The Gates

Traffic Impact and Analysis

New York City
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Summary of Program

In February 2005, *The Gates, Project for Central Park, 1979-2005* was on view in Central Park. This temporary public art work by artists Christo and Jean-Claude, consisted of 7,500 gates bearing saffron-colored fabric panels, lining 23 miles of pedestrian paths in Central Park. The exhibit was formally on display for a sixteen day period between February 12th and February 27th, 2005.

Working with the Central Park Conservancy, numerous public and private entities and city agencies worked together to ensure that the maintenance and management of the park was not disturbed and the logistical challenges were met. The New York City Department of Transportation played a critical role in this process, assisting in minimizing the impacts on the City, the Park and its users during the entire project.

The Gates required the full closure of the Central Park Drives for the setup and dismantling of the exhibit both prior to and after the exhibit, and the partial closure of the Park Drives during the two-week exhibit.

This report documents the traffic impacts associated with the closures of the park drives during the Christo exhibit.

Summary of Findings

- Overall, there were significant increases in volume on most roadways in the vicinity of the park.

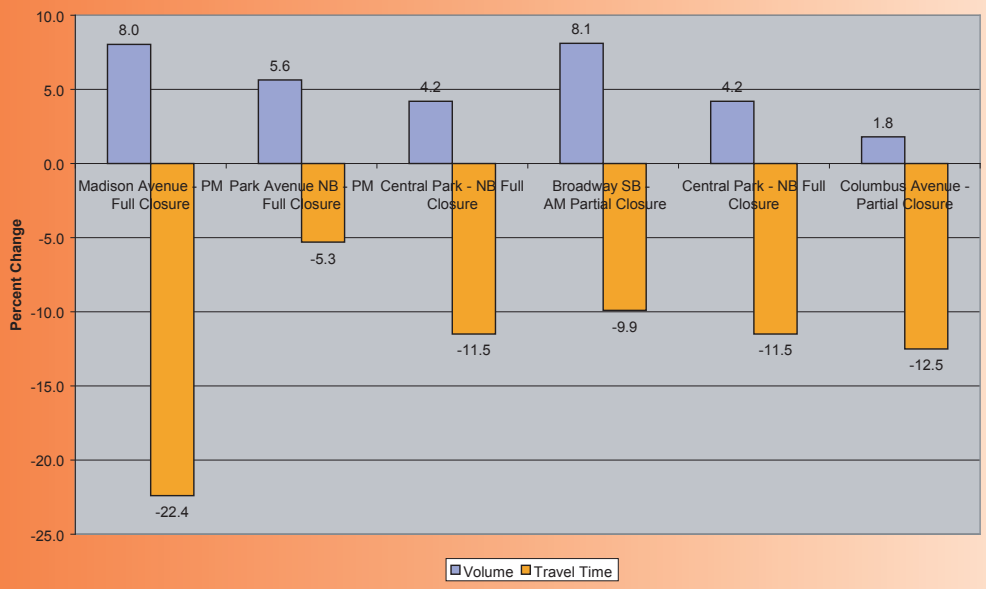
- The impacts were more widespread during the full closure of the park drives and more concentrated on roadways adjacent to the park during the partial closure (i.e. peak period/off-peak direction).

- The full closure had a greater impact in the AM peak period (7-10 AM), while the partial closure had a greater impact in the PM peak period (4-7PM). This can be attributed to the full closure having more of an effect on commuting patterns (particularly with the West Drive being closed).

- Despite the significant increases in vehicular volumes, the city's Traffic Management Program helped to minimize vehicular travel time delays. We believe this was primarily attributed to roadway capacity improvements achieved through the extensive construction embargo supplemented by the large deployment of traffic officers.

- The graph below depicts volumes and travel times at selected locations/ corridors. In general, when volumes increase, travel times also increase and travel speeds decrease. However at the locations depicted in the figure below, this did not occur as travel times decreased despite the increases in volume.

Percent Change in Volume and Travel Times
Selected Locations and Times

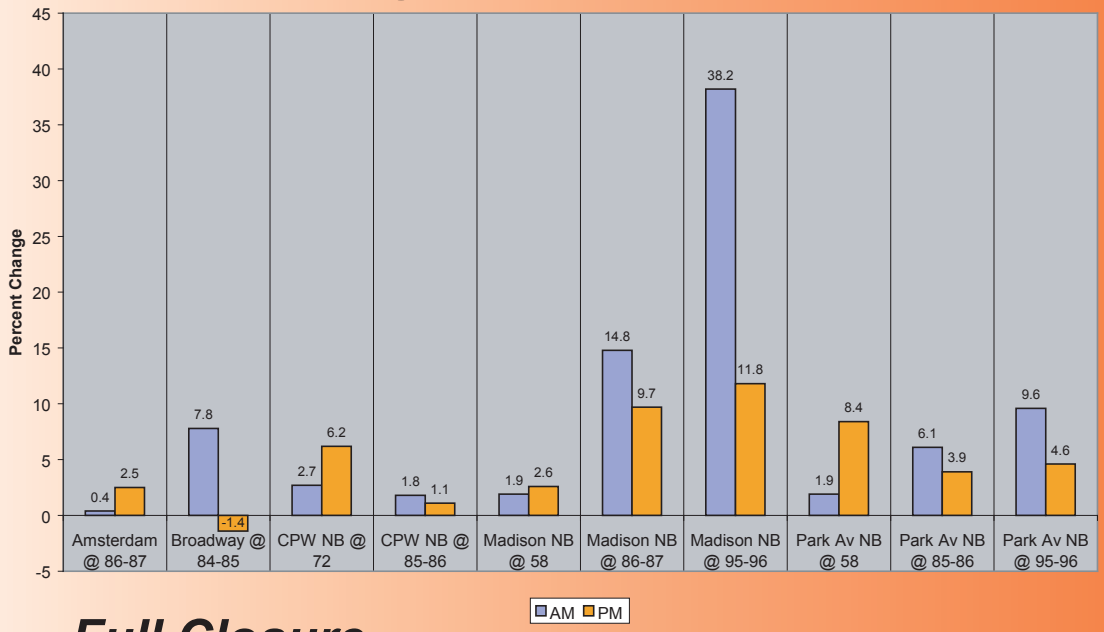


Scenario 1: Full Closure of the Park Drives

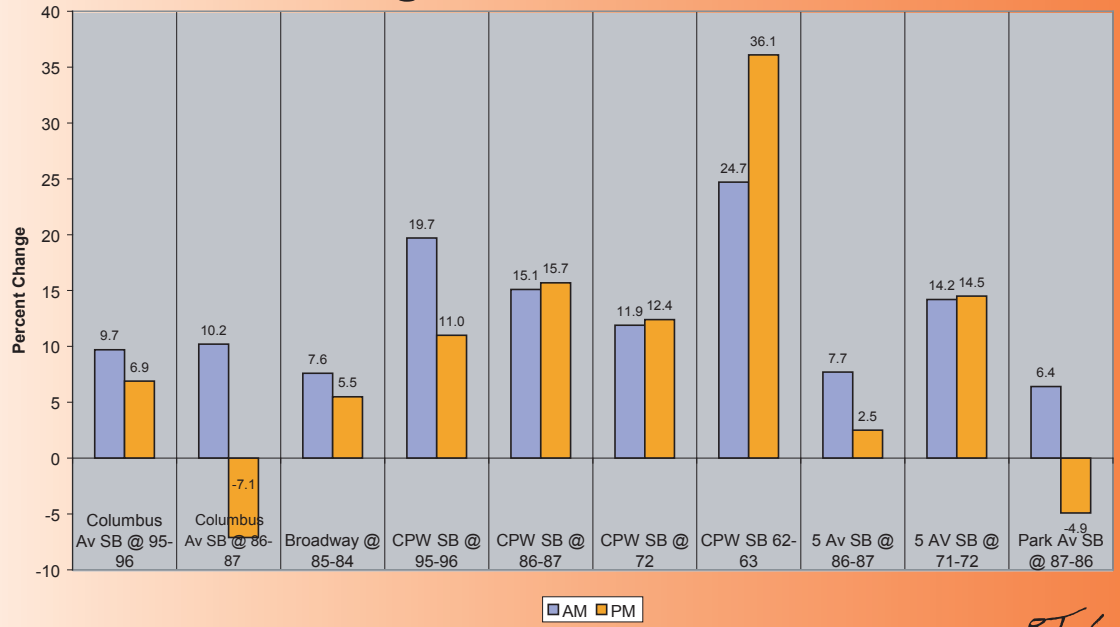
Vehicle Volumes

- Overall, all northbound and southbound locations exhibited increases in the AM peak period, and seventeen of the twenty locations exhibited volume increases in the PM peak period.

