use; and
- 18% of metered spaces were used by placard vehicles, removing them from use by the general public.

The results demonstrate a fully saturated parking environment in LM. There is a clear domino effect as to how excessive placards affects not only other placard users, but also commercial vehicles, the general public, and ultimately, pedestrians, bicyclists, and bus passengers. For example, typically, as there are almost no available legal spaces, drivers park wherever they can. Placard vehicles end up parking in areas intended for others. When the legal spaces are exhausted, if a driver has a non-restrictive placard, s/he can legally park in spaces meant for commercial loading/unloading or the general public. This pushes other drivers to circle needlessly for a space or park illegally in No Standing spaces, double parking, crosswalks, and bus stops, impeding and causing friction with pedestrians, bicyclists, bus passengers, and existing traffic. The results of this study indicate that placard parking has a significant impact on the effective use of streets.

On-Street Bus Layover and Storage *(9)*

In addition to local New York City Transit buses, a variety of public and private express, commuter, tourist, intercity, and casino buses also serve LM. These provide a significant level of service to the various employees, tourists, and residents in LM. For example, about 10% of LM commuters are served by buses. With future population increases and the variability is gasoline prices, the demand for public transit, especially buses, is expected to increase. While increasing public transit use supports the City's desire to reduce congestion and minimize single-occupancy vehicles entering LM, problems ensue because of the variability in operating conditions, management practices, and layover/storage requirements for each bus type. For example, commuter and express buses drop off passengers in the morning and pick up passengers in the evening with no service in between. Therefore, these buses require interim layover space, preferably near their next route's origin. On the other hand, tour and charter buses have irregular schedules and routes and therefore, typically park near their destination. Consequently, there is no one size fits all approach for resolving bus parking issues.

Currently, many of the buses use South Street, under the FDR Drive and along the East River as layover space, as shown in **FIGURE 5**. The East River Waterfront project requires that all 92 spaces currently used for bus layovers be relocated. Additionally, other charter and intercity buses park in Chinatown, a highly dense commercial and residential area. Still other buses find first-come first-serve spaces throughout LM. There is some NYCDOT regulated on-street bus parking in LM; however, supply greatly exceeds demand. This is also further complicated by the placard parking issue described above.

Requiring that buses return to their depots for layovers, often in New Jersey or the outer boroughs, creates environmental and traffic concerns. Additionally, as the buses are serving the interests of LM, the City feels strongly that the issue should not be exported to other neighborhoods. Therefore, finding space within LM is a priority for policy makers. A standalone facility is a under consideration, but

that is a long-term solution. An interim solution is critical. The methodology for finding these locations should be incorporated into the greater street management framework such that a balance can be achieved between bus layover areas, the public realm, the environment for pedestrians and bicyclists, commercial needs, and general traffic operations.

FIGURE 5 Existing bus layover/storage on South Street under the FDR Drive.

CASE STUDIES

There are a number of innovative international examples that have successfully undertaken street management projects. The Team reviewed Copenhagen to demonstrate the comprehensive planning efforts and longevity of the process necessary to create a world class, economically viable, pedestrian focused urban center. London was selected to highlight its Red Routes program, which enabled vast improvements in traffic flows and bus service, while also supporting improvements in pedestrian movement.

Copenhagen, Denmark – *Strøget*

In the early 1960's, there was concern in Copenhagen that private vehicles were taking over the city. To ensure that the city would not be completely overrun, city officials created *Strøget*, an entirely car-free pedestrian shopping area. *Strøget* remains as Europe's largest pedestrian-exclusive area and a model for urban areas worldwide. Initially, storeowners feared that businesses would not be able to compete with stores outside of the zone and citizens would protest because of Denmark's harsh winter climate. However, the initial implementation of the car-free zone increased retail sales by 30% while decreasing air and noise pollution. *(10)* Following the creation of the car-free zone, the city expanded the area of *Strøget* and began reclaiming public plazas by decreasing the quantity of parking by 2-3% per year. *(11)*

Copenhagen's plan to preserve its public spaces occurred in conjunction with other plans to improve city life for pedestrians and cyclists. The 1947 "Finger Plan" helped contain development to the areas surrounding rail corridors that extended from the city center. This helped preserve public spaces within the city by giving residents living outside city limits alternative transportation options. In addition, heavy focus was put on improving bicycle and pedestrian facilities; placing bicycle lanes rather than curbside parking adjacent to sidewalks and expanding the bicycle network by over 62% between 1950 and 1995. Combined, these policies and the necessary long-term dedication to them by both city officials

and the general public helped to increase pedestrian space in the city center by six times from the 1950's. *(12)*

