NYC**BRT** **Study**

New York City Transit

New York City Department of Transportation

New York State Department of Transportation

CM 1286 New York City Bus Rapid Transit Study

FINAL CONCEPT PLAN FOR THE FIRST & SECOND AVENUE-125TH STREET CORRIDOR

Document ID:
CM 1286-01.090200.1

TABLE OF CONTENTS

OVERVIEW

The First & Second Avenue -125th Street Corridor spans most of the east side of Manhattan, approximately 8.5 miles between the Staten Island Ferry Terminal in Lower Manhattan to 125th Street, then crosses 125th Street from First to Twelfth Avenues, adding approximately 3 more miles. This corridor travels through high density neighborhoods from the Lower Manhattan Financial District, through Chinatown and the Lower East Side, through East Midtown and the Upper East Side, and then river-to-river across Harlem.

After crossing 125th Street, the proposed BRT route would replace the existing M15 limited service on First and Second Avenues between 125th and Houston Streets. Below Houston Street, the corridor continues via Allen and Pike Streets to Madison Street and Water Street, terminating at Whitehall Street at the southern end of the corridor.

The following Concept Plan includes recommendations for physical and operational improvements for the 1st/2nd Avenue corridor. In this phase of the BRT study, these recommendations are conceptual in nature and many issues are still up for discussion. In the second phase of the study, more detailed design work will take place, and more extensive data collection and analysis will be completed to identify impacts and develop potential mitigation measures.

EXISTING CONDITIONS

Physical Attributes

The following describes each major section of roadway within this Corridor: First and Second Avenues; the roadways south of Houston Street; and 125th Street.

South of Houston Street

Below Houston Street, the primarily residential Lower East Side street grid changes to irregular and odd-angled intersections. The irregular grid pattern continues south of Canal Street where most streets are narrow with usually just one traffic lane. Travel can be slow and time consuming, with pedestrian traffic often overflowing into the roadway. Major traffic generators include the Manhattan, Brooklyn, and Williamsburg Bridges. (Unless they are a transfer site, bridges ae a conduit not a trip generator)

The corridor extends south of Houston Street via Allen Street and then via Pike Street. Allen Street carries three travel lanes plus a parking lane and a bike lane in each direction, separated by a wide planted median. There has been discussion in the community about opportunities to widen the medians of Allen Street to create an environment more conducive to pedestrians. South of Pike Street, the corridor transitions to Madison Street, a relatively narrow street through Chinatown, then connecting with Pearl and Water Streets. Both Pearl and Water streets have to two travel lanes plus a parking lane in each direction. Reconstruction of Water Street segment is currently planned. The reconstruction will reduce the roadway width of Water Street to 52 feet, with one travel lane in each direction separated by a median with left-turn lanes and a parking lane on each side of the street.

First Avenue

First Avenue is an important northbound arterial that is six to seven lanes wide (70 feet), including four to five travel lanes with curb parking lanes on both sides of the avenue. It extends from Houston Street to East 125th Street and is characterized by high traffic volumes and high density residential and commercial uses. Approaching East 34th Street, NYU/Bellevue Hospitals are major traffic generators along the east side of First Avenue. At East 41st Street, First Avenue

divides into a tunneled section that allows northbound traffic to travel unimpeded under East 42nd Street, or to continue at grade northward, serving the United Nations on the east side and local residential and commercial uses along the west side of the avenue. The tunneled section provides four lanes for through traffic (reduced to three at the tunnel exit), with service roads at-grade on either side of the tunnel entrance between East 41st and 42nd Streets, and at the exit at East 49th Street. The service roads vary from one to three travel lanes. Buses travel along the east service road and not within the tunnel.

North of the tunneled section, the roadway reverts to its six to seven lane layout. Farther north, as First Avenue approaches East 57th Street and the Queensboro Bridge, the two left-most lanes of the avenue provide dedicated bridge access.

Between East 34th and 96th Streets, the east curb lane is designated as a bus lane from 4-7 PM. A bike lane is located between East 72nd and 125th Streets on the west side of First Avenue, adjacent to the curb parking lane, reducing the roadway at this point to four travel lanes.

Second Avenue

Second Avenue serves as an important southbound arterial on the East Side of Manhattan, stretching from East 127th Street in the north, to Houston Street in the south. Like First Avenue, it is characterized by high traffic volumes and high density residential and commercial uses. It is also a significant approach route to three of Manhattan's major East River crossings – the Triborough Bridge at East 125th Street, the Queensborough Bridge at East 59th Street, and the Queens-Midtown Tunnel in the vicinity of East 36th Street. Queuing and traffic delays at each of these three locations can be substantial, especially near East 59th Street throughout the typical weekday (often extending northward as far as East 66th Street), and near the Queens-Midtown Tunnel during the afternoon peak period (4PM to 7PM).

Second Avenue's roadway width varies from 60 to 70 feet with four travel lanes between East 125th and 59th Streets, and from East 23rd to 14th Streets. Between East 59th and 23rd Streets, Second Avenue is consistently about 70 feet wide, allowing for five travel lanes with parking along both curbs. Between East 96th and 14th Streets, the west curb lane is a priority bus lane between 7-10 AM. From East 14th to Houston Streets, the roadway operation changes again as there is no bus lane, but a bike lane is added adjacent to the east side curb lane, reducing the roadway to three travel lanes plus the two curb lanes.

125th Street

125th Street is Harlem's premier street, extending river-to-river and traversing residential and commercial areas. Several bus routes traverse 125th Street, linking it with primarily residential neighborhoods to the north and south, as well as with The Bronx, Queens and LaGuardia Airport. With these bus routes, as well as heavy traffic volumes, curbside parking and deliveries, 125th Street has considerable traffic congestion at most times of the day. Several intermodal connections are located along this corridor, with several north-south bus routes, most major subway lines, and MTA Metro-North Railroad. Metro-North's Harlem-125th Street Station is situated at Park Avenue.

As the primary crosstown street in Upper Manhattan, 125th Street is characterized by heavy commercial and retail development in the middle of the corridor, and high density residential uses on the western end. The easterly end of the corridor provides connections to the Triborough Bridge, FDR Drive, the Willis Avenue Bridge to the Bronx, and the Third Avenue Bridge from the Bronx. The roadway is bi-directional, with two travel lanes and a curb lane with parking in each direction. Between Fifth Avenue and Frederick Douglass Boulevard, each block has a mid-block

signalized intersection and crosswalks located at sidewalk bulb-outs to facilitate pedestrian crossings of these long blocks. Vehicle and bus travel along 125th Street is slowed due to frequent double parking, which often reduces street capacity to a single moving lane.

Operational Attributes

Bus Operations

The M15 operates along First and Second Avenues from East 125th Street to Houston Street, continuing south of Houston Street along Allen Street and then Pike Street. The M15 then turns onto Madison Street, continuing its route southward along St. James Place and Water Street to Whitehall Street. A second branch extends west on East Broadway and Park Row to serve the City Hall area.

M15 local and limited-stop bus services are the primary routes serving this corridor. Additional routes either provide transfer to the M15 or traverse a short part of the First and Second Avenue route. The M15 local operates on 4 minute headway during the AM peak period and every 7 - 8 minutes in the PM peak. The M15 limited operates on 3-4 minute headway during the AM peak and every 6 minutes in the PM peak.

Along 125th Street are several bus routes that connect 125th Street to the north, south and east with other locations. Bus routes that travel on125th Street include the M60, M100, M101, and the Bx15. There is no bus route that only traverses 125th Street.

Traffic Conditions

Analyses of traffic conditions in urban areas are based on critical conditions at intersections and are defined in terms of levels of service. According to the *Highway Capacity Manual 2000* (HCM) that was used for these analyses, levels of service (LOS) at signalized intersections are defined in terms of the average control delay per vehicle at an intersection. Levels of service A (≤ 10 seconds/vehicle), B (between 10 and 20 second/vehicle delay), and C (between 20 and 35 second/vehicle delay) are considered acceptable; LOS D (between 35 and 55 second/vehicle delay) is generally considered marginally acceptable up to mid-LOS D (45 seconds of delay for signalized intersections), and is considered unacceptable above mid-LOS D. LOS E (between 55 and 80 second/vehicle delay) and F (≥85 second/vehicle delay) are considered unacceptable.

The data for this effort was collected during October 2005 and January 2006 and verified against other studies. Due to their importance along the corridors, the following locations were analyzed as part of this phase of the study:

- First Avenue and East Houston Street
- First Avenue and East 14th Street
- First Avenue and East 23rd Street
- First Avenue and East 34th Street
- First Avenue and East 42nd Street
- First Avenue and East 57th Street
- First Avenue and East 72nd Street
- First Avenue and East 86th Street
- First Avenue and East 96th Street
- First Avenue and East 106th Street
- First Avenue and East 116th Street
- First Avenue and East 125th Street
- Second Avenue and East 14th Street

- Second Avenue and East 23rd Street
- Second Avenue and East 34th Street
- Second Avenue and East 42nd Street
- Second Avenue and East 57th Street
- Second Avenue and East 72nd Street
- Second Avenue and East 86th Street
- Second Avenue and East 96th Street
- Second Avenue and East 106th Street
- Second Avenue and East 116th Street
- Second Avenue and East 125th Street

The results of the existing condition assessments are summarized below. Overall intersection levels of service are a weighted average of the delays for all of the individual traffic movements.

- First Avenue and East Houston Street – Currently operating at overall LOS D in both the AM and PM peak periods with average delays of 35 and 36 seconds per vehicle respectively. The most congested movement at this intersection is the eastbound left turn from Houston Street, which operates at LOS E during the AM peak.

- First Avenue and East 14th Street – Currently operating at LOS C with average delays of 25 seconds per vehicle in both the AM and PM peak periods. 14th Street westbound is the most congested approach operating at LOS D during both peak periods.

- First Avenue and East 23rd Street – This intersection is currently operating at LOS D during the AM peak period with average delays of 44 seconds per vehicle. All movements of both the eastbound and westbound approaches of 23rd Street are failing at LOS E or F. During the PM peak the intersection is operating at an overall LOS of C with average delays of 33 seconds per vehicle.

- First Avenue and East 34th Street – Currently operating at LOS C with average delays of 31 seconds per vehicle in both the AM and PM peak periods. The left turn movement from 34th Street eastbound is the most congested approach operating at LOS E during both peak periods.

- First Avenue and East 42nd Street – Currently operating at LOS C (average delay of 25 seconds per vehicle) during the AM peak and LOS E (average delay of 58 seconds per vehicle) during the PM peak. The intersection fails during the PM peak due to congestion of the northbound left turn movement from First Avenue and the westbound approach of 42nd Street.

- First Avenue and East 57th Street – Currently operating at LOS C during the AM peak and LOS B during the PM peak.

- First Avenue and East 72nd Street – Currently operating at LOS C during the AM peak and LOS B during the PM peak.

- First Avenue and East 86th Street – Currently operating at LOS B during both the AM and PM peak periods.

- First Avenue and East 96th Street – Currently operating at LOS C during both the AM and PM peak periods.

- First Avenue and East 106th Street – Currently operating at LOS B during both the AM and PM peak periods.