Full Closure
Vehicle Volumes Northbound Roadways
Percent Change vs. Before Conditions



Full Closure
Vehicle Volumes Southbound Roadways
Percent Change vs. Before Conditions



- The most widespread impacts occurred on the southbound roadways where six locations in the AM peak period and five locations in the PM peak period exhibited increases of over 10% as compared to the northbound roadways where only two locations in the AM peak period and one location in the PM peak period exhibited increases in volume.

- The most significant increases in volume on southbound roadways were on Central Park West at 62nd Street (+24.7% in the AM and +36.1% in the PM peak period) and Fifth Avenue at West 71st Street (+14.2% in the AM and 14.5% in the PM peak period) which were used as alternate routes to the park drives.

- In the northbound direction, there were significant increases on Madison Avenue, particularly in the AM peak period (38.2% at 95th Street and 14.8% at 86th Street), as this was used as an alternate northbound route to the East Drive, which was closed north of 72nd Street.

- The east/west corridors generally experienced increases in volume as motorists used these roadways to access alternate routes. Some of the most significant impacts occurred on the 65th Street corridor which exhibited increases of over 25% in the westbound direction and over 20% in the eastbound direction during both the AM and PM peak periods.

- Eastbound East 72nd Street between Fifth and Madison Avenues showed significant increases in both the AM and PM peak periods (35.2% and 28.7%, respectively) as motorists were forced to exit the East Drive at East 72nd Street.

- Eastbound and westbound 110th Street in the AM peak and Westbound 59th Street in the PM peak showed significant increases, particularly as motorists were unable to access the park drives and utilized alternate routes.

- There were significant decreases on westbound 72nd Street at Fifth Avenue as motorists were no longer able to access the Park Drives at the East 72nd Street entrance.

Travel Time/Speed

- All five southbound roadways surveyed exhibited travel time increases during the AM peak period. All of these roadways, with the exception of Broadway, showed increases of over 10%.

- The most significant increases occurred on the east side of the Park, with Fifth Avenue travel times increasing by 19.2% and Park Avenue travel time increasing by 25.6%.

- Speed reductions were more pronounced on southbound roadways south of 72nd Street.

- Dramatic decreases in speed occurred on Central Park West between 79th and 65th Streets as speed decreased by 70% in the AM peak period and by 56% in the PM peak period.

- There was an overall improvement in travel times in the PM peak period. Northbound roadways generally exhibited improvement. Eastbound and westbound travel times exhibited improvement or remained relatively unchanged with the exception of westbound 85th Street in the AM peak period.

Scenario 2: Off-Peak Closures of the Park Drives During the Peak Travel Period

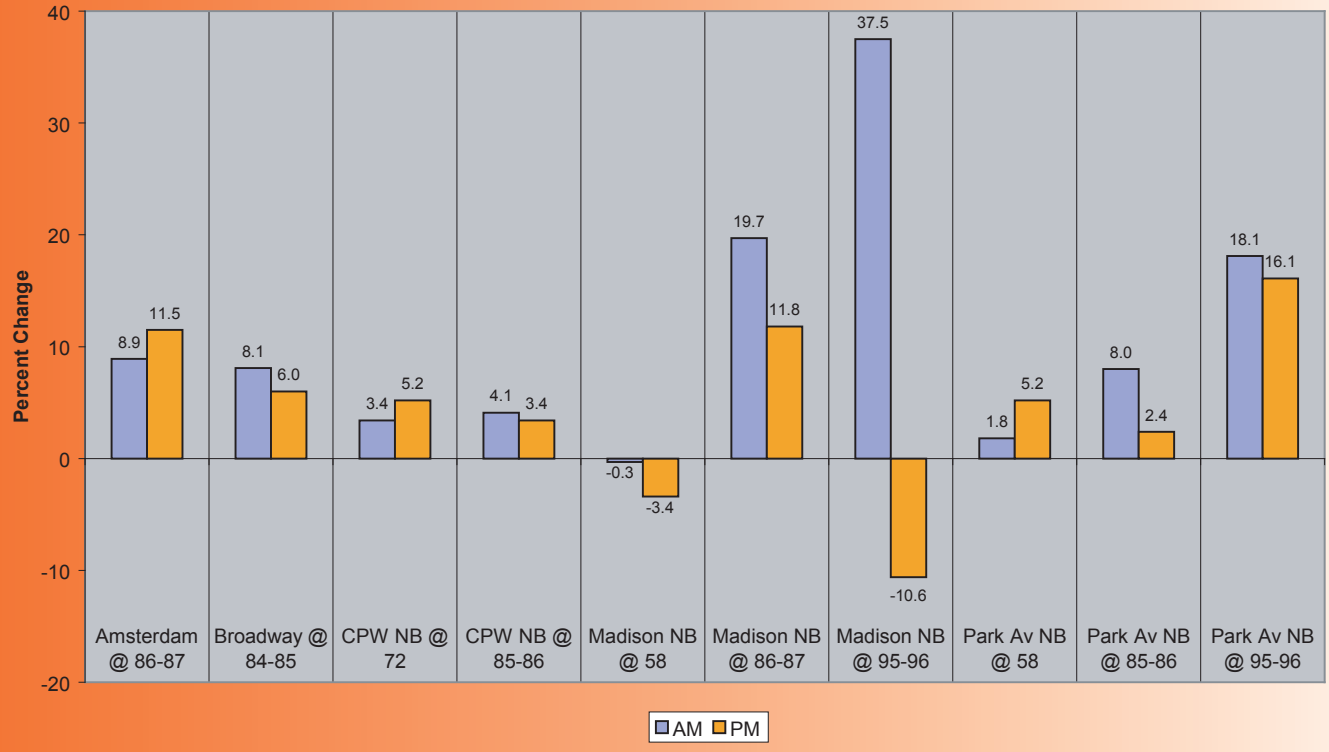
Vehicle Volumes

- In the AM peak period, nine of the northbound roadways and seven of the southbound roadways exhibited increases. In the PM peak period, eight of the northbound roadways and six of the southbound roadways exhibited increases.

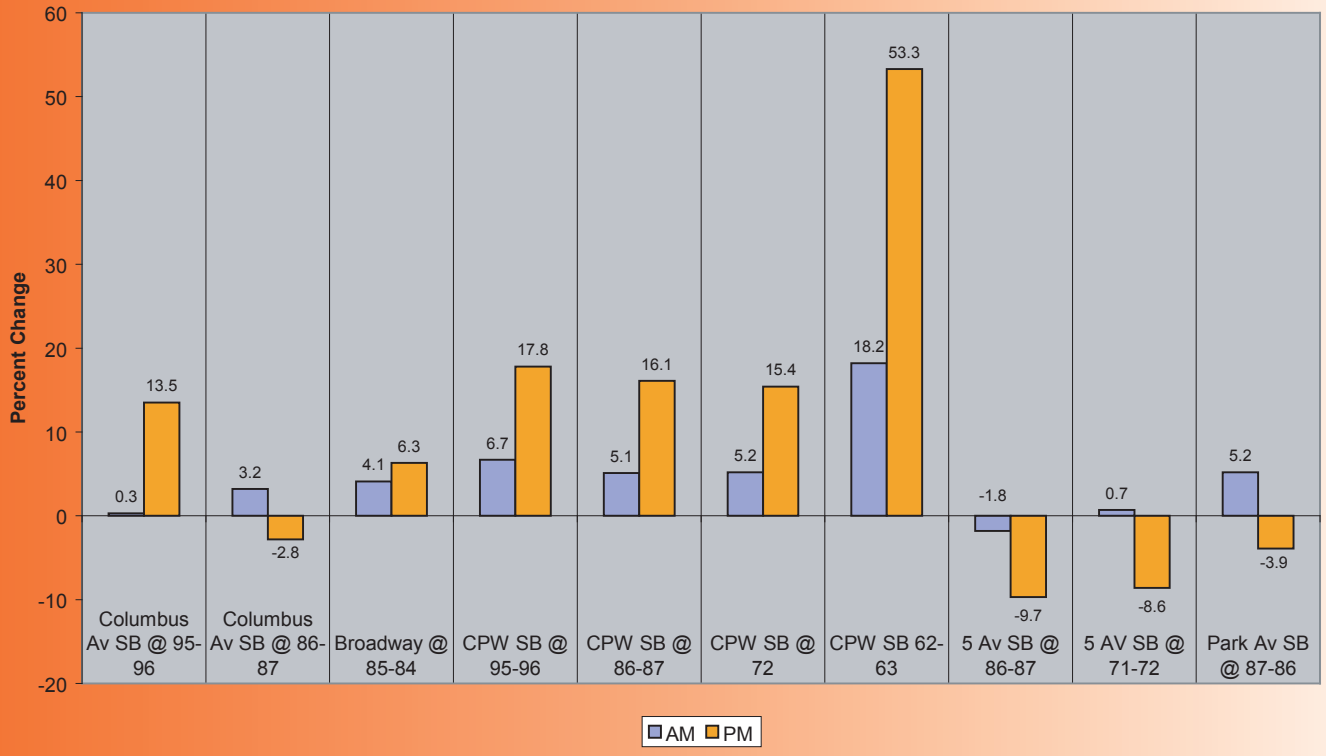
- The impacts were more significant on northbound and southbound roadways immediately adjacent to the park and were concentrated in the PM peak period.