London, United Kingdom – Red Routes

Since its inception in 1994, the Priority (Red) Route Network program has improved roadway safety for bicyclists and pedestrians, reduced traffic delays related to congestion and enhanced bus service. This occurred by prohibiting curbside vehicle stopping in strategic retail areas. Despite reducing parking availability in these areas, the percentage of illegally parked cars has dropped from 86% to 23% and 75% of vehicles park within one minute of beginning their search for a parking space. *(13)* Red Routes roadways were made safer as well as those that have been in operation for at least 24 months (as of the 2000 survey) had a 6.4% decrease in accidents. In comparison, accidents in all of London increased by 0.6% during that same time period. Additionally, accidents involving pedestrians declined by 9.2% and those involving cyclists were down 8.4%. *(14)*

Red Routes have also successfully addressed congestion issues, both for private vehicles and public transit. Prior to their inception in 1994, the average journey speeds were between 14.3 and 18.4 mph. In 2000, average speeds on those same roads, now with Red Routes, increased 20% to 19.6 – 23 mph. *(15)* Public transit has also reaped the benefits, with bus travel times 10% faster and 27% more reliable from 1994-2000. This has led to increases in public transport ridership. *(16)*

DEVELOPING AND TESTING A STREET MANAGEMENT FRAMEWORK

Streets are the backbone of LM's transportation system, but they are also public spaces for residents, workers, and visitors in LM. Ultimately, it can be argued that ineffectively using curb space as shown above directly and negatively impacts the ability of LM to create a vibrant, 24/7 neighborhood for all users. By better managing the streets and rationalizing how streets are utilized, traffic flows can be improved, pedestrian areas can be expanded, and overall LM can be redeveloped as the Downtown for the 21st Century.

As part of the City's comprehensive planning study, the Team developed a street management framework to create a structure to classify streets types. In addition, the team developed an extensive microsimulation traffic model of LM, which can test the framework to ascertain impacts of modifying the street network. This will enable the City to move forward on a variety of pilot and permanent projects across LM.

Testing a Street Management Framework *(17)*

The Team developed a framework to help guide the City's future management of streets in LM. Initially, the team collected and analyzed vision statements and goals produced by stakeholders and civic agencies in response to September 11th. The Team interviewed key stakeholders to further understand how their goals could be met. This resulted in an overall summary of the major themes for LM. Stakeholders universally agreed that the global competitiveness of LM as a place to live, work, and visit is fundamentally tied to transit access and pedestrian circulation and to the quality of its public spaces. Therefore, the management of the street system needed to reflect this. Agency involvement culminated in a charrette to focus the project's efforts and gain buy-in from agencies as the street management strategy and pilot programs were developed.

A street management framework is a way of classifying different street types based on how they carry pedestrian and vehicular traffic and how they function as public spaces. It proposes how streets could operate more effectively in the future across all modes, not to make improvements for one mode over another or provide extreme tactics to control on-street behavior. The framework also forms a basis for developing measures to help streets function as they should and ensure that these measures are implemented in a coordinated way. Goals can be set for street performance for each type and measured to understand the impacts, improvements, and possible need for modifications.

Street classification systems exist from the American Association of State Highway and Transportation Officials (AASHTO) or as a component of context sensitive solutions and complete streets. Historically, AASHTO's classification system has primarily focused on assigning geometric design criteria to various street types to ensure the safe and effective operation of vehicular traffic. The AASHTO system minimally addresses other users and does not take into account streets' ability to be public spaces. Because these aspects are integral to redeveloping LM, our street management framework was developed based on the underlying concepts of complete streets and context sensitive design. Both recognize the importance of creating safe and convenient streets for all users and the need for streets to be considered as part of public realm. They also highlight the importance of creating of a connected network of streets, not just a few key thoroughfares. Our work for LM utilized the background behind both concepts, such that streets function effectively across all modes and the public experience was considered. However, the project has not yet undertaken design for each street type at the level addressed by context sensitive design and complete streets.

The street management framework assessed every block south of Canal Street and assigned each to one of the defined five street types: Access, Through, Activity, Residential, or Support. **FIGURE 6** shows all of the streets based on their type.