- First Avenue and East 116th Street – Currently operating at LOS B during the AM peak and LOS C during the PM peak. The eastbound left turn from 116th Street is the most congested movement operating at LOS D (36 seconds per vehicle) during the AM peak and LOS E (55 seconds per vehicle) during the PM peak.

- First Avenue and East 125th Street – Currently operating at LOS B during both the AM and PM peak periods.

- Second Avenue and East 14th Street – Currently operating at LOS C during both the AM and PM peak periods.

- Second Avenue and East 23rd Street – Currently operating at LOS C during both the AM and PM peaks. The westbound approach of 23rd Street is relatively congested with left turn movements operating at LOS F (88 seconds per vehicle) during the AM peak and LOS E (72 seconds per vehicle) during the PM peak; and through movements at LOS E (67 seconds per vehicle) during the AM peak and LOS D (46 seconds per vehicle) during the PM peak.

- Second Avenue and East 34th Street – Currently operating at LOS C during both the AM and PM peaks. This intersection has a number of movements that are close to or already failing in particular the 34th Street eastbound right turn and westbound left turn at LOS E in the AM peak and LOS D during the PM peak.

- Second Avenue and East 42nd Street – During the AM peak this intersection operates at LOS D (44 seconds per vehicle), with all movements at LOS D or worse. During the PM peak, the intersection is at LOS D (35 seconds per vehicle).

- Second Avenue and East 57th Street – During the AM peak this intersection operates at LOS D (45 seconds per vehicle), with all movements at LOS D or worse. During the PM peak, the intersection is at LOS C (32 seconds per vehicle).

- Second Avenue and East 72nd Street – Currently operating at LOS C during both the AM and PM peak periods.

- Second Avenue and East 86th Street – Currently operating at LOS C during both the AM and PM peak periods.

- Second Avenue and East 96th Street – Currently operating at LOS D (36 seconds per vehicle) during the AM peak and LOS C (28 seconds per vehicle) during the PM peak.

- Second Avenue and East 106th Street – Currently operating at LOS C (24 seconds per vehicle) during the AM peak and LOS B (16 seconds per vehicle) during the PM peak.

- Second Avenue and East 116th Street – Currently operating at LOS D (40 seconds per vehicle) during the AM peak and LOS C (28 seconds per vehicle) during the PM peak.

- Second Avenue and East 125th Street – During the AM peak this intersection operates at LOS D (51 seconds per vehicle), with the Triboro off ramp, eastbound 125th Street and westbound 125th Street left turn movements all failing. During the PM peak, the intersection operates at LOS D (average delay of 42 seconds per vehicle) with delays of 93 seconds per vehicle for the eastbound 125th Street approach.

Northbound First Avenue and southbound Second Avenue operate under a coordinated signal system resulting in high progression quality for the prevailing avenue traffic flows. The traffic signals all operate with 90-second cycles along both corridors between Houston Street and East 125th Street. The result is generally lower average delays for avenue traffic, since most of that traffic arrives at the signal during the green phase, but with higher delays for vehicles on the cross-streets.

A number of the cross-streets at analyzed locations serve as connections to major traffic access and egress points along the East Side of Manhattan, such as the Queens Midtown Tunnel (QMT) at East 34th Street, the Queensboro Bridge (QBB) at East 57th Street, the Triborough Bridge (TBB) ramps at East 125th Street, and the FDR Drive at many of points along the First Avenue corridor. Each one of these connections acts as a major “sink/source”, pulling traffic from or adding traffic to, the First Avenue and Second Avenue corridors.

Overall, the analysis intersections operate well during both peak hours since the prevailing traffic volumes along the avenues experience smaller delays due to the signal progression. A number of the cross-street approaches, specifically at East 23rd, 34th, and 57th Streets, and eastbound 125th Street at Second Avenue, have delays within the LOS E and F range. This is typically due to the traffic associated with the FDR Drive, QMT, QBB, and TBB.

Second Avenue operates at marginally acceptable LOS D at a number of locations during the AM peak, generally at analysis intersections between East 23rd and 57th Streets, and in the vicinity of East 96th Street. Furthermore, at some intersections, the avenues can experience more significant delays at times, particularly First Avenue at East 57th Street during the PM peak hour. Traffic demand toward the QBB causes heavy delays for the northbound left from First Avenue onto East 57th Street, resulting in increased turn delays for the lefts as well as additional delays for the adjacent northbound lanes. This is the one intersection that operates at an overall LOS E during the PM peak.

Parking Operations

An assessment of the existing parking conditions was undertaken at a limited number of locations on this corridor. The purpose of this analysis was to determine the existing parking demand at locations on the corridor as well as to obtain some information relating to the parking supply, turnover and occupancy characteristics at these locations. This information will also be used later in this Concept Plan to examine the impacts of the proposed BRT concepts on parking along the corridor.

On-street parking conditions were assessed within 6 different segments of First Avenue, 8 different segments along Second Avenue, and 2 segments on 125th Street. The blocks were surveyed for parking usage and duration for legal, illegal, and double parked vehicles as well as loading/unloading vehicles. The data were collected every 15 minutes for each parking space to determine the duration for which each vehicle was parked. Along this corridor, data were

collected during hours corresponding to the proposed BRT/bus dedicated lane operating hours discussed later in this concept plan.

The following summary highlights examples of the parking analysis on one sample block face within each segment in which it was collected.

First Avenue

1) First Avenue between East 7th and East 10th Streets
Data within this segment was collected during both peak periods on the east side of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

First Avenue between East 7th and St. Mark's Place – East side: There are 9 legal, 1-hour metered parking spaces on this block face. During the AM peak period, a total of 12 legally parked cars and 1 truck were observed to park for a mean duration of 29 and 15 minutes, respectively. One car parked illegally for a duration of 15 minutes. Three trucks were double parked or loading/unloading for a mean duration of 30 and 23 minutes, respectively. During the PM peak period, a total of 15 legally parked cars and 1 truck were observed to park for a mean duration of 70 and 15 minutes, respectively. One double parked truck and 2 loading/unloading trucks were observed for a mean duration of 15 minutes.

2) First Avenue between East 17th and East 20th Streets
Data within this segment was collected during both peak periods on the east side of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

First Avenue between East 18th and 19th Streets – East side: There are 5 legal, 1-hour metered parking spaces on this block face, in addition to a Taxi Stand. During the AM peak period, a total of 11 legally parked cars were observed to park for a mean duration of 68 minutes. Eight cars parked illegally for a mean duration of 19 minutes. One double parked truck and 1 loading/unloading truck was observed for a mean duration of 30 minutes. During the PM peak period, a total of 19 legally parked cars were observed to park for a mean duration of 41 minutes. Two cars parked illegally for a mean duration of 53 minutes. There were no double parked or loading/unloading vehicles observed.

3) First Avenue between East 55th and East 58th Streets
Data within this segment was collected during the AM peak period (7 AM to 10 AM) on the east side of the street.

First Avenue between East 57th and 58th Streets – East side: There are 2 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 2 legally parked cars and 5 trucks were observed to park for a mean duration of 30 and 21 minutes, respectively. Five cars parked illegally for a mean duration of 33 minutes. Two trucks were double parked for a mean duration of 15 minutes. Six loading/unloading trucks were observed for a mean duration of 20 minutes.

4) First Avenue between East 70th and East 73rd Streets
Data within this segment was collected during the AM peak period (7 AM to 10 AM) on the east side of the street.

First Avenue between East 71st and East 72nd Streets – East side: There are 9 legal, 1-hour metered parking spaces on this block face, however, "no stopping" regulations are in effect during

the survey period. During the AM peak period, a total of 2 illegally parked cars were observed to park for a mean duration of 15 minutes. There were no double parked or loading/unloading vehicles observed.

5) First Avenue between East 84th and East 87th Streets
Data within this segment was collected during the AM peak period (7 AM to 10 AM) on the east side of the street.

First Avenue between East 84th and East 85th Streets – East side: There are 8 legal, 1-hour metered parking spaces on this block face. During the AM peak period, a total of 20 legally parked cars and 1 truck were observed parking for a mean duration of 45 and 15 minutes, respectively. Two cars and 1 truck were doubled parked for a mean duration of 15 minutes. There were no illegal or loading/unloading vehicles observed.

6) First Avenue between East 114th and East 117th Streets
Data within this segment was collected during both peak periods on the east side of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

First Avenue between East 116th Street and East 117th Streets – East side: There are 3 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 8 legally parked cars were observed to park for a mean duration of 58 minutes. Two cars and 1 truck parked illegally for a mean duration of 15 and 5 minutes, respectively. There were no illegal or loading/unloading vehicles observed. During the PM peak period, a total of 5 legally parked cars and 5 trucks were observed to park for a mean duration of 57 and 51 minutes, respectively. One double parked car and 1 truck were observed to park for a mean duration of 30 and 15 minutes, respectively. There were no illegal or loading/unloading vehicles observed.

Second Avenue

1) Second Avenue between East 6th and East 9th Streets
Data within this segment was collected during both peak periods on the west side of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

Second Avenue between East 7th and St. Mark's Place – West side: There are 8 legal, 1-hour metered parking spaces on this block face. During the AM peak period, a total of 17 legally parked cars and 3 trucks were observed to park for a mean duration of 17 and 25 minutes, respectively. Four cars and 2 trucks were parked illegally for a duration of 15 and 30 minutes, respectively. Three loading/unloading trucks were observed for a mean duration of 40 minutes. During the PM peak period, a total of 29 legally parked cars and 3 trucks were observed to park for a mean duration of 38 and 20 minutes, respectively. Two cars parked illegally for a mean duration of 15 minutes. One car and 2 double parked trucks were observed for a mean duration of 15 to 30 minutes. Four trucks loaded/unloaded for a mean duration of 23 minutes.

2) Second Avenue between East 33rd and East 36th Streets
Data within this segment was collected during the Midday peak period (10AM to 4PM) on the west side of the street.

Second Avenue between East 33rd and East 34th Streets – West side: There are 3 legal parking spaces on this block face, in addition to a bus stop. During the Midday peak period, a total of 4

legally parked cars and 5 trucks were observed to park for a mean duration of 19 and 30 minutes, respectively. Seven cars were parked illegally for a duration of 45 minutes. Three double parked trucks were observed for a mean duration of 15 minutes. Seven loading/unloading trucks were observed for a mean duration of 24 minutes.

3) Second Avenue between East 39th and East 42nd Streets

Data within this segment was collected during the Midday peak period (10AM to 4PM) on the west side of the street.

Second Avenue between East 40th and East 41st Streets – West side: There are 7 legal parking spaces on this block face. During the Midday peak period, a total of 25 legally parked cars and 4 trucks were observed to park for a mean duration of 41 and 19 minutes, respectively. Three cars and 1 truck were parked illegally for a mean duration of 15 minutes. One loading/unloading truck was observed for a duration of 15 minutes. There were no double parked vehicles observed.

4) Second Avenue between East 61st and East 64th Streets

Data within this segment was collected during the Midday peak period (10AM to 4PM) on the west side of the street.