- The most dramatic impacts occurred on Central Park West and Fifth Avenue.

Partial Closure
Vehicle Volumes Northbound Roadways
Percent Change vs. Before Conditions



Partial Closure
Vehicle Volumes Southbound Roadways
Percent Change vs. Before Conditions



- In the AM peak period, eastbound East 72nd Street between Madison and Fifth Avenues showed significant impacts with volumes increasing 47.9%.

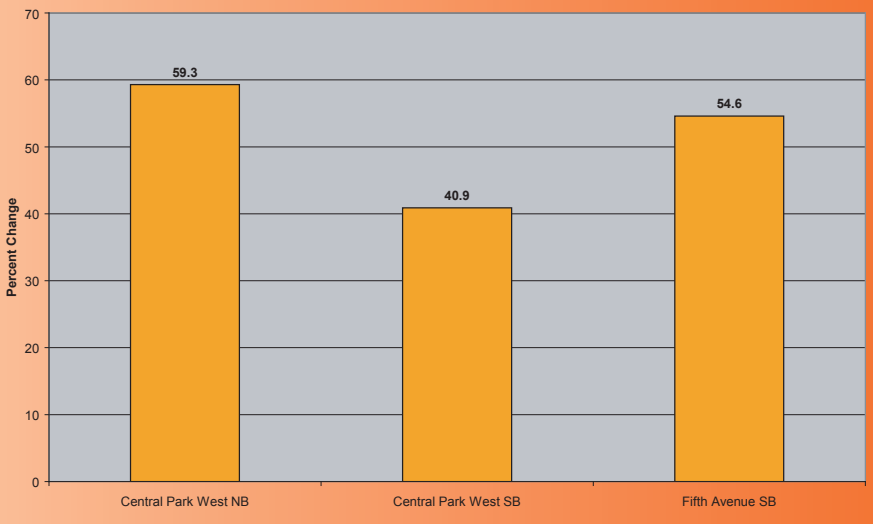
- Northbound Madison Avenue also showed a significant increase at 96th Street (37.5%) and at 86th Street (nearly 20%) in the AM peak period. Northbound Park Avenue also exhibited significant increases in volume during both the AM and PM peak periods (18.1% and 16.1%, respectively).

- In the AM peak period, eastbound East 72nd Street between Madison and Fifth Avenues showed significant impacts with volumes increasing 47.9%.

Travel Time/Speed

- On Fifth Avenue, travel time increased significantly by 54.6% in the PM peak period. Although volumes decreased during this time period by nearly 10%, this can be attributed to the roadway being unable to process the vehicular demand associated with the high level of congestion related to the exhibit.

Partial Closure
Locations with Significant Travel Time Increases
PM Peak



- Other locations with significant travel time increases in the PM peak period were Central Park West northbound and southbound (59.3 and 40.9 percent, respectively) and Fifth Avenue (54.6%).

- During the PM peak period, speed decreased dramatically by 58% between 72nd and 65th Street and by 50%, south of 65th Street.

- All eastbound roadways showed travel time decreases in the AM peak period.

- On east/west roadways, westbound 79th Street showed the most significant increase in travel time (13.6%) in the PM peak period. In the AM peak period, the greatest increase in travel time occurred on westbound 85th Street (14%).

Development of the Traffic Management Program

Based upon the enormity of the project, in both the physical scale of the undertaking as well as the anticipated crowds coming to view the exhibit, the Department of Transportation (DOT), in conjunction with the Department of Parks & Recreation (DPR), the New York City Police Department (NYPD) and the Central Park Conservancy (CPC) developed a comprehensive traffic management program that ensured the efficient movement of traffic within the Park as well as on the roadways surrounding the Park.

In developing the traffic management program, there were two primary scenarios that needed to be addressed. Under the first scenario, which took place the week before and after the formal viewing of the exhibit, the Park Drives were closed to motor vehicles at all times to allow for the expeditious installation and dismantling of the exhibit. During this time period, large trucks and other service vehicles were frequently traversing and parking along the Park Drive roadways and pathways to deliver materials throughout the park.

Under the second scenario during the exhibit, the Park Drives were closed to motor vehicles in the off-peak direction during the peak travel periods. This scenario involved accommodating the vast number of visitors coming to view the exhibit while managing the movement of vehicles through Central Park and along the adjacent roadways.

Scenario 1: Full Closure of the Park Drives

The East and West Drives remained closed to motor vehicle traffic at all hours, with the exception of the portion of the East Drive from the Sixth Avenue entrance to the East 72nd Street exit, which remained open between the hours of 7AM and 7PM to facilitate traffic leaving the Manhattan Central Business District (CBD). All east-west transverse roads remained open with the exception of the 72nd Street Transpark roadway which was closed during this period.

These restrictions were instituted during the initial set-up phase, which

began on February 4th and extended through February 11th, and during the dismantling of the exhibit, which was originally scheduled to occur between February 28th and March 4th. However, due to inclement weather which affected the dismantling and removal of *The Gates*, the East Drive remained closed between East 72nd Street and Lenox Avenue through March 14th.

Scenario 2: Off-Peak Closure of the Park Drives During the Peak Travel Period

Under Scenario 2, the Department implemented an innovative traffic management program whereby only the peak direction Park Drive would remain open to motor vehicle traffic during the respective peak travel period. Under this program, the West Drive was open on weekdays from the Lenox Avenue entrance to the 7th Avenue/ 59th Street exit between the hours of 7 AM and 10 AM, while the East Drive north of East 72nd Street was closed. The portion of the East Drive between the Sixth Avenue entrance and East 72nd Street remained open between the hours of 7 AM and 7 PM. In addition, the existing HOV 2+ regulations remained in effect during this period on the West Drive.

During the PM peak period (3-7PM) on weekdays, the East Drive remained open between East 72nd Street and Lenox Avenue. Vehicles were allowed to enter from the Sixth Avenue or East 72nd Street entrance and travel north as far as the Lenox Avenue exit. No vehicles were permitted on the West Drive.

All east/west transverse roads remained open, and during the PM peak period, the 72nd Street Transpark roadway was open to westbound traffic, which was required to exit at West 72nd Street and Central Park West.

Implementation and Monitoring of *The Gates* Traffic Management Program

Program Elements

In the months prior to the installation of *The Gates*, DOT, DPR, CPC and the NYPD developed a program to manage both vehicular and pedestrian traffic during the art exhibition. This program focused on meeting the accessibility needs of the art installation, while efficiently managing the flow of traffic into and out of the CBD and on the roadways adjacent to the park. Key elements of the program included the assignment of dozens of police officers and traffic agents, a broad limitation on construction activity, an extensive driver information program, signage and physical treatments.

Data Collection and Monitoring

Given the scale and scope of the overall traffic management plan, the Department instituted a comprehensive data collection effort throughout the entire project. This effort focused on the Park Drives, the roadways immediately adjacent to the park, and at several other critical intersections and locations throughout the area bounded by 110th Street/Cathedral Parkway to the north, 59th Street to the south, Park Avenue to the east, and Broadway to the west. This effort included the collection of vehicle volumes and travel times and speeds along critical corridors for both the AM (7-10AM) and PM peak periods (3-7 PM). This information was collected daily to assess the performance, impacts and effectiveness of the traffic management program.

Driver Information Program

In order to advise motorists of the components of the traffic management program, the Department developed a comprehensive program to alert motorists of the changing conditions on the Park Drives. This program used all available mass media outlets including print, radio and television.