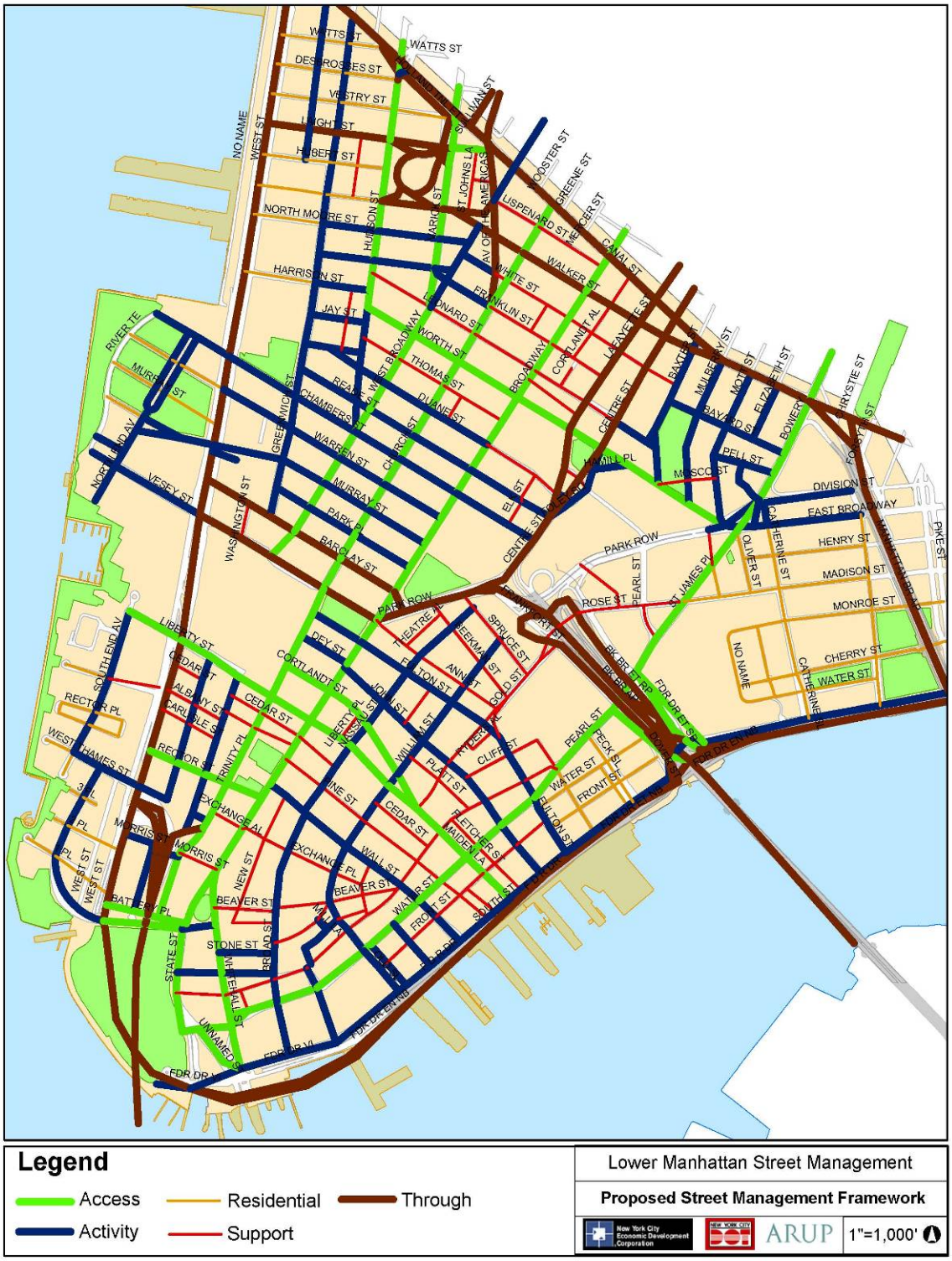

FIGURE 6 Proposed street management framework for LM.