Second Avenue between East 61st and East 62nd Streets – West side: There are 7 legal parking spaces on this block face. During the Midday peak period, a total of 18 legally parked cars and 10 trucks were observed to park for a mean duration of 26 minutes. Two cars and 2 trucks were parked illegally for a mean duration of 15 to 30 minutes. One double parked truck was observed for a duration of 15 minutes. Eight loading/unloading trucks were observed for a mean duration of 28 minutes.

5) Second Avenue between East 69th and East 72nd Streets

Data within this segment was collected during the PM peak period (4PM to 7PM) on the west side of the street.

Second Avenue between East 70th and East 71st Streets – West side: There are 8 legal, 1-hour metered parking spaces on this block face, however, “no standing” regulations are in effect during the survey period. During the PM peak period, 4 cars were parked illegally for a mean duration of 15 minutes. There were no double parked or loading/unloading vehicles observed.

6) Second Avenue between East 85th and East 88th Streets

Data within this segment was collected during the PM peak period (4PM to 7PM) on the west side of the street.

Second Avenue between East 86th and East 87th Streets – West side: There are 7 legal, 1-hour metered parking spaces on this block face. During the PM peak period, a total of 24 legally parked cars and 2 trucks were observed to park for a mean duration of 39 and 15 minutes, respectively. One car was parked illegally for a duration of 15 minutes. There were no double parked or loading/unloading vehicles observed.

7) Second Avenue between East 92nd and East 95th Streets

Data within this segment was collected during the PM peak period (4PM to 7PM) on the west side of the street.

Second Avenue between East 92nd and East 93rd Streets – West side: There are 9 legal, 1-hour metered parking spaces on this block face. During the PM peak period, a total of 18 legally parked cars and 1 truck were observed to park for a mean duration of 41 and 15 minutes, respectively. Three cars and 4 trucks were parked illegally for a mean duration of 20 and 79 minutes, respectively. One car and 1 double parked truck were observed for a duration of 15 minutes. Two loading/unloading trucks were observed for a mean duration of 15 minutes.

8) Second Avenue between East 115th and East 118th Streets
Data within this segment was collected during the PM peak period (4PM to 7PM) on the west side of the street.

Second Avenue between East 115th and East 116th Streets – West side: There are 4 legal parking spaces on this block face, in addition to a bus stop. During the PM peak period, a total of 10 legally parked cars and 2 trucks were observed to park for a mean duration of 54 and 30 minutes, respectively. One car and 1 truck were parked illegally for a duration of 15 minutes. There were no double parked or loading/unloading vehicles observed.

125th Street

1) 125th Street between Fifth and Lexington Avenues
Data within this segment was collected during both peak periods on the north and south sides of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

125th Street between Park and Lexington Avenues – North side: There are 5 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 11 legally parked cars were observed to park for a mean duration of 44 minutes. Nine cars and 1 truck parked illegally for a mean duration of 43 and 30 minutes, respectively. One car was double parked for a duration of 30 minutes. There were no loading/unloading vehicles observed. During the PM peak period, a total of 21 legally parked cars were observed to park for a mean duration of 46 minutes. Three cars parked illegally for a mean duration of 30 minutes. There were no double parked or loading/unloading vehicles observed.

125th Street between Park and Lexington Avenues – South side: There are 5 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 11 legally parked cars were observed to park for a mean duration of 85 minutes. Ten cars parked illegally for a mean duration of 35 minutes. There were no double parked or loading/unloading vehicles observed. During the PM peak period, a total of 19 legally parked cars were observed to park for a mean duration of 49 minutes. Nine cars parked illegally for a mean duration of 30 minutes. There were no double parked or loading/unloading vehicles observed.

2) 125th Street between Broadway and Morningside Avenue
Data within this segment was collected during both peak periods on the north and south sides of the street, from 7 AM to 10 AM and 4 PM to 7 PM.

125th Street between Amsterdam and Morningside Avenues – North side: There are 27 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 22 legally parked cars and 1 truck were observed to park for a mean duration of 123 and 60 minutes, respectively. There were no illegal, double parked or loading/unloading vehicles observed. During the PM peak period, a total of 42 legally parked cars were observed to park for a mean duration of 116 minutes. Three double parked cars and 2 trucks were observed for a mean duration of 30 minutes. There were no illegal or loading/unloading vehicles observed.

125th Street between Amsterdam and Morningside Avenues – South side: There are 11 legal parking spaces on this block face, in addition to a bus stop. During the AM peak period, a total of 24 legally parked cars were observed to park for a mean duration of 81 minutes. Thirteen cars parked illegally for a mean duration of 67 minutes. One double parked truck and 1 loading/unloading truck were observed for a duration of 60 minutes. During the PM peak period, a total of 18 legally parked cars were observed to park for a mean duration of 110 minutes. Eighteen cars parked illegally for a mean duration of 118 minutes. One double parked truck was observed for a duration of 30 minutes. There were no loading/unloading vehicles observed.

PROPOSED BRT ELEMENTS

BRT Service Plan

The proposed BRT route would extend from the west side of 125th Street at Twelfth Avenue, to 125th Street and Second Avenue (for the southbound routing), and replace the existing M15 limited service on First and Second Avenues, operating between East 125th Street and Whitehall Street. The M15 local service would continue to operate as it does today, serving both the Whitehall and City Hall branch termini. Based on current ridership data and preliminarily forecasted future use, in the AM peak, BRT vehicles would operate in both directions on about 3-4 minute headway. The M15 local service on the two branches would operate in both directions on a combined 5 minute headway. Local buses would also benefit to some degree from the travel time savings and reliability within the exclusive BRT/bus lanes.

The BRT would stop at the following stations, from west to east on 125th Street, then north to south:

125th Street

- 125th Street and Twelfth Avenue Opportunity for off-board fare collection
- 125th Street and Broadway (1 subway)
- 125th Street and St. Nicholas Avenue (A B C D subway)
- 125th Street and Lenox Avenue (2 3 subway)
- 125th Street and Lexington Avenue/Park Avenue (Metro-North and 4 5 6 subway)
- 125th Street and Between First and Second Avenues (along the north side of 125th Street serving the westbound BRT) Opportunity for off-board fare collection
- East 125th Street/Second Avenue (transition from eastbound BRT on 125th Street to southbound Second Avenue)

First Avenue and Second Avenues

- East 116th Street
- East 106th Street
- East 96th Street
- East 86th Street
- East 72nd Street
- East 57th Street
- East 42nd Street
- East 34th Street
- East 23rd Street
- East 14th Street (L subway)
- Houston Street/Allen Street (F V subway)
- Grand Street

- St. James/Chatham Square
- Fulton Street/Seaport
- Wall Street (❷❸ Subway)
- Whitehall Terminal Station (❶Ⓡ Ⓦ Subway) Opportunity for off-board fare collection.

Running Ways

Running ways describe the type of right-of-way on which the BRT Vehicle will operate over the course of the route. The type of running way for a BRT system could range from a separated, exclusive right-of-way to operating in mixed traffic, where the BRT vehicle shares lanes with general traffic. The choice of running way for a particular BRT system is generally a function of the physical space available, but other considerations such as frequency of service can also be an input.

This corridor is discussed in segments:

- 125th Street from Twelfth Avenue to First and Second Avenues;
- First and Second Avenues from East 125th Street to East 96th Street;
- East 96th Street to East 59th Street;
- East 59th Street to Houston Street; and,
- Houston Street to Whitehall Street.

125th Street

The proposed concept plan for 125th Street would create bus lanes along both curbs of 125th Street from Twelfth Avenue on the west to First Avenue on the east for the westbound BRT/bus lane and to Second Avenue for the eastbound BRT/bus lane. The bus lanes would operate during the peak hours of 7 AM to 10 AM and 4 PM to 7 PM in both directions, Monday through Friday and possibly on weekends. Parking and deliveries would be removed during bus lane hours of operation.

BRT stations along 125th Street would be located primarily at intersections with subway stations and would be designated separately from the local bus stops. The BRT service would speed travel across 125th Street, while existing buses would provide local service along 125th Street.

The 125th Street/River-to-River Study, administered by the Department of City Planning (DCP), was initiated to generate a development framework for the entire 125th Street corridor between the Harlem and Hudson Rivers. The study's Advisory Committee, which includes over 100 individuals representing elected officials, local civic groups and cultural institutions, stakeholders, and Community Boards 9, 10 and 11, began meeting in late 2003. In response to the broad and diverse range of concerns expressed by the advisory group about the future of 125th Street, Deputy Mayor Daniel L. Doctoroff formed the 125th Street/River-to-River Interagency Working Group. In addition to DCP, the team consists of representatives from the Economic Development Corporation (EDC), and several other city agencies including the Departments of Cultural Affairs, Transportation, Small Business Services, and Housing Preservation and Development. The team is working together with the Advisory Committee to identify solutions for issues raised during the planning process.

A key element to providing BRT/bus lanes on 125th Street would be the removal of the bulb-outs currently existing at three midblock locations between Fifth Avenue and Frederick Douglass Boulevard. These bulb-outs facilitate pedestrian crossings, but cannot be used to the advantage of BRT service as they are signalized with crosswalks and prevent the implementation of

continuous bus lanes. Elimination of the bulb-outs does not necessarily require the elimination of the midblock signal and pedestrian crossing; however, this should be examined if BRT service along this segment is advanced. If the midblock crossings and signals were eliminated, pedestrians would be required to cross at the nearest intersections at the ends of those blocks.

Additionally, the evaluation of 125th Street included an assessment of a possible BRT alignment along 124th and 126th Streets, and determined that 125th Street is the only viable through-route option for this corridor. 124th Street does not extend the length of the corridor. Although 126th Street does extend from Second Avenue to Morningside Avenue, there is no viable eastbound counterpart, except 125th Street, unless 126th Street is altered to allow for two-way traffic flows. Both 124th and 126th Streets provide viable alternate routes for auto traffic to/from the Triborough Bridge, but are not viable candidates for top-quality BRT service, the goal of this project.

Should further analysis determine that designated bus lanes are not a viable option for 125th Street, it is recommended to terminate the BRT service at 125th Street and First and Second Avenues. Although crosstown service for connectivity with subway services is important, a BRT making all stops in mixed traffic is neither advisable nor required as there are currently several bus routes that provide crosstown service in mixed traffic.

First and Second Avenues

The BRT proposal for First and Second Avenues is a single, dedicated bus lane located one lane away from the curb lane and referred to as an "interior running lane". During peak hours, parking would be prohibited along the curb lane to provide additional capacity for transit. Bulb-outs would be implemented at BRT stations to allow the BRT to load without pulling to the curb, and to allow for a larger customer waiting area. In general, three general traffic lanes plus curbside access on the left-side curb would still be maintained (the curb lane across the avenue from the BRT/bus lane). This would allow a significant increase in bus throughput and require less enforcement than other alternatives.

Local buses will stop at the curb, not at the bulb-outs. The local stops should be on a different blockface than the BRT stations. Generally the local stops should be upstream from the BRT stations, with consideration to right-turn movements. In Phase II consideration will be given to where buses will stop during late night hours when only local service will operate.