Another primary driver information conduit was the regional Intelligent Transportation System (ITS) program utilizing the region's Variable Message Signs (VMS) on various parkways and expressways such as the Long Island Expressway and the Brooklyn-Queens Expressway, as well as 24 strategically placed portable VMSs at locations throughout Manhattan. This included eight signs at Park Drive entrances, seven signs at various West Side locations advising motorists on southbound and eastbound approaches, five signs at locations north of the Park (for southbound and westbound approaches), three signs on the East Side for northbound and westbound traffic, and one sign on the East Drive approaching the East 72nd Street exit.

At each of these locations, messages were created based upon the various phases of the traffic management plan. The first phase of the plan advised motorists of the impending closure of the entire Park Drives. These messages began running on January 31st and continued through February 11th. At locations on the West Side, motorists were encouraged to utilize Columbus Avenue as an alternate southbound roadway prior to reaching Central Park to minimize the amount of diverted traffic on Central Park West. On the East Side, motorists were also advised to utilize alternate routes. All VMSs advised drivers that the transverse roads would remain open during the closures. These messages were repeated during the dismantling of *The Gates* between February 26th and March 4th at all locations.

During the off-peak directional closures, only the portable VMSs at the Park Drive entrances and within the Park continued to advise motorists of the traffic patterns in effect. These messages, tailored to the East and West Drives, advised motorists of the details of the off-peak closures between February 14th and February 25th.

The full VMS program can be found in Appendix I.

Signage Program

Additionally, the DOT developed innovative signage to alert pedestrians in the Park of the presence of motor vehicles on the Park Drives. These signs, mounted at several marked crosswalks throughout the Park, were posted on lamp poles and oriented toward pedestrians, rather than motorists.

Enforcement

The NYPD, developed a traffic enforcement program to maintain mobility of vehicular and pedestrian traffic on the streets surrounding Central Park during the various phases of *The Gates* exhibit. Each day, dozens of NYPD personnel were posted at critical intersections within the vicinity of Central Park to manage the diverted flow of motor vehicles during both the AM and PM peak periods. During the actual exhibit between February 12th and February 27th, there was an increased police presence in and around Central Park to accommodate the influx of visitors coming into Central Park to view the exhibit.

Physical Treatments

One of the final elements of the traffic management plan was the development of temporary closure treatments on the Park Drives, and at various entrances and exits to the Drives. Currently, the Parks Department utilizes a variety of temporary closure treatments in the normal operation of the Park Drives. However, with the changing traffic patterns, additional traffic management techniques needed to be employed to regulate traffic flow on the Park Drives. The primary purpose of these treatments was to prevent vehicles from accessing closed roadways, especially during the off-peak roadway closures. In addition to prohibiting vehicular traffic, these treatments needed to accommodate for Parks Department vehicles, a tourist trolley and other vehicles authorized to access the Drives, while being easily deployable and moveable by Parks Department personnel during the changes in the operation of the Park Drives. Working within these guidelines, DOT developed unique treatments at each of the identified locations to safely channelize vehicular traffic onto the appropriate roadways through the use of high-visibility, light weight traffic barrels and unique signage. In addition, at high traffic locations such as the East 72nd Street entrance, more visible signage and French barricades were deployed to prevent vehicles from entering the Drives. Full details of these treatments and their locations can be found in Appendix II.

Impact Assessment

In order to assess the impacts associated with the park drive closures, an extensive amount of data was collected. Vehicular travel times were conducted on critical roadways and Automated Traffic Recorders (ATRs) were placed at key locations within the study area and compared to "before" conditions. Of particular concern, were the north/south roadways adjacent to the park as well as the transverse roads and the crosstown streets approaching them. The data was collected during a five-week period beginning on January 31st, when the DPR began the set up of the exhibit, and concluded on March 4th, 2005. Data was conducted:

- before the initial closures, week of January 31st;
- during the full closure (set-up and dismantling of exhibit), from February 4th to 11th, and February 28th to March 4th;
- during the off-peak closure (during the exhibit), from February 14th to 25th.

Major Findings

Scenario 1: Full Closure of the Park Drives

Following is a summary of the average of the Week One (February 4th - February 11th) and Week Four (February 28th - March 4th) data collected during the full closure of the Park Drives for the AM (7-10AM) and PM peak periods (3-7PM).

Vehicle Volumes

Northbound/Southbound Roadways

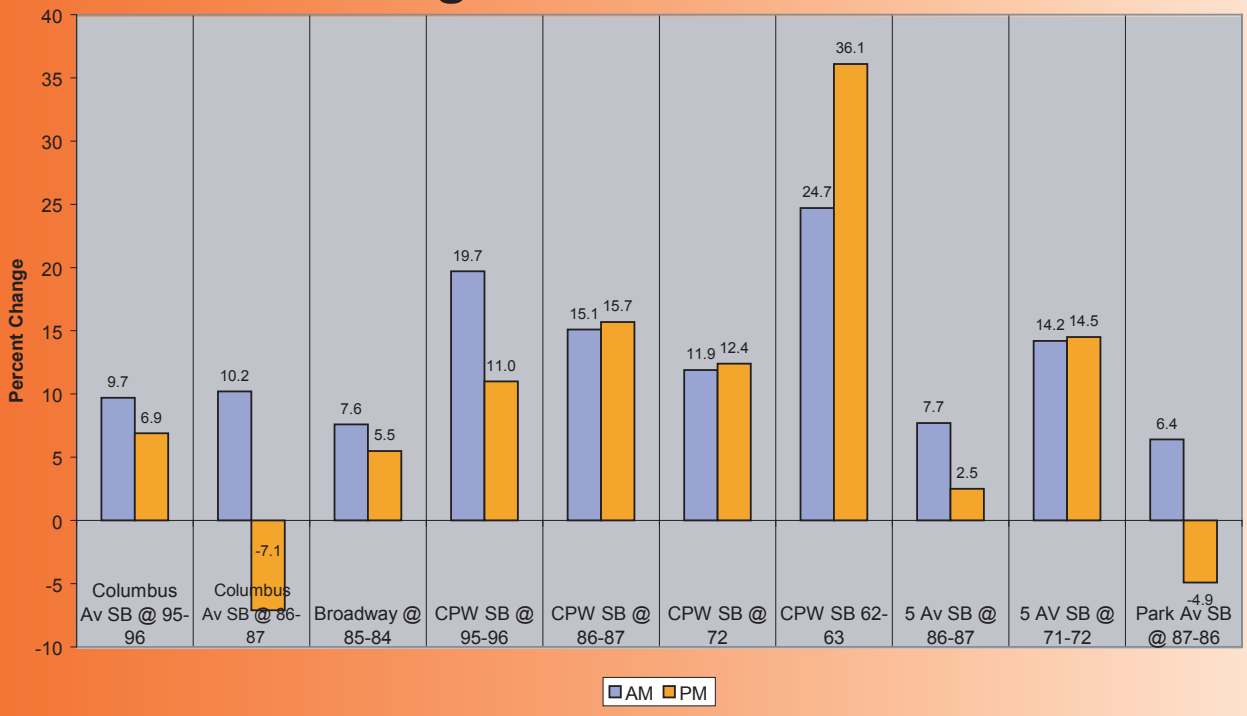
ATR volumes were analyzed on ten northbound roadways and ten southbound roadways surrounding the park to determine the changes in volumes as compared to "before" conditions for the AM and PM peak periods.

Overall, all northbound and southbound locations exhibited volume increases in the AM peak period, and seventeen of the twenty locations exhibited volume increases in the PM peak period.