Definitions for each street management type were created as follows:

- Access: Serve the major traffic and bus movements to LM. These are high capacity multilane surface streets that are suited to carry the volumes of traffic bound for the area and include Broadway, Church Street, and Water Street. The primary emphasis on access streets is to move vehicles, including buses, while still supporting pedestrian movement.
- Through: Similar to access streets, except that through streets serve the major traffic and bus movements traveling through the area. These are mainly the regional peripheral highways that carry trips that neither begin nor end in LM. Examples include the FDR Drive, Canal Street, and West Street/West Side Highway. Like access streets, the primary emphasis on through streets is to move vehicles, including buses, while still supporting pedestrian movement.
- Activity: Comprised of places where LM "lives" – large volumes of pedestrians congregate to work, shop, socialize, and access subway stations. There are varying levels of commercial access and local vehicle traffic. The system of activity streets is understandable, rational and connected to systems of vehicular and transit access. Examples include Nassau, Fulton, Chambers, and Greenwich Streets.
- Support: "Back streets" of LM, which are designated for delivery and pick-up, loading, and entry to parking lots. Examples include the narrow east-west streets of the Financial District.
- Residential: Streets where the main adjacent land use is housing. The focus is pedestrian activity and safety and residential needs. Areas with an abundance of residential streets include Chinatown, TriBeCa, and Battery Park City.

While certain typologies imply a focus on particular modes, in fact, a robust typology should address all potential users on each type of street. For example, while access streets may focus on transit and taxi throughput to a greater extent than support streets, their management strategy should still recognize the importance of improving pedestrian safety and comfort. This is especially important as access streets are major bus corridors and therefore attract throngs of pedestrians during peak periods. In fact, the proposed typology focuses on improving pedestrian conditions across all street types and only focuses improvements for vehicles on access, through and support streets. These relationships are shown in greater detail in **TABLE 1**, which describes the management priorities for each type of street for each mode.

TABLE 1 Matrix of Street Types and Recommended Actions, By Mode

Street type	Pedestrians	Taxis and Black cars	Trucks	Private vehicles	Transit	Cyclists
Access and Through streets	• Improve quality and safety of ped environment. • Widen sidewalks and crosswalks where warranted, especially at transit nodes.	• Through and destination traffic. • Taxi circulation routes, if not restricted.	• Through and local truck routes.	• Through and destination private vehicles use. • Explore access control measures to limit private vehicle use in LM	• Bus routes. • Physical and operational BRT measures used.	• Cyclists should use these streets. • No bike lanes except where traffic poses safety problems for cyclists.
Activity streets	• Improve quality and safety of ped environment. • Prioritize ped movement/ LOS over vehicle movement/LOS. • At certain times, create ped-only zones.	• Taxis should not load, unload, or cruise. • Black cars may make pickups in limited loading zones.	• Trucks may be restricted by time/ day or outright.	• No through traffic. • No peak period street parking or loading/ unloading. • May restrict private vehicles by time/day or outright.	• Geometry prevents buses from using these streets.	• Bikes may use these streets, though peds have priority. • "Dismount" rules may be used on pedestrianized streets.
Support streets	• Improve quality and safety of ped environment. • Address poor sightlines, inadequate sidewalk space, and ped visibility around loading and parking areas.	• Taxi stands and black car layover areas. • No cruising. • Black cars may load or unload.	• Loading and unloading zones are located on these streets. • These streets may form truck links between access streets and final destinations.	• No through traffic. • Targeted loading/ unloading zones • Parking lots entrances/ exits. • Links between access streets and parking.	• Geometry prevents buses from using these streets.	• Bikes allowed, but streets not designed/ redesigned around cycling.
Residential Streets	• Improve quality and safety of the ped environment. • Prioritize ped movement/LOS over vehicle movement/LOS.	• No cruising • Loading/ unloading permitted in front of residential buildings.	• Not used unless destination on street (i.e., deliveries to residences)	• No through traffic. • Use traffic calming to maintain low traffic volumes and speeds. • Resident parking only	• No buses. • Street design should ensure safe, convenient walking conditions to nearby bus and subway stops.	• Bike lanes may be considered where street dimensions allow. • Low volume and speeds benefit cyclists.

Creating a framework does not mean that the same management measures are applied to every street within a type. Instead, a menu or toolkit of management, operational, and physical measures can be outlined and pilot projects can be created to test various single or groups of measures. Examples of potential pilot projects and subsequent lessons learned are listed in **TABLE 2**.