Along the right-side curb (adjacent to the BRT lane), this proposed treatment would restrict curbside access during peak hours for all but right-turning vehicles (with right turn bays created at key locations to facilitate traffic flow). This would reduce the number of vehicles crossing the BRT lane for parking or loading/unloading during the key peak hours, but permits these curbside needs at other times of day. This scheme, then, most importantly allows for a dedicated bus lane 24 hours a day, 7 days a week.

First and Second Avenues: East 125th Street to East 96th Street - Along Second Avenue, the existing roadway would be re-striped to accommodate a 12-foot wide interior BRT/bus lane located one lane away from the curb. This would allow for a 10-foot curb bulb-out at the BRT station locations. Outside of peak hours, the curb lane would remain as curbside parking or other existing activity. Three general traffic lanes and curbside parking and/or deliveries along the opposite curb would remain along Second Avenue.

An alternative option for the configuration of traffic lanes on both 1st and 2nd Avenues would be to restrict parking on the opposite curb to the proposed Bus lanes. This would have the benefit of

providing an additional travel lane for general traffic, reducing the potential impact of the proposed interior bus lane on traffic movements.

Along First Avenue, the 12-foot interior BRT lane would allow for a 12-foot wide bulb-out and parking lane (non-peak hours only), with three general travel lanes and curbside parking on the opposite side of the street.

Should the extension of the BRT along 125th Street not advance, the northern terminus and final stop of the BRT would be along 125th Street between First and Second Avenues.

First and Second Avenues: East 95th Street to East 59th Street- The physical BRT treatment would remain the same as in the previous section, with the exception of Second Avenue between East 68th and East 59th Streets. In this section, the BRT would transition to operate in a curb bus lane as currently provided, due to the congestion and traffic movements near the entry and exit points to the Queensboro Bridge.

Although First Avenue is also impacted by traffic to and from the Queensboro Bridge, most activity is along the western side of the avenue, which does not prevent the continued bus lane along the east curb along this segment.

First and Second Avenues: East 58th Street to Houston Street - The physical BRT treatment would remain the same as in the previous section, with one interior bus lane and curb bulb-outs to accommodate BRT stations on both avenues. Exceptions where the BRT would run in a curb bus lane are found on both avenues. On Second Avenue, the BRT is proposed to operate in a curbside bus lane (as today) near the entrances to the Queens-Midtown Tunnel between East 42nd Street and East 34th Street. Along First Avenue, the BRT would operate in the existing curbside bus lane near the United Nations between East 41st Street and East 48th Street. At the tunnel exit on First Avenue, where the BRT would transition back to an inside running lane, traffic patterns will need to be carefully examined in the next phase.

The BRT is proposed to operate in mixed traffic along the segment near Bellevue Hospital and the NYU Medical Center between East 29th Street and East 34th Street. This will allow the BRT to move far left from the east curb, if necessary, to avoid the curbside congestion typical at these hospitals. The interior BRT/bus lane would resume on north side of East 34th Street.

Opportunities to provide additional priority for BRT vehicles will be examined at all transitions between running way types to allow the vehicles make these movements as quickly and seamlessly as possible.

Houston Street to Whitehall Street

Below Houston Street, no dedicated BRT lanes or bulb-outs have been proposed in this plan. Allen Street, however, is a wide roadway with a center median and three lanes in each direction. If community-based proposals to widen the median and/or the sidewalks on Allen Street are not implemented, or if the improvements do not narrow the roadway appreciably, then there is an opportunity to designate part of the roadway for curb bus lanes. If First and Second Avenue is selected as one of the five demonstration corridors, then opportunities for special treatments for buses along Allen Street will be explored.

Pavement Markings

Once the final five corridors have been determined then the appropriate markings will be designed to best fit the corridor and abutting land use. Certain basic elements such as word message (BUS

LANE) and color will be consistent among all corridors so as to ensure uniformity among corridors within the borough and within the city.

At transition points, for example in moving from the Interior Bus Lane at 66th Street to the Curb Bus Lane etc, special attention will be given to ensure clarity for the driving public.

Signage
Once the final five corridors have been established a unique signage package for each corridor will be developed. A basic curb-side parking design, spaced in accordance with New York City Department of Transportation (NYCDOT) standards, will include time of day requirements, for both the bus lane and allowable parking and deliveries, consistent with existing NYCDOT standard signage type and size.

Unique BRT overhead signage will clearly identify that a BRT lane does exist. It is envisioned that at least two overhead signs will be placed, depending upon the length of the block, one at the head and the other at mid block. If necessary a third sign may be located at the end of the block. Signage supports will be consistent with existing NYCDOT Bus Lane treatments in the city. At transition points where the character of the BRT lane may change special attention will be given to ensure clarity for the driving public.

Stations
Twenty-two new Stations (as listed in the Service Plan section of this Concept above) would be constructed for the First & Second Avenues-125th Street corridor. Stations will be constructed from available existing sidewalk space or from agreements formed with other City/State Agencies or private interests. BRT stations will include a range of features/elements beyond what is provided at existing NYCT bus stops. At this Phase of the Study, the exact location of each of the stations has not been decided; however, where feasible, it is the policy of NYCT and NYCDOT to provide far-sided stations, and that the BRT stations should be separate from other bus stops on the corridor.

For Phase 1, three basic types of stations have been identified: a terminal or large station; a medium station; and a basic station. The choice of station is dependent on the physical space available at each location as well as the ridership. At a minimum, each station will include the following:

- The BRT Icon – This Icon is the unique identifier of the system;
- Passenger Information Systems – Next bus arrival information; and,
- Route Map – highlighting opportunities to transfer to transit modes and lines.

The 2 figures located in the appendix of this Concept Plan provide an outline of the station types and features. It is the objective of the Study to provide the full array of passenger facilities at each station; however, given the nature of the corridors or parts of corridors (often located in highly built-up areas, with extensive competition for sidewalk space), this is not always possible.

On the First & Second Avenues-125th Street corridor, BRT station stops along First and Second Avenues would typically be constructed on bulb-outs that would allow for an expanded station shelter and waiting area, potentially equipped with Ticket Vending Machines and other technological improvements. It is the intention that the BRT stations would be separated from local M15 bus stops, which would be located on the next upstream block. Each of the proposed BRT station locations are listed in the previous section.

Ideally, shelters would be incorporated at all Stations. The type of shelter and station will likely vary by segment along this corridor as sidewalk widths vary, however, it is expected all stations on this corridor should have sufficient space available to construct medium-type stations based on the existing limited bus stop facilities. These stations would provide the three above features as well as Ticket Vending Machines (TVMs).

In terms of the BRT Icon, which is yet to be developed, this element would be included and consistent in the design of all BRT station types. This has a major role in the overall branding of the system, discussed later in this Concept Plan.

One of the features of the station designs is the integration of the BRT stations and the BRT vehicle's platform height. The platform height of the station will be consistent with the platform height of the vehicles to allow for safe boarding of the vehicles. In addition, it is proposed that the platform edge at stations be colored and textured, similar to subway platforms, so that visually-impaired riders can identify the platform edge. It also allows provides a safer waiting area for passengers as they should not wait on the edge of the platform.

Intelligent Transportation Systems (ITS) Elements

The range of ITS applications available for BRT includes Automatic Vehicle Location Systems (AVLC), Transit Signal Priority (TSP) and other Passenger Information Systems (PIS), such as on-board announcements and messages, relating to next stop or transfers. Other vehicle-based ITS applications would include devices for reading contactless fare media placed at each door to enable multiple door boarding (even a single such device at the front door would reduce dwell times). This could be coupled with a "non payment alarm" in the case of a multiple door application (see Fare Collection).

As will be described in the following section of the Concept, a number of locations have been identified for the provision of Transit Signal Priority. The purpose of such applications would be to allow the BRT vehicles to move in advance of general traffic, thus minimizing the overall congestion or intersection delays imposed on the BRT.

Automatic Vehicle Location Systems (AVLC)

New York City Transit is currently implementing an AVLC system across the bus network. This system will be called Service Management and Customer Information System or SMCIS. By monitoring the location of each of the BRT vehicles, information can be sent to each of the BRT stations as to the estimated arrival time of the next BRT. This has proven to be an extremely popular feature at BRT stations worldwide.

One of the other features of AVLC is that it can be introduced in conjunction with an upgraded traffic signal system. The AVLC system can determine if the vehicle is running on, ahead or behind schedule. In instances where a vehicle is operating behind schedule, and assuming the BRT vehicle fulfills a range of other criteria, the AVLC system can communicate to the traffic controller this information and then some form of priority (either as an extended green phase or an early green phase) can be provided to the BRT vehicle through a predetermined algorithm programmed in the traffic controller. At present, the NYCDOT traffic signal system is not compatible for such an application; however, ways of upgrading the system to allow such operations are under investigation. In addition, the ability and need to provide such priority corridor-wide or at particular problem locations is also being examined.

Transit Signal Priority

Traffic signals are critical to the successful management of traffic in cities. Providing for buses at traffic signals is likely to be the key component of a successful BRT corridor operation by stabilizing the reliability and travel times for each corridor. Being familiar with the limitations, capabilities and operating equipment of the New York City Department of Transportation's (NYCDOT's) Traffic Signal System will facilitate choosing the best approach to achieve the desired goal of improving bus travel through BRT.

There are many approaches and techniques that can be employed such as: Intersection Priority with the use of Selective Vehicle Detection or Automated Vehicle Detection; Route Priority which closely resembles the existing AM and PM peak hour priority already provided in most cases to the prevailing traffic flow; or an Area-Wide Priority similar to SCOOT (used in the UK) or SCATS (used in Australia). Other techniques include Pre-Signals, Queues Jumpers and Queue Relocation.

Along northbound First Avenue and southbound Second Avenue, the coordinated signal system operation results in high progression quality for the prevailing avenue traffic flows with all traffic signals operating on 90-second cycles between Houston Street and East 125th Street. Along these portions of the corridor, in the short term, Transit Signal Priority (extended green phase) could be implemented at major cross-streets to allow the BRT to advance across the intersection to each station, minimizing further delays at a red light. Key locations to study include:

- NYU Hospital-Bellevue (First Av / 30th Street)
- Queens Midtown Tunnel (First/Second Av at 36th Street)
- Queensborough Bridge (First Avenue 55th-59th Streets; Second Av 68th -59th Streets)
- 96th Street (both directions)
- Willis Avenue Bridge/Triborough Bridge (First Avenue 116th St-125th St)

In the longer term, with the development and implementation of the AVLC system, connectivity between NYCDOT and NYCT computers, and the integration of the new traffic signal controller and software, selective Transit Signal Priority could be provided corridor-wide for those BRT vehicles that are running behind schedule. This conditional form of priority would result in a more reliable operation and reduce bus bunching.

Below Houston Street, where the BRT operates in mixed traffic through the congested neighborhoods of the Lower East Side and Chinatown, transit signal priority could allow the BRT to advance more quickly and reliably. One particular point of congestion is where Pearl Street crosses under the Brooklyn Bridge.

BRT Vehicles

BRT vehicle design affects every aspect of system performance and cost. The appearance, both external and internal is a key contributor to the over-all system's image, identity and position in the transportation market place.