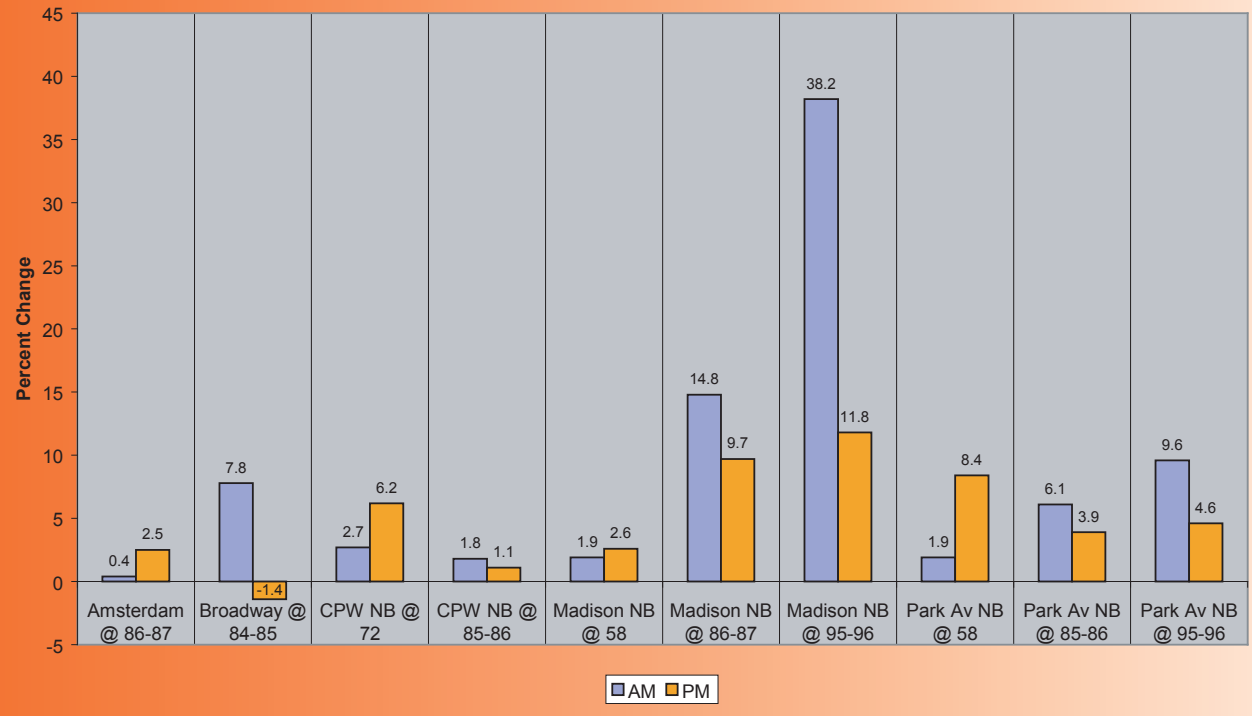
The most widespread impacts occurred on the southbound roadways whereby six locations in the AM peak period and five locations in the PM peak period exhibited increases of over 10% as compared to the northbound roadways whereby only two locations in the AM peak period and one location in the PM peak period exhibited increases in volume. The largest percentage change on the southbound roadways in both the AM and PM peak periods occurred on Central Park West between 63rd and 62nd Streets where volume increased by 24.7% (to 1,045 from 838 or 207 additional vehicles) and 36.1% in the PM peak period (to 1,324 from 973 or 351 additional vehicles). The largest increase in vehicle volume occurred on Fifth Avenue between 72nd and 71st Streets where volumes increased by 572 vehicles (to 4,591 from 4,019). The three locations monitored along Central Park West (West 95th, West 86th and West 72nd Streets) showed increases in volume of over 10% during both the AM and PM peak periods.

The largest increase in volume on the northbound roadways occurred on Madison Avenue at 96th Street where volumes increased significantly by 38.2% (to 2,067 from 1,496). This increase of 571 vehicles also represented the largest increase in the number of vehicles.

Full Closure
Vehicle Volumes Southbound Roadways
Percent Change vs. Before Conditions



Full Closure
Vehicle Volumes Northbound Roadways
Percent Change vs. Before Conditions



Eastbound/Westbound Roadways

There were volume increases on six of the eight eastbound roadways in the AM peak period and seven of the eight eastbound roadways in the PM peak period.

The greatest impact occurred on eastbound East 72nd Street between Fifth and Madison Avenues averaging 35.2% (to 1,384 from 1,024 or 360 additional vehicles) in the AM peak period, and 28.7% (to 2,306 from 1,792 or 514 additional vehicles) in the PM peak period. This was due to motorists being forced to exit the East Drive at 72nd Street and continue eastbound on 72nd Street to access points north.

The eastbound 65th Street Transverse Road showed increases of over 20%. In the AM peak period volumes increased 21.4% (to 3,249 from 2,672) and in the PM peak period volumes increased 23.5% (to 4,545 from 3,672).

Eastbound 86th Street at Columbus Avenue exhibited an increase of 29.4% (to 1,634 from 1,263 or 371 additional vehicles) in the AM peak period and 15.6% (to 2,436 from 2,107 or 329 additional vehicles) in the PM peak period.

Eastbound 110th Street between Lenox and Fifth Avenues showed a significant increase in volumes averaging 24.2% (to 1,149 from 925 224 additional vehicles) in the AM peak period. The volume increase was less pronounced in the PM peak period (10.4%). This may be attributed to motorists being unable to access the drives from points north of the park and thereby using 110th Street eastbound to Fifth Avenue as an alternate southbound route.

There were volume increases on five of the six westbound roadways in both the AM and PM peak periods.

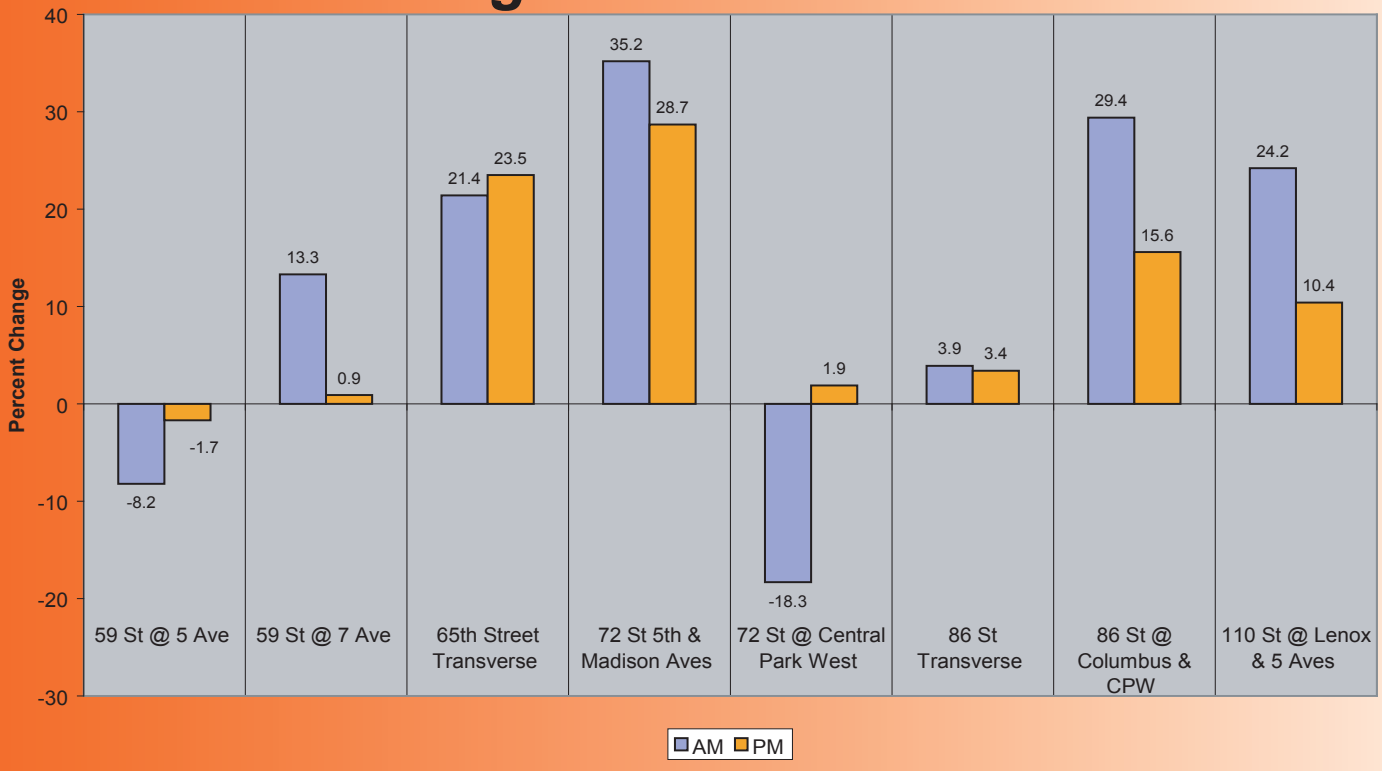
The greatest increase in volume occurred on the westbound 65th Street Transverse Road, where volumes increased 25.1% (to 3,239 from 2,590 or 649 additional vehicles) in the AM peak period and 34.3% (to 4,999 from 3,721 or 1,278 additional vehicles) in the PM peak period. These significant increases in volume may be attributed to motorists using the 65th Street Transverse Road as an alternate to the 72nd Street Transpark Road (which was closed) to access points west.