TABLE 2 Example of Street Management Pilot Projects and Lessons Learned

Project	Purpose	Outcomes
Signal timing changes on Church Street (Access) near World Trade Center	Tests whether pedestrian conditions can be improved without harming traffic throughput on an access street	Improved pedestrian environment observed, so signal timing plan implemented
Parking management on Chambers Street (Activity) to support short-term construction maintenance and protection of traffic	Tests tactics to keep permit parking off activity streets where high-turnover retail parking is more appropriate	Placard parking was shown to be a major issue. This led to the placard parking studies.
Institute different access route to the New York Stock Exchange at different times of the day due to the mixed uses on surrounding blocks	Tests how delivery operations can adjust to obeying different rules at different times of day and how signage can be used to inform drivers	New access routes have been implemented.
Siting, installation and promotion of a "catch a cab" booth in LM to make taxi service more predictable and reliable	Tests opportunities to create a win-win situation by bringing together taxi passengers and drivers in a rational way	Opportunities exist to develop cab stands in key LM locations.

Testing a Street Management Framework – Next Steps *(18)*

To support the City in effectively managing LM's streets, a microsimulation traffic model for all of LM south of Worth Street was created. It is valid for the morning peak (7:00 – 9:00 AM) and evening peak (4:00 – 6:00 PM). An extensive data collection effort was conducted from 2003-2007 to populate and validate the model.

The overall objective of the model is to enable the City to assess the impacts of various activities on LM's road network operations. The model can compile network measures of effectiveness such as levels of service (LOS), speeds, delay based on any changes or scenarios. This will aid the City in creating traffic management plans to mitigate any potential negative impacts. At this time, the model has been used mainly to test various traffic operations, such as road closings unrelated to the street management framework.

However, for the street management framework, scenarios could be developed with a range of options to ensure a comprehensive and robust plan for LM. Using the model, the various scenarios could be tested by street type, by neighborhood, or for LM as a whole in order to understand each scenario's impacts. Some types of scenarios could include, but are not limited to the following:

- Closing roads or individual travel lanes by time or permanently for construction, security, or public realm benefits;
- Changing travel lanes into bus lanes during peak times, days, or permanently;
- Narrowing the width of streets' cross sections dedicated to vehicular travel in order to accommodate more public space, bus lanes, or alternative transport;
- Adding/removing parking lanes during peak periods or permanently; and
- Tracking the impact of multiple changes to the road network over time on traffic operations.

While the use of the model to evaluate these scenarios is still preliminary, any model results alone should not eliminate the scenarios from consideration or public discussion. Depending on the outcomes

from the model, modifications could be made to the scenarios to improve the results. Additionally, as each scenario would have a range of options as to how they could be implemented, the model outputs could inform the public discussion, along with more qualitative benefits and concerns. From there, additional pilot projects could be established or a more comprehensive set of implementable projects could be developed to truly impact LM's existing street system.

CONCLUSION

With the massive development occurring in LM, it is clear that reverting to the congested, vehicle-focused, pre-2001 streets is counter to creating a 24/7 live/work/play community. While streets are the backbone of LM's transportation system, they also comprise the public space that serves a variety of roles for residents, workers, and visitors in the area. Moving forward, the area is rife with opportunities to redefine how all users view and experience LM's streets and public spaces.

From a policy perspective, the City is ready for change and decision makers recognize that transportation is the greatest single barrier to making their vision for LM a reality. From the Mayor's bold and far-reaching *PlaNYC2030* came the challenge of congestion charging that, while ultimately unsuccessful, began the conversations at all levels as to how to change existing travel behaviors. NYCDOT is working to create implementable policies focused on mobility and reducing our carbon footprint, while still ensuring improvements in residents' overall quality of life. Combined, this sets forth long-term strategies to be followed by specific policies, plans, and implementable projects.

Changes are happening. In early 2008, the Mayor transformed placard parking policy, reducing placards by at least 20%. He also placed the Police and Department of Transportation in charge of issuing, managing, and monitoring placards. NYCDOT is currently assessing sites to support bus layover and daily storage needs. However, while these policies are a step in the right direction, in order to meet the goals of LM, they need to be positioned against a more comprehensive plan for street management.

As of October 2008, the LM Street Management Study was still ongoing and the street management framework remains conceptual. Additional outreach will be necessary to finalize the framework. The Team continues to work with the City to find opportunities to test the framework. Classifying streets based on how they could carry traffic and function as public spaces will support reprioritizing the allocation of the LM's limited space. This will better accommodate pedestrians and provide green space and an attractive public realm that will enable LM to differentiate itself as the Downtown of the 21st Century.

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