Vehicles should provide sufficient passenger capacity at comfortable loading standards (i.e., 3 standees per square meter in North America) for anticipated ridership levels and planned service structure and frequencies. All corridors where BRT is being considered can justify articulated, 18-meter, or 60-foot vehicles configured to provide maximum capacity and facilitate internal circulation as well as boarding and alighting. The current M15 services operate with 60 ft high-floor, two door, articulated vehicles.

Travel time surveys conducted in the spring of 2005 suggest that passenger service (boarding and alighting time) occupies an inordinate amount of total revenue service time. Accordingly:

- Vehicles should be easy and rapid to board and alight from. Low floor heights (i.e., less than 15 inches above pavement level) are desirable unless technologies permitting safe and reliable level boarding and alighting (e.g., rapidly deployed ramps/bridges, some type of precision docking mechanism) could be used.

- A sufficient number of self-opening doors of sufficient width should be included, especially with the provision of off-board fare collection. Generally, to reduce the dwell time one stream (two streams per door) should be provided for each ten feet of vehicle length.

The use of specialized BRT vehicles is often desirable for high volume routes (e.g., current limiteds) where the operational cost savings of the specialized vehicles will offset their incremental maintenance costs. The cost of such vehicles should be considered on a life-cycle basis as some of the features that add to initial acquisition costs (e.g., identity, unique seat and door configuration, propulsion system, etc.) have the potential to reduce ongoing operating and maintenance costs, increase passenger revenue and add to vehicle service life. Initially, BRT service can be operated with the current fleet of buses.

Most BRT systems, much like rail transit systems, also utilize a variety of customer communications devices that make it easier for them to use the system. One such device recommended for NYC is strip maps over each door. Another recommended customer information provision is an ITS application that visually and audibly announce the next stop so that passengers do not have to cluster around the front window to see when their stop comes up.

Just as for rail rapid transit, it is critical that the vehicle planning and design be fully integrated with planning and design for other BRT elements such as running ways, stations, fare collection and service plans if the over-all system is to achieve its maximum effectiveness and efficiency.

Fare Collection Strategy

Fare Structure – No changes in fare policy are anticipated for BRT in New York City. The existing structure will be maintained in line with the existing bus and subway flat fare. Time and monetary (electronic purse) based fares levels should be maintained.

Fare Media – MTA-NYCT is continuing to move towards the use of Contactless fare media. The implementation of this technology system-wide would allow for integrated ticketing and facilitate lower dwell times at stations. It is necessary to be able to demonstrate the viability of electronic readers at each bus door. BRT corridors could well offer an opportunity to deploy the technology on buses. Since cash fares are not accepted, fare media will be made available.

The use of monetary (coin) transactions should not be allowed on the BRT in order to help support the image of a higher quality of service (coins are not allowed on the subway) as well as to speed the overall service.

Fare Collection Process – Where physically possible, off-board fare collection should be provided at BRT stations. The use of double-stream, multiple-door buses will facilitate the overall rapid transit objectives. This process could be expedited through the use of barrier controlled areas where space permits. At locations where sufficient sidewalk space permits, such as route termini and other high volume boarding points, entry controlled areas be provided that would facilitate speedier boardings and reduce the level of fare evasion.

The potential off-board fare collection opportunities are listed as follows:

- 125th Street, between 1st and 2nd Avenue; and,
- Whitehall Terminal Station.

Further details of how the fare collection strategy may be implemented will be devised in Phase 2 of the Study.

Enforcement

The time-saving attraction of BRT, maintaining service reliability to make it a mode-of-choice, and realizing the operating costs that will keep it viable are all dependent on free-flowing Running Ways. This is attained most effectively on dedicated rights-of-way, but the BRT network will not enjoy this, therefore signage/markings, driver education, and enforcement will be the determinants of whether BRT operating performance matches design.

Since signage is critical for enforcement it must be clear, distinctive, and plentiful, and strategies are in place to help assure that:

- Violation of the running way is minimized;
- Violations reflect deliberate driver action (not error);
- Dealing with violators is legally actionable; and,
- Enforcement actions include both immediate actions and longer-term behavior modification.

One component of the enforcement strategy should be done conventionally, using New York City Police Department (NYPD), and NYPD Traffic Enforcement Agents in roving patrols, tow trucks, on specifically focused locations. They would use their police powers to remove trespassing vehicles (by direction or towing), and issue summonses to violators in a manner that will minimize further disruption on the Running Way. Though this is the most effective and the highest cost operating strategy, it is the only one to offer the option of a 'moving violation'. The potential court cost, license points, and subsequent insurance impact of a 'moving violation' is the most potent deterrent to repeat violations. This enforcement strategy must have advance commitment and planning among NYPD, NYCDOT, and NYC Transit. It should be tailored to deal with illegal parking and parking patterns in formerly-legal curb space that have be reclassified as a Running Way. This is a key step that must precede BRT implementation in each corridor.

Intelligent Transportation Systems (ITS) technology offers a second approach to keep Running Ways clear through enforcement. A model for this could be Transport for London, which uses more than 500 roadside cameras and 900 bus-mounted video cameras to enforce its numerous bus lanes. The roadside cameras take multiple photos of intruding vehicles and their license plates. Charges are assessed against the registered owner of the vehicle in a process similar to NYC's red-light enforcement program. Bus-mounted cameras use video and are tied into the Automatic Vehicle Location (AVL) system in a manner such that recording is done only when buses are using a bus lane, with time and location imprinted on the video. A variation of this, under test in Southwark, London, employs a similar technology mated to architecturally-distinctive cantilevered poles that may offer the opportunity to mate BRT-specific design treatments in New York City to enforcement. The model for the back-office photo review and violation charges exists today in the MTA's E-Z pass Customer Service Center and NYCDOT'S Red Light Camera Program.

These ITS enforcement strategies must clear certain hurdles before implementation.

- Enforcement on public streets will require State Legislative action similar to the legislation required for the implementation of the red-light enforcement program The red-light has the aura of saving lives; a broad consensus will be needed to establish to the Legislature that BRT Running Ways rise to the same level of public benefit.
- Costs of cameras, maintenance, and violation processing will have to be assessed and funded.

AVL is still in the formative stages in New York City, and is unlikely to be in place for all BRT corridors. Camera enforcement should be capable of linkage to AVL, but not dependent on it.

Branding/Image

The multiplicity of languages spoken by residents of NYC along with the very high numbers of tourists suggest that making BRT routing and access points easier to understand should be a key objective. Accordingly, it is recommended that elements of the proposed BRT system be distinct from other local, limited or express services. This would not only be a benefit to the tourists, but would be something that all existing and/ potential transit riders would benefit greatly from. The unique branding/image of a system will run through each element of the system including vehicles, stations, running ways etc. As this Study advances, the specific details with regards to branding and identity will be refined. The features of the branding image will include:

- Distinct pavement marking and pavement color scheme;
- A distinct appearance for BRT vehicles;
- The BRT Icon;
- Design of BRT Station; and,
- Consistent graphics throughout.

While it is recognized the existing MTA-NYCT bus operations are viewed in the highest regard, it is considered necessary to promote and market the proposed BRT system with similar attributes to other rapid transit modes.

IMPACT OF ELEMENTS

Impact of BRT Proposals at Key Intersections

The assessment of potential significant traffic impacts of the proposed BRT plan is based on significant impact criteria defined in the *CEQR Technical Manual*. For No Build LOS A, B, or C conditions that deteriorate to unacceptable LOS D, E, or F in the future Build condition, a significant traffic impact is defined. For a No Build LOS D, an increase of Build delay by 5 or more seconds is considered a significant impact if the Build delay meets or exceeds 45.0 seconds. For a No Build LOS E, the threshold is a 4-second increase in Build delay; for a No Build LOS F, a 3-second increase in Build delay is significant. However, if a No Build LOS F condition already has delays in excess of 120 seconds, an increase in Build delay of more than 1 second is considered significant.

2013 No Build Conditions

The No Build analysis is a study of future conditions without the proposed action of providing a BRT treatment to First and Second Avenues. This future scenario serves as a base condition by which the Build, i.e. the future with the proposed action, is compared. Through this comparison impacts attributable to the BRT treatment are identified and mitigated accordingly.

Traffic growth along the First Avenue and Second Avenue corridors was projected by NYC DOT as follows:

- 1.00 percent per year for locations from East Houston Street to East 23rd Street;
- 1.15 percent per year for locations from East 34th Street to East 57th Street;
- 1.00 percent per year for locations from East 72nd Street to East 96th Street; and
- 1.15 percent per year for locations from East 106th Street to East 125th Street.

Appropriate growth rates were applied to all traffic movements at all analysis intersections. It should be noted that the traffic signal timings have not been amended from the 2005 Existing Conditions analysis performed. The following intersections are expected to reach capacity by 2013 due to background traffic growth alone:

- First Avenue and East Houston Street – This intersection is forecast to approach capacity with an overall LOS D (44 seconds per vehicle) during the AM peak and LOS D (47 seconds per vehicle) during the PM peak.

- First Avenue and East 23rd Street – It is anticipated that this intersection will fail at LOS E (58 seconds per vehicle) during the AM peak due to significant delays at the east and westbound approaches of 23rd Street; and reach LOS D (40 seconds per vehicle) during the PM peak.

- First Avenue and East 34th Street – This intersection is forecast to approach capacity with an overall LOS D (42 seconds per vehicle) during the AM peak and LOS D (44 seconds per vehicle) during the PM peak.

- First Avenue and East 42nd Street – This intersection is forecast to approach capacity with an overall LOS D (43 seconds per vehicle) during the AM peak and LOS D (41 seconds per vehicle) during the PM peak.

- First Avenue and East 57th Street – During the PM peak, this intersection will fail at LOS F (average delays of 93 seconds per vehicle) with significant levels of congestion on all approaches. The intersection should remain at LOS C (32 seconds per vehicle) during the AM peak.

- Second Avenue and East 23rd Street – This intersection is forecast to approach capacity during the AM peak with overall average delays of 42 seconds per vehicle (LOS D). The intersection should remain at LOS C (29 seconds per vehicle) during the PM peak.

- Second Avenue and East 34th Street – This intersection is forecast to approach capacity during the AM peak with overall average delays of 47 seconds per vehicle (LOS D). The intersection should remain at LOS C (32 seconds per vehicle) during the PM peak.

- Second Avenue and East 42nd Street – This intersection will fail at LOS E for both the AM and PM peak periods, with overall average delays of 76 seconds and 63 seconds per vehicle respectively. All individual movements will fail during the AM peak and all but one in the PM peak.

- Second Avenue and East 57th Street – During the AM peak, this intersection will fail at LOS E (average delays of 77 seconds per vehicle) with all individual approaches also failing. The intersection should remain at LOS D (43 seconds per vehicle) during the PM peak.

- Second Avenue and East 72nd Street – This intersection is forecast to approach capacity during the AM peak with overall average delays of 51 seconds per vehicle (LOS D). The intersection should remain at LOS C (28 seconds per vehicle) during the PM peak.

- Second Avenue and East 86th Street – This intersection is forecast to approach capacity during the PM peak with overall average delays of 50 seconds per vehicle (LOS D). The intersection should remain at LOS C (25 seconds per vehicle) during the AM peak.