There were significant volume increases on westbound 110th Street at Frederick Douglass Circle with increases of 27.9% (to 1,612 from 1,260 or 352 additional vehicles) in the AM peak period and 19.1% (to 1,806 from 1,260 or 289 additional vehicles) in the PM peak period. This may be attributed to motorists being unable to access the drives from points north of the park and thereby using 110th Street westbound to Central Park West or Columbus Avenue as alternate southbound routes.

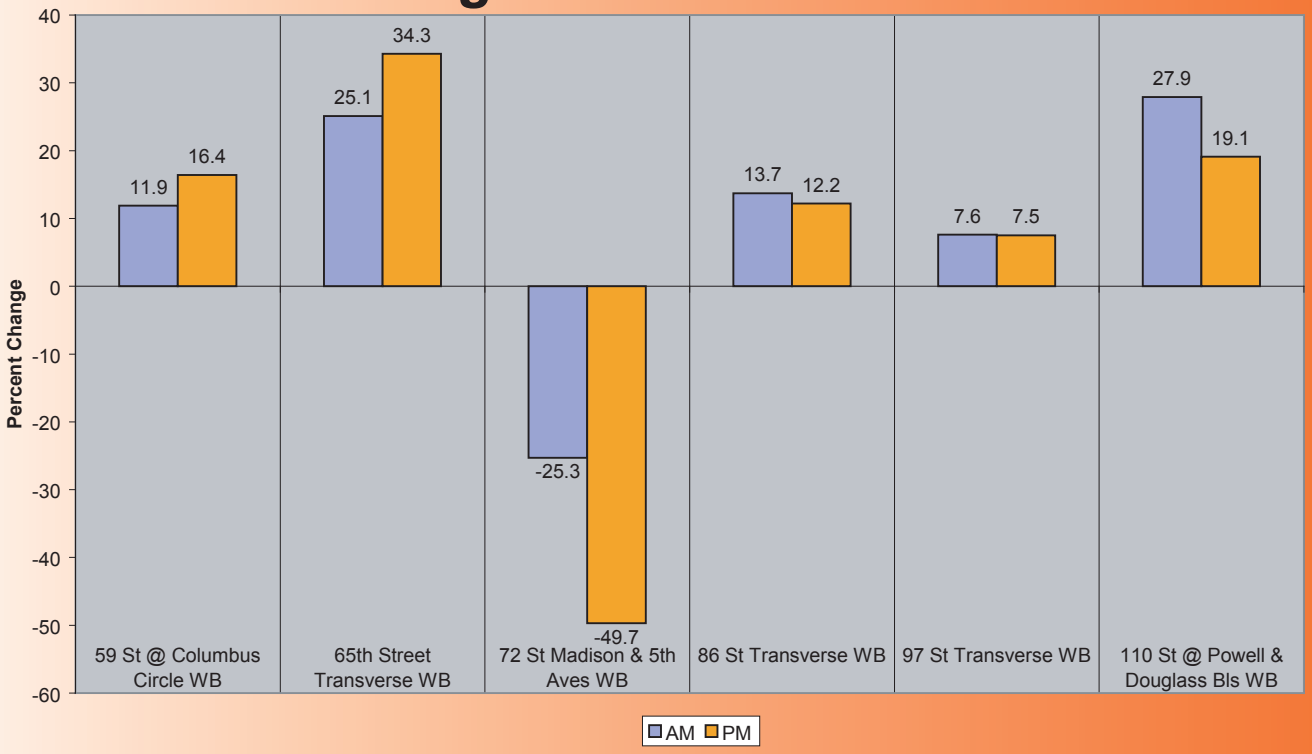
Westbound 59th Street at Columbus Circle also showed a significant increase in volumes of 11.9% (to 2,629 from 2,350 or 279 additional vehicles) in the AM peak period and 16.4% (to 3,461 from 2,973 or 488 additional vehicles) in the PM peak period. This may be due to motorists using the west side to access points north.

There were significant decreases in volume on westbound 72nd Street at Fifth Avenue as motorists were no longer able to access the Park Drives at the East 72nd Street entrance.

Full Closure
Vehicle Volumes Eastbound Roadways
Percent Change vs. Before Conditions



Full Closure
Vehicle Volumes Westbound Roadways
Percent Change vs. Before Conditions



Additional volume charts for each location can be found in Appendix III.

Travel Times

Despite the significant increases in vehicular volumes, the traffic management program described earlier helped to minimize vehicular travel time delays. We believe this was primarily attributed to roadway capacity improvements achieved through the extensive construction embargo supplemented by the large deployment of traffic officers.

Northbound/Southbound Roadways

Vehicle travel time surveys were conducted on five southbound roadways (Columbus Avenue, Broadway, Central Park West, Fifth Avenue and Park Avenue) and five northbound roadways (Amsterdam Avenue, Broadway, Central Park West, Madison Avenue and Park Avenue) and compared to "before" conditions.

The most significant adverse impacts occurred on the southbound roadways in the AM peak period, which is the peak direction of travel to the CBD. All five southbound roadways surveyed exhibited increases in travel time

during the AM peak period. All of these roadways, with the exception of Broadway, showed travel time increases of over 10%.

The most dramatic increases occurred on the east side of the park with Fifth Avenue travel times increasing 19.2% (to 21.41 minutes from 17.96 minutes), and Park Avenue increasing 25.6% (to 20.74 minutes from 16.51 minutes). Northbound roadways showed general improvements in travel time, with the only negative impact occurring on Park Avenue during the AM peak period where travel times increased by 8.4% (to 12.84 minutes from 11.85).

There was an overall improvement in travel times in the PM peak period, with all northbound roadways showing improved travel times with only Columbus Avenue and Central Park West southbound showing slight increases in travel time.

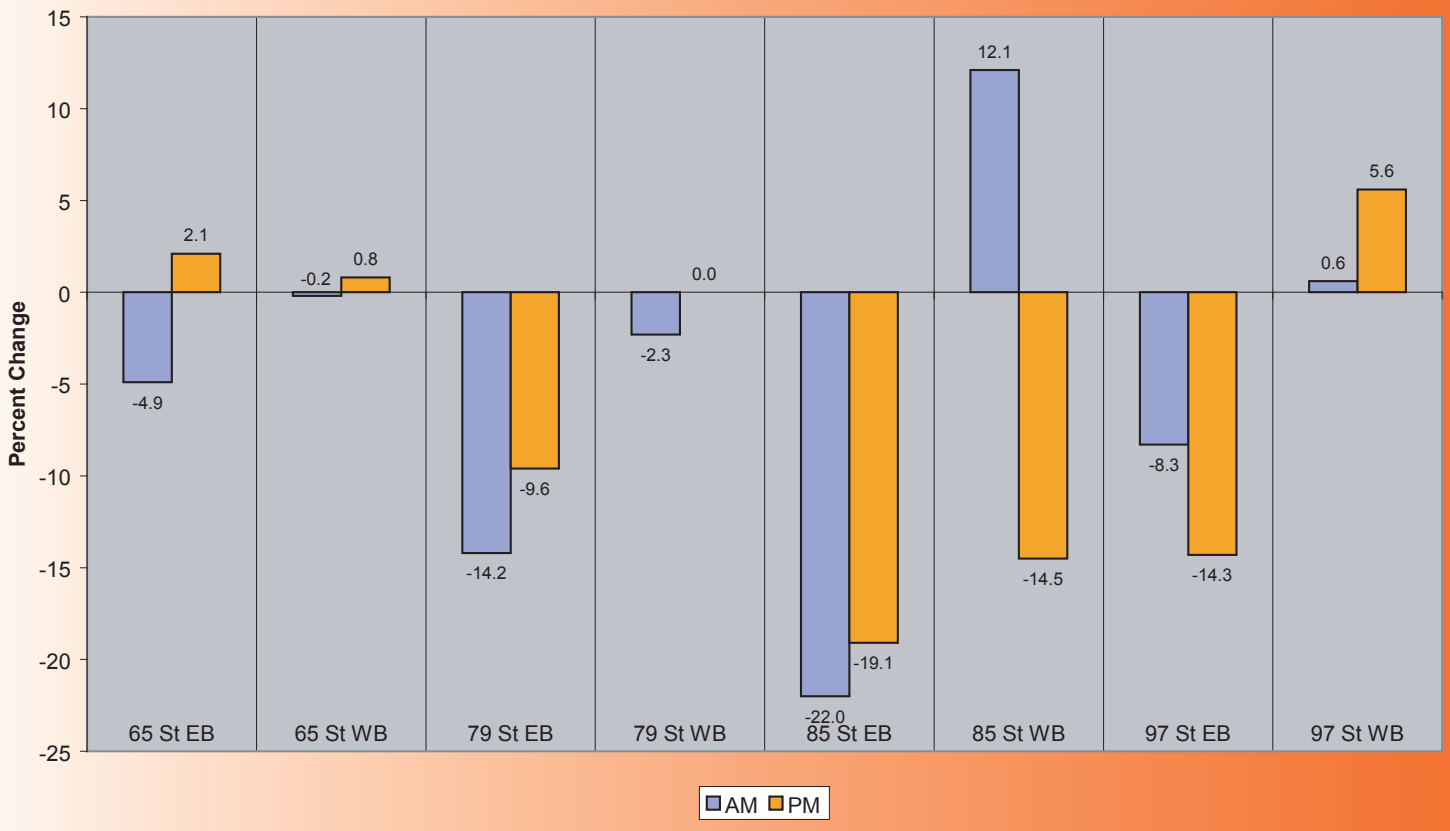
Full Closure
Travel Time Northbound and Southbound Roadways
Percent Change vs. Before Conditions