- Second Avenue and East 96th Street – This intersection is forecast to approach capacity with an overall LOS D (54 seconds per vehicle) during the AM peak and LOS D (46 seconds per vehicle) during the PM peak.

- Second Avenue and East 116th Street – This intersection will fail at LOS E for both the AM and PM peak periods, with overall average delays of 71 seconds and 58 seconds per vehicle respectively.

- Second Avenue and East 125th Street – This intersection will fail at LOS E for both the AM and PM peak periods, with overall average delays of 75 seconds and 56 seconds per vehicle respectively.

As outlined above, projected traffic growth is expected to worsen existing traffic delay at all intersections and bring many to failure by 2013, especially those currently at or near capacity. Most of those intersections would likely degrade from marginally acceptable LOS D to unacceptable levels of service.

2013 Build Conditions

Build condition analysis was undertaken with HCS with the same input volumes as for the No Build condition outlined above. Lane modifications were then made as appropriate to reflect proposed BRT improvements. At most locations, the interior running lane BRT treatment necessitates the conversion of one general travel lane to a BRT/bus-only lane, as well as the formation of exclusive right turn lanes adjacent to the BRT/bus-only lane.

The assessment of potential significant traffic impacts of the proposed BRT Plan, based on the *CEQR Technical Manual* impact criteria is outlined below. Intersections that are not listed are not expected to be significantly impacted by the Plan:

- First Avenue and East 14th Street – During the AM peak period, it is anticipated that the 2013 Build alternative will result in overall intersection performance at LOS F with average delays of 91 seconds per vehicle. Due to the results of AM peak No Build analysis (LOS C, 31 seconds delay per vehicle); this is considered a potentially significant impact. Potential significant impacts are also anticipated in the PM peak period which will operate at LOS D with overall average delays of 50 seconds per vehicle.

- First Avenue and East 34th Street – During the PM peak period, it is anticipated that the 2013 Build alternative will result in overall intersection performance at LOS E with average delays of 56 seconds per vehicle; this is considered a potentially significant impact. Potential significant impacts are not anticipated during the AM peak period.

- First Avenue and East 42nd Street – During the PM peak period this intersection will fail at LOS F with overall average delays of 85 seconds per vehicle, mainly due to severe congestion of the First Avenue northbound left and through movements. The overall

increase in average delays from 41 seconds in the No Build condition (LOS D) qualifies as a potentially significant impact. No significant impacts are expected in the AM peak.

- First Avenue and East 57th Street – Potentially significant impacts are anticipated at this intersection in both the AM and PM peak periods, with overall average delays increasing to 91 seconds per vehicle and over 120 seconds per vehicle respectively (LOS F). These impacts are mainly due to increased congestion of northbound traffic on First Avenue.

- First Avenue and East 72nd Street – Potentially significant impacts are forecast at this intersection during the AM peak period, with overall average delays of 76 seconds per vehicle (LOS E) as compared to 30 seconds per vehicle (LOS C) in the No Build condition. Potentially significant delays are also anticipated during the PM peak period which will operate at LOS D (35 seconds per vehicle) as compared to LOS B (17 seconds per vehicle) in the No Build condition. These delays are again due to increased congestion of the through and left turn movements on the First Avenue approach under the Build alternative.

- First Avenue and East 86th Street – Potentially significant impacts are anticipated at this intersection in both the AM and PM peak periods, with overall average delays increasing to 41 seconds per vehicle (LOS D) and 58 seconds per vehicle (LOS E) respectively. These impacts are mainly due to increased congestion of northbound traffic on First Avenue.

- First Avenue and East 96th Street – It is anticipated that the Build alternative will result in overall average delays of 107 seconds per vehicle (LOS F) during the PM peak period, as compared to 41 seconds per vehicle (LOS D) for the No Build. This potentially significant impact is due to major congestion of general northbound traffic on First Avenue. Significant impacts are not anticipated during the AM peak.

- First Avenue and East 106th Street – Potentially significant impacts are anticipated during the PM peak period, where the Build condition will operate with overall average delays of 69 seconds per vehicle (LOS E) compared to 18 seconds per vehicle (LOS B) in the No Build condition. Again, this potentially significant impact is a result of increased congestion of general northbound traffic on First Avenue. Significant impacts are not anticipated during the AM peak.

- First Avenue and East 116th Street – Major congestion of general northbound First Avenue traffic during the PM peak will result in overall average intersection delays of 108 seconds per vehicle (LOS F), as compared to 30 seconds per vehicle (LOS C) for the No Build condition. Significant impacts are not anticipated during the AM peak.

- Second Avenue and East 23rd Street – Potentially significant impacts are anticipated during the AM peak period, where the Build condition will operate with overall average delays of 107 seconds per vehicle (LOS F) compared to 46 seconds per vehicle (LOS D) in the No Build condition. All movements are expected to fail at LOS E or F. Significant impacts are not anticipated during the PM peak.

- Second Avenue and East 34th Street – It is anticipated that the Build alternative will result in overall average delays of 63 seconds per vehicle (LOS E) during the AM peak period, as compared to 47 seconds per vehicle (LOS D) for the No Build. This potentially significant impact is mainly a result of increased congestion of general southbound traffic on Second Avenue. Significant impacts are not anticipated during the PM peak.

- Second Avenue and East 42nd Street – Potentially significant impacts are anticipated at this intersection in both the AM and PM peak periods, with overall average delays increasing to 111 seconds per vehicle and 94 seconds per vehicle respectively (LOS F). These impacts are mainly due to major congestion of southbound traffic on Second Avenue.

- Second Avenue and East 57th Street – Potentially significant impacts are anticipated during the AM peak period, where the Build condition will operate with overall average delays of 91 seconds per vehicle (LOS F) compared to 77 seconds per vehicle (LOS E) in the No Build condition. All movements except the proposed curbside bus / right turn lane are expected to fail. Significant impacts are not anticipated during the PM peak which will.

- Second Avenue and East 72nd Street – Potentially significant impacts are anticipated at this intersection in both the AM and PM peak periods, with overall average delays increasing to 112 seconds per vehicle and 98 seconds per vehicle respectively (LOS F). These impacts are mainly due to major congestion of southbound traffic on Second Avenue.

- Second Avenue and East 86th Street – This intersection will perform very poorly under Build conditions with overall average intersection delays of over 120 seconds per vehicle during both the AM and PM peak periods. These significant impacts are again a result of excessive delays for southbound through traffic on Second Avenue.

- Second Avenue and East 96th Street – Increased delays on Second Avenue southbound will result in potentially significant impacts on this intersection during both the AM and PM peaks, with overall average delays increasing to 109 seconds and 108 seconds per vehicle respectively (LOS F) as compared to 54 seconds and 46 seconds per vehicle (LOS D) under No Build conditions.

- Second Avenue and East 106th Street – It is anticipated that the Build alternative will result in overall average delays of 67 seconds per vehicle (LOS E) during the AM peak period, as compared to 30 seconds per vehicle (LOS C) for the No Build. This potentially significant impact is again a result of increased congestion of general southbound traffic on Second Avenue. Significant impacts are not anticipated during the PM peak.

- Second Avenue and East 116th Street – Potentially significant impacts are anticipated at this intersection in both the AM and PM peak periods, with overall average delays increasing to 106 seconds per vehicle and 118 seconds per vehicle respectively (LOS F). These impacts are mainly due to major congestion of southbound traffic on Second Avenue.

As evident from these results, First Avenue and Second Avenue would experience significant delays due to the loss of capacity under the proposed BRT plan without traffic engineering improvements applied to mitigate those impacts. The impact is more apparent for the avenue approaches that are at or very near capacity under the 2013 No Build condition. There would be a considerable increase in the number of intersections operating at overall LOS E or F, due to the increased delays for the prevailing avenue traffic. There would be 15 intersections in the AM peak hour and 14 intersections in the PM peak hour with a significant impact for at least one traffic movement.

During the AM peak, these locations would include the First Avenue approaches at East 14th, 57th, and 72nd Streets, and the Second Avenue approaches at East 23rd Street and locations analyzed

between East 42nd and 116th Streets. There is a greater impact to Second Avenue than First Avenue during the AM peak since the former carries the prevailing southbound traffic during that time period. During the PM peak, there would be substantial delays along First Avenue at East 42nd and 57th Streets and at locations analyzed between East 86th and 116th Streets, as well as the Second Avenue approaches at East 42nd Street, locations analyzed between East 72nd and East 96th Streets, and at East 116th Street.

It should be noted that analysis results for First Avenue at East 57th Street indicate that the BRT treatment would cause a significant "choke point" at the northbound approach during the PM peak. As discussed in the Existing Conditions section, the left-turn demand onto East 57th Street is very high, typically necessitating vehicles to form two turning lanes. The projected future traffic growth and the loss of a general moving lane, replaced by the BRT/bus-only lane, would worsen the congestion unless mitigation is provided. The 2013 Build delays are expected to be approximately three minutes per vehicle on average for the left-turn and through movements.

Similar to First Avenue at East 57th Street, the northbound approach at East 96th Street currently experiences a high right-turn demand onto East 96th Street toward the FDR Drive during the AM peak, and vehicles typically form two turning lanes in the Existing Condition. In the 2013 Build condition with the BRT treatment, however, the right-turning vehicles would have to turn from a single curbside turning bay. The projected right-turn demand could queue to the upstream intersection. The proposed parking prohibition along the entire east curbside between East 95th and 96th Streets should be sufficiently enforced to ensure that the right-turn queue has enough storage space and does not spillback into the adjacent BRT/bus lane, hindering bus flow. However, there would be opportunities to improve the Build condition through mitigation strategies should this corridor progress.

The only cross-street that would experience delay impacts due to the implementation of BRT would be East 125th Street at Second Avenue. The addition of BRT/bus-only lanes in both directions along the street would cause additional delays at the intersection with Second Avenue for the westbound approach during the AM peak, and the eastbound approach during the PM peak. The impacts would be the result of lane re-striping (narrowing) of the general travel lanes to accommodate the new BRT/bus-only lanes. The proposed BRT station between First and Second Avenues and the increased BRT frequency would also impact capacity on East 125th Street.

Impact of BRT Proposals on Parking Operations

Generally, BRT would operate on exclusive interior BRT/bus lanes during all times of day along First and Second Avenues. Under this scenario, curbside access on the east side of First Avenue and the west side of Second Avenue would be restricted during the AM and PM peak periods. Along 125th Street, all parking and curbside access would be restricted during the dedicated BRT/bus lane operating hours in the AM and PM peak hours.

As illustrated in the parking inventory of selected blocks on the 1st/2nd Avenues and 125th Street Corridor, presented earlier in this Concept Plan, there is a high-demand for parking throughout the Corridor. Consequently, it is likely that the proposal to relocate this parking will be a concern with both residents and business owners in the area.

Should this corridor be selected to proceed to Phase 2 of the Study, the question of parking will remain a central element to be addressed. The estimated ridership levels (discussed in a later section), support the assertion that the provision of a quality running way for the BRT in the Peak periods must remain a priority on this corridor and therefore the provision of Bus Only lanes is essential.