Eastbound/Westbound Roadways

Vehicle travel time surveys were conducted on four eastbound/westbound roadways (65th, 79th, 85th and 97th Streets).

The most significant impact occurred on westbound 85th Street in the AM peak period, whereby travel times increased 12.1% (to 8.23 minutes from 7.34 minutes). There were very minimal increases in the PM peak period on both eastbound and westbound 65th Street and westbound 97th Street. All other roadways exhibited travel time improvements or remained relatively unchanged in both the AM and PM peak periods.

Full Closure
Travel Time Eastbound and Westbound Roadways
Percent Change vs. Before Conditions



Detailed travel time/speed charts for each location can be found in Appendix IV.

Segment Speed Analysis - Full Closure

Travel time data was collected at key checkpoints along critical corridors. Generally, for the northbound and southbound roadways the checkpoints were along major crosstown roadways (e.g., 79th Street). For the eastbound and westbound roadways, every northbound/southbound roadway was a checkpoint. The total number of segments for the eight northbound/southbound routes was 47 and the total number of segments for the eight eastbound/westbound streets was 55. Speed ranges were developed and are displayed on the maps and charts. These ranges are:

- less than 5 MPH
- 5.0 to 7.99 MPH
- 8.0 to 10.99 MPH
- 11.00 to 13.99 MPH
- 14 MPH and above

As speeds in the lower ranges (below 8 MPH) were the most critical, the speed segment analysis focused on these segments.

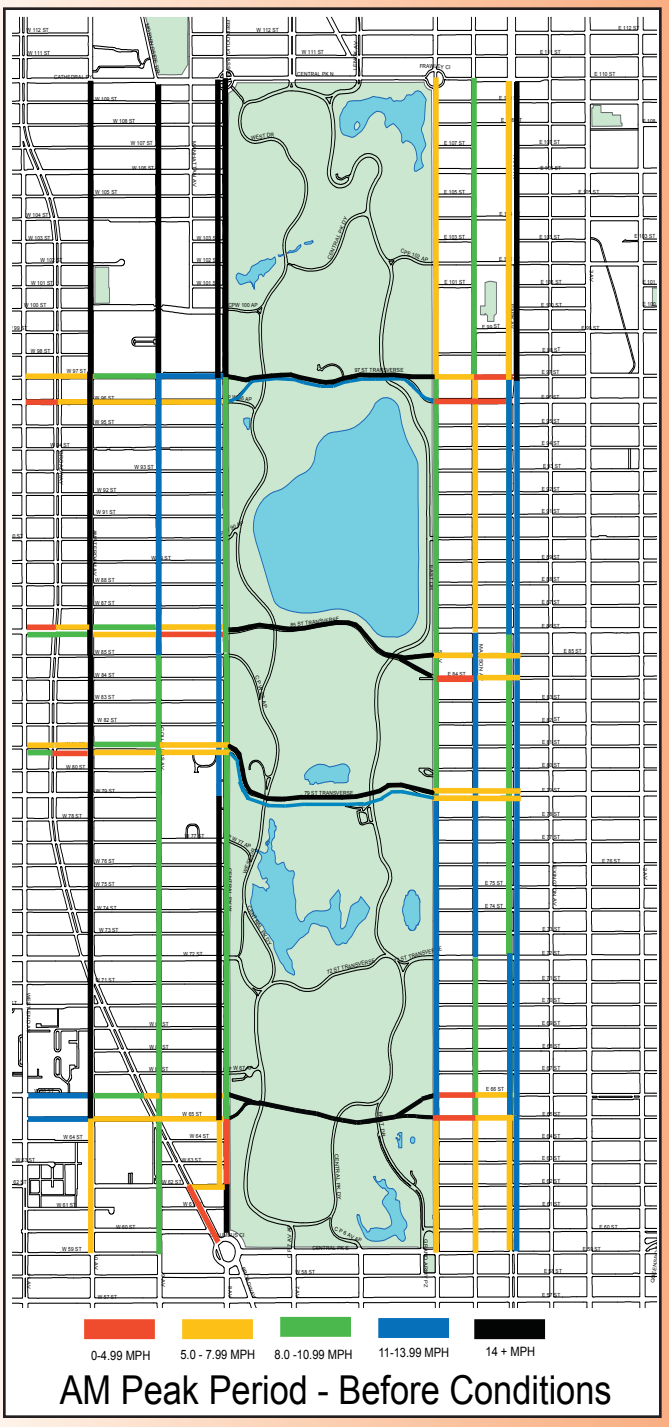
Northbound and Southbound Roadways

The full closure resulted in increases in the number of segments operating at below 5 MPH (to five segments from two) as compared to "before" conditions in the AM peak. The number of segments operating between 5 MPH and 8 MPH increased to eleven segments from nine as compared to "before" conditions. This data indicates that there were more segments experiencing severe congestion as a result of the full closure. A majority of these impacts occurred along the southern portion of the roadways as vehicles traveling toward the CBD accumulated. Part of this accumulation can be attributed to the 72nd Street Transpark Road being unavailable. There were no changes to the number of segments operating below 8 MPH in the PM peak. Dramatic speed reductions occurred on Central Park West between West 79th and West 65th as speeds decreased by 70.3% to 4.4 MPH from 14.8 MPH in the AM peak period and by 55.7% to 4.7 MPH from 10.6 MPH in the PM peak period.