Potential Travel Time Savings

A preliminary assessment of the potential travel time savings arising from the provision of BRT on each corridor has been completed. A methodology was constructed upon which to base the potential travel time savings. This methodology is summarized as follows:

- A template for each corridor was provided by New York City Transit. This template provides calculations for stop to stop distance and travel time between each stop, derived from recent schedules. This form also presents the number of stops skipped going from the base case service to BRT service. For corridors that currently have limited stop service, this form shows the number of current limited stop locations that were eliminated. For corridors that have local service only, this form presents the total number of stops skipped.

- Time savings for each stop skipped comes from three sources; acceleration and deceleration time, pull in/pull out time, as well as door open/close time. The savings in acceleration and deceleration time is assumed to be 5 seconds per skipped stop. Pulling into and out of traffic is estimated to take 10 seconds. Door open/close time is assumed to take another 5 seconds. This results in a time savings of 20 seconds per stop skipped. The percentage of stops that each bus makes was calculated based on the most recent ride checks for the primary route on the corridor.

- Calculation of time savings from the addition of curb or interior bus lanes where they did not previously exist reflects empirical observations on bus lane performance, but typically savings are in the range of 1.00 - 1.25 minutes per mile.

- Where right turn conflicts will be removed (e.g., by addition of an interior bus lane), a savings of 10 seconds per major intersection is assumed.

- Queue jumpers, where provided, are estimated to save 10 seconds per intersection. To achieve a more specific average time savings would require a traffic study of each of the affected intersections, and would still be contingent on what part of the traffic light cycle the bus would arrive during. A 10 second average is a modest average estimate.

- Bus bulbs will result in 10 seconds of time savings as these stop treatments remove the need to pull into and out of stops, which takes 10 seconds (as stated above).

- The total time improvement due to a given BRT scheme for a given existing route is calculated as the sum of the individual savings from the sources noted above.

- Total revenue times for the new BRT route is calculated by subtracting the total time saved from the current limited or local running time for the respective route(s).

- In Phase II, there will be consideration of time savings for reduction of dwell time – the change in high-floor to low-floor vehicles, adding a third door, and contactless fare media technology.

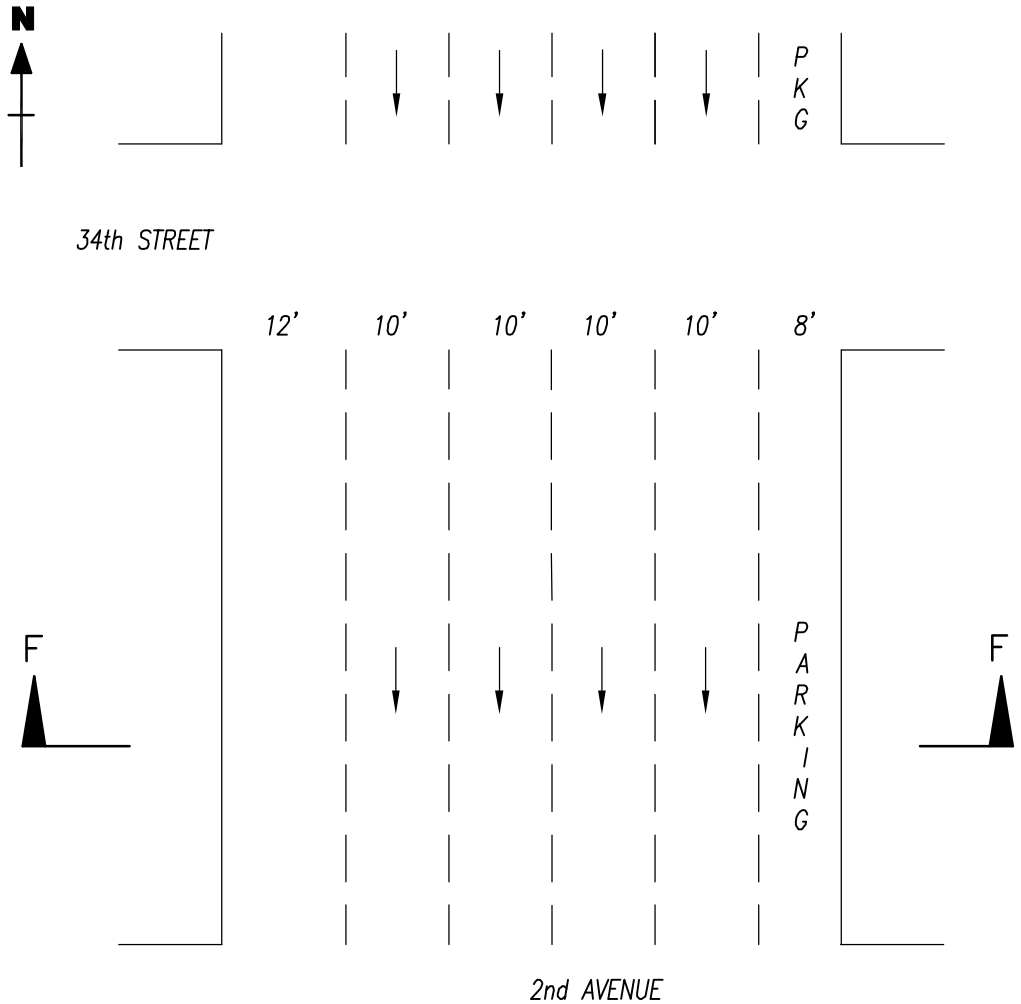
- Because off-board fare collection is not a certainty, no time savings from faster boarding was included.

Using the above method, it has been estimated that the proposed BRT would operate about 13-18% faster in the segment on First and Second Avenues. For entire route distance, including the extension across 125th Street it has been estimated that the proposed BRT would operate about

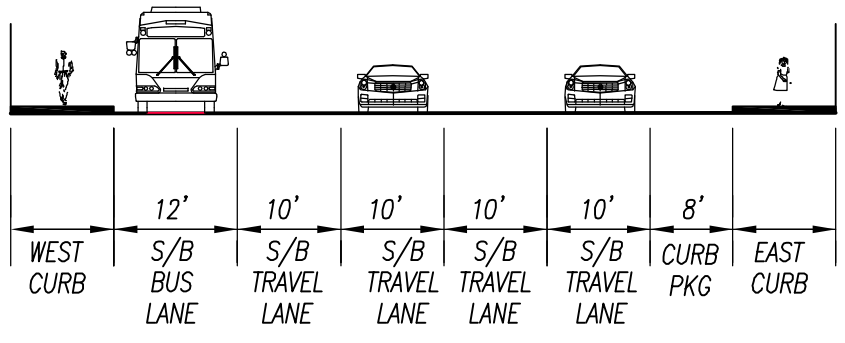
20-24% faster. A greater increase in speed is projected on 125th Street because currently all service is local and there no bus lanes.

Potential Ridership

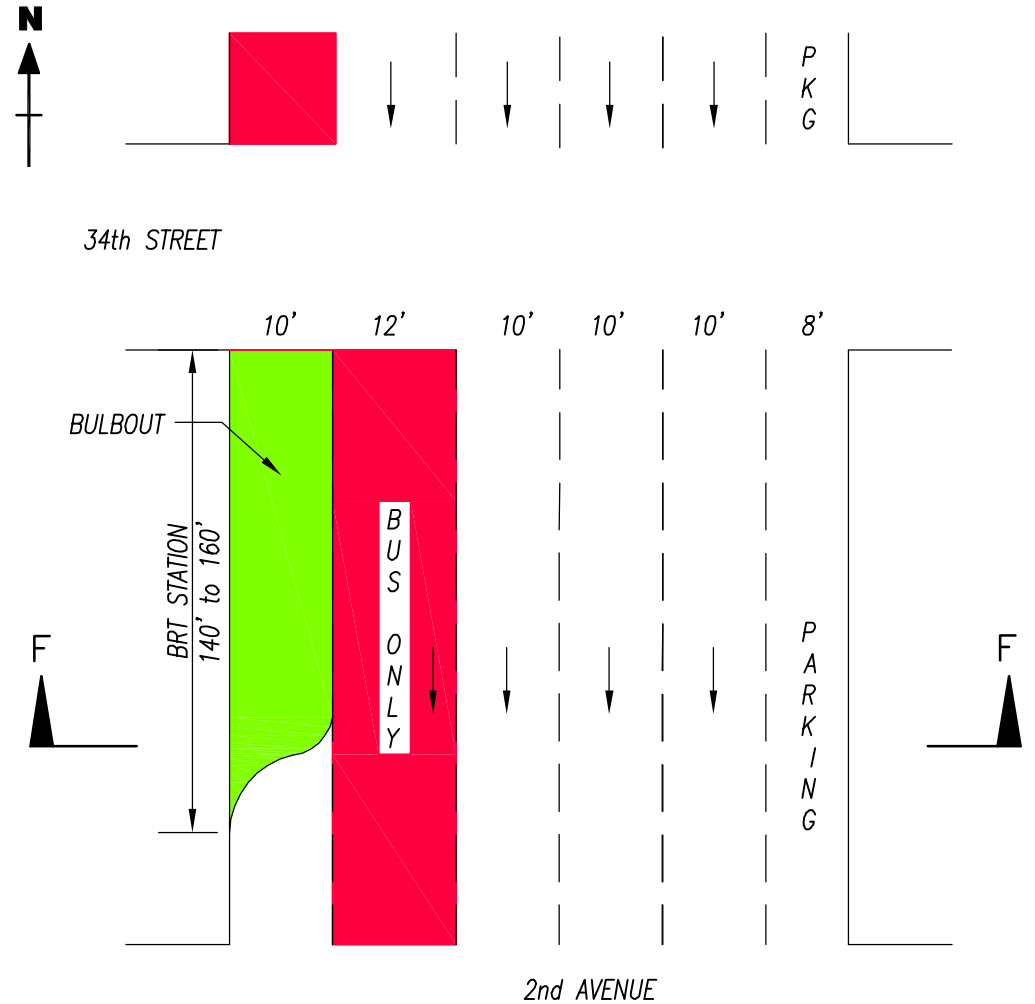
As in the case of the potential travel time savings a preliminary estimate of the potential BRT ridership for each corridor was also completed. Again, rather than undertake an onerous demand forecasting exercise, this assessment was constructed by following a series of rules developed from empirical observations on the characteristics of BRT ridership in other US cities. For example, where no limited stop bus service exists on a corridor, it was decided that 60% of the riders on the local service would switch to BRT. Where a limited stop service does exist, 100% of the limited stop riders would switch to BRT, and in addition, an extra 10% of local service riders would also avail of the improved BRT service. In Phase 2, latent demand and shifts from other modes will be determined.