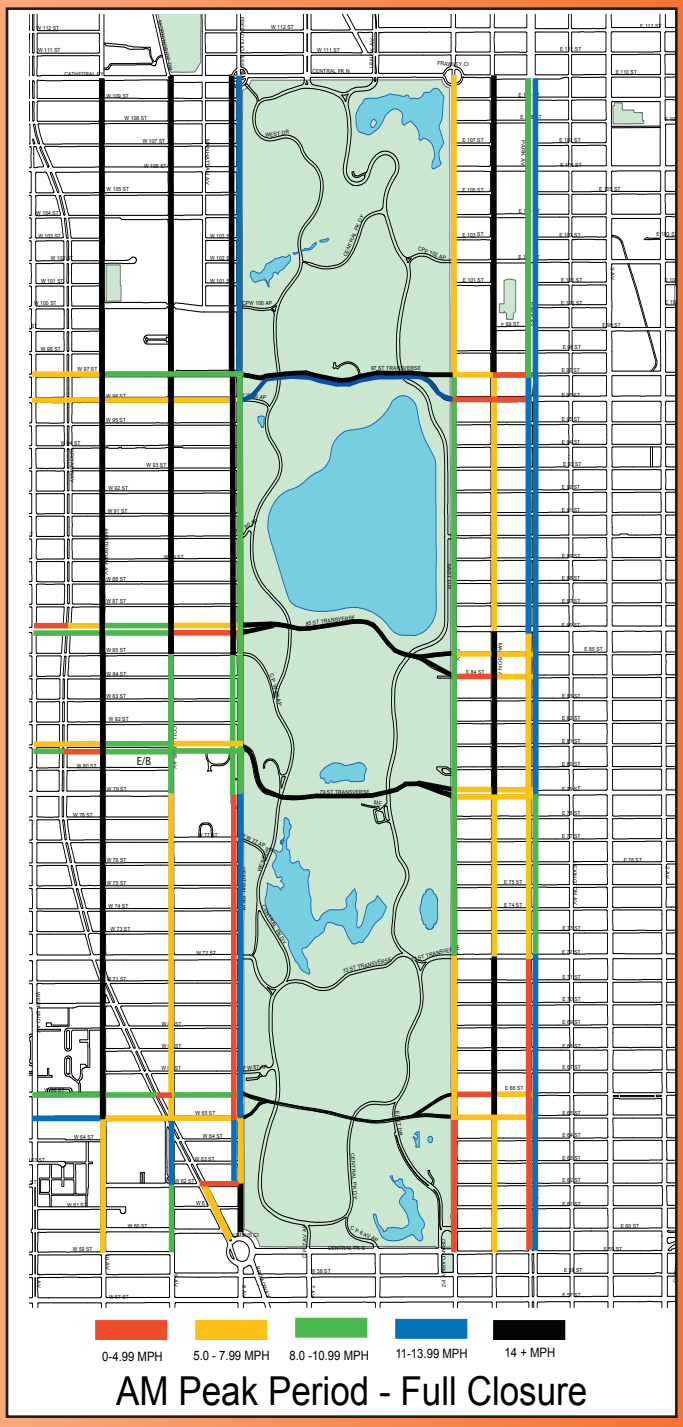
Eastbound and Westbound Roadways

Fewer segments operated at speeds below 8 MPH in the AM peak period (to 33 from 38 segments) compared to "before" conditions. In the PM peak period, the number of segments operating below 8 MPH remained

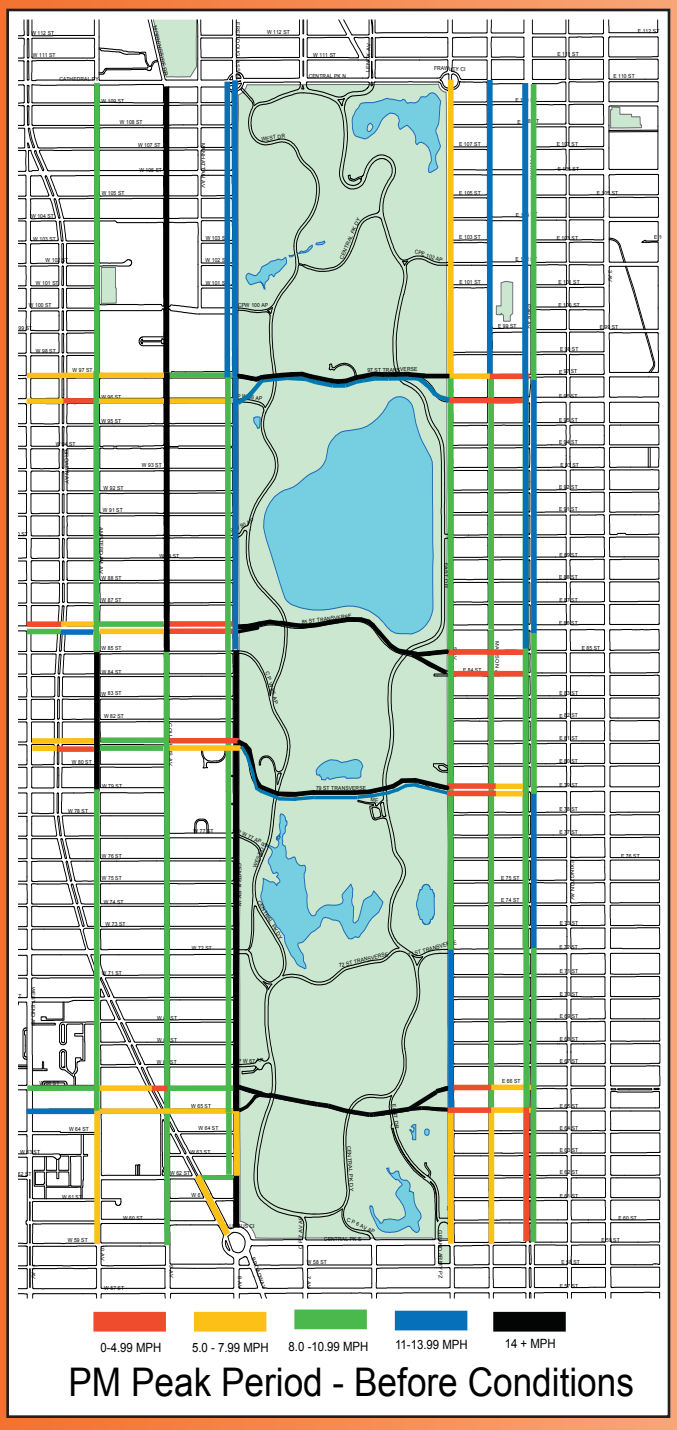
unchanged at 37 segments. In both “before” and full closure conditions in both the AM and PM peak periods, at least 40% of segments operated in the 5-8 MPH range. The only segments that operated at high speeds were the transverse segments where speeds averaged over 20 MPH. The high speeds on the transverse road segments led to much improved crosstown corridor speeds.



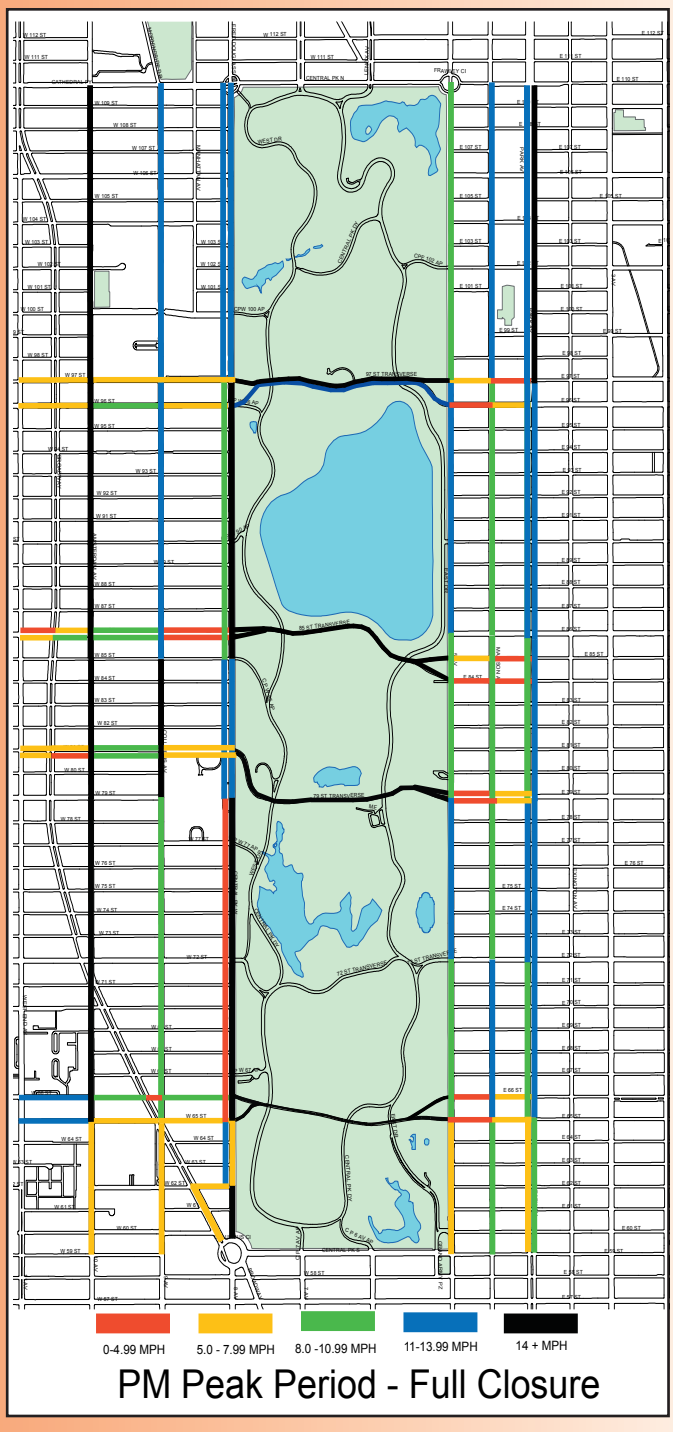
AM Peak Period - Before Conditions



AM Peak Period - Full Closure



PM Peak Period - Before Conditions



PM Peak Period - Full Closure