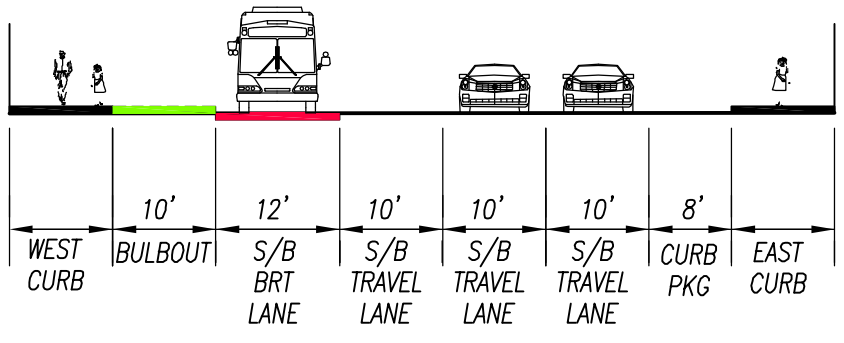
EXISTING LAYOUT



SECTION F



PROPOSED LAYOUT



SECTION F

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: J. JENKINS	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

CONTRACT CM–1286

NEW YORK CITY BUS RAPID TRANSIT STUDY

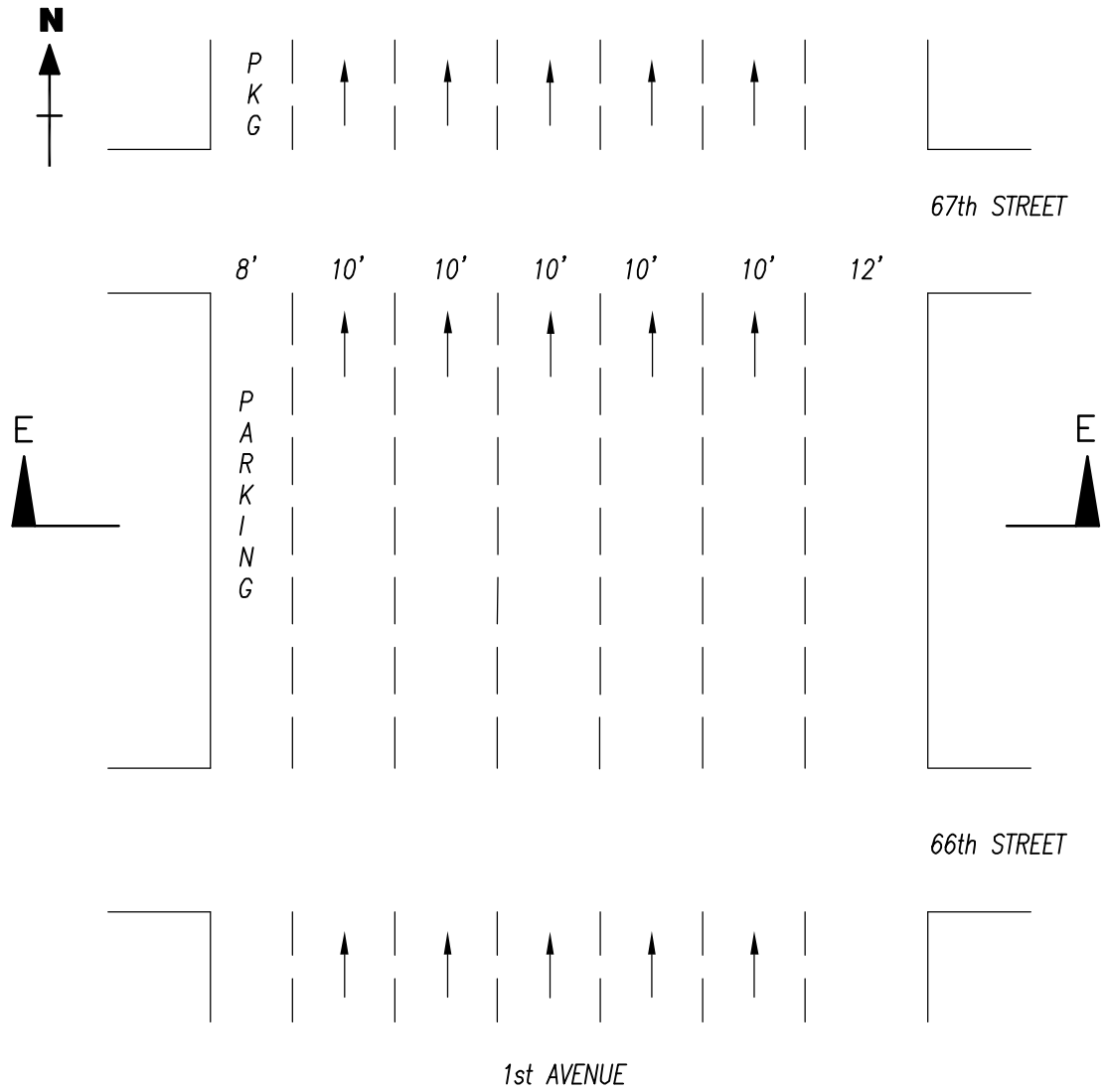
DRAWING TITLE: 1st/2nd AVENUE CORRIDOR SECTION F–F 2nd AVE @ 34th ST.

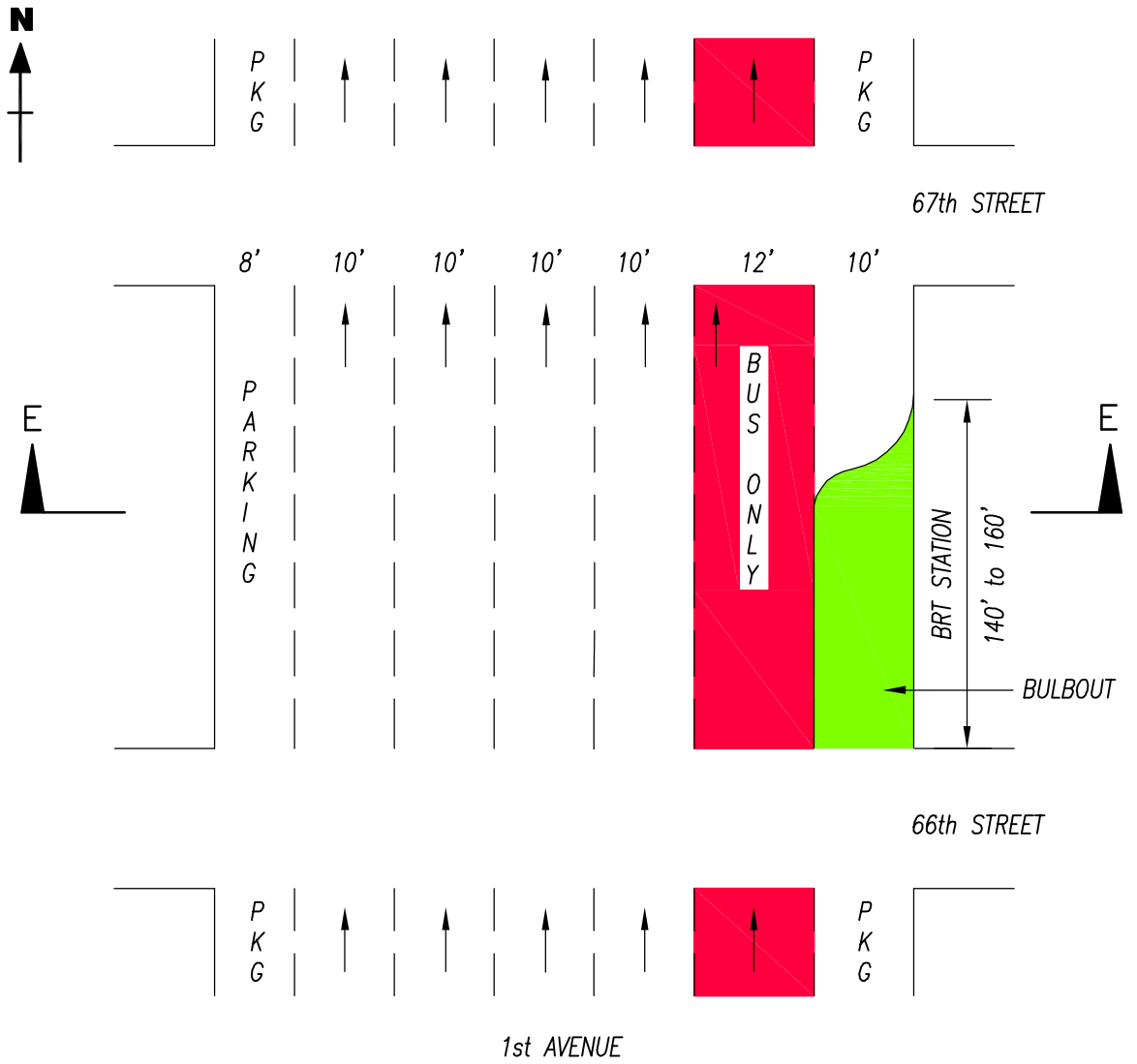
SCALE:	DATE:
NTS	09/09/05

FIGURE 10

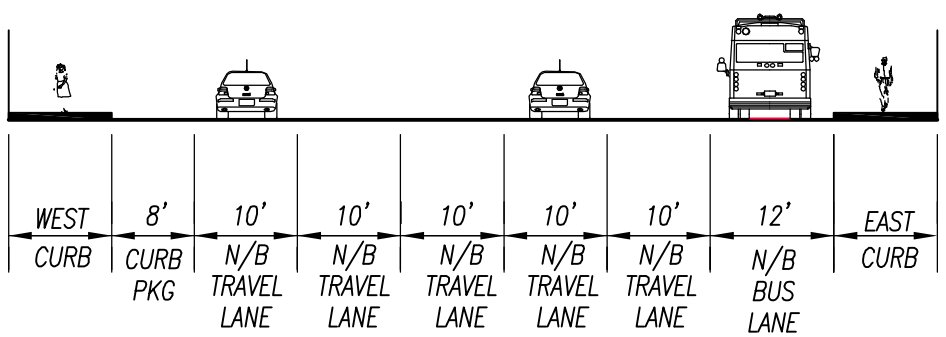
REVISION:	SHEET No:
0	

J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-FF_1st&2nd_AVE.dwg, SECTION FF-1st&2nd_AVE, 4/7/2006 2:19:26 PM



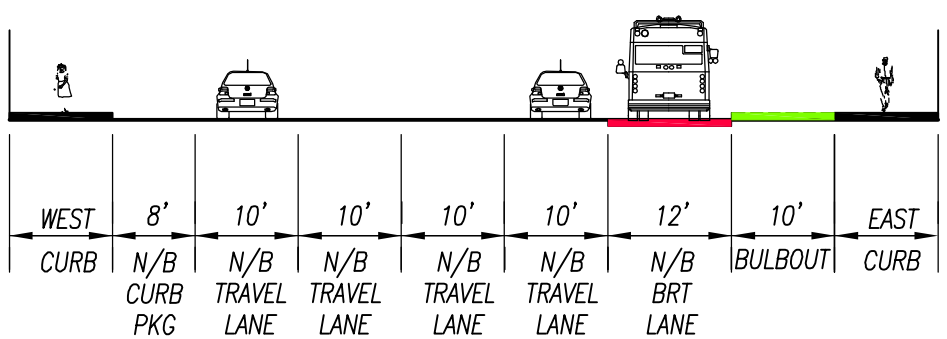


EXISTING LAYOUT



SECTION E

PROPOSED LAYOUT



SECTION E

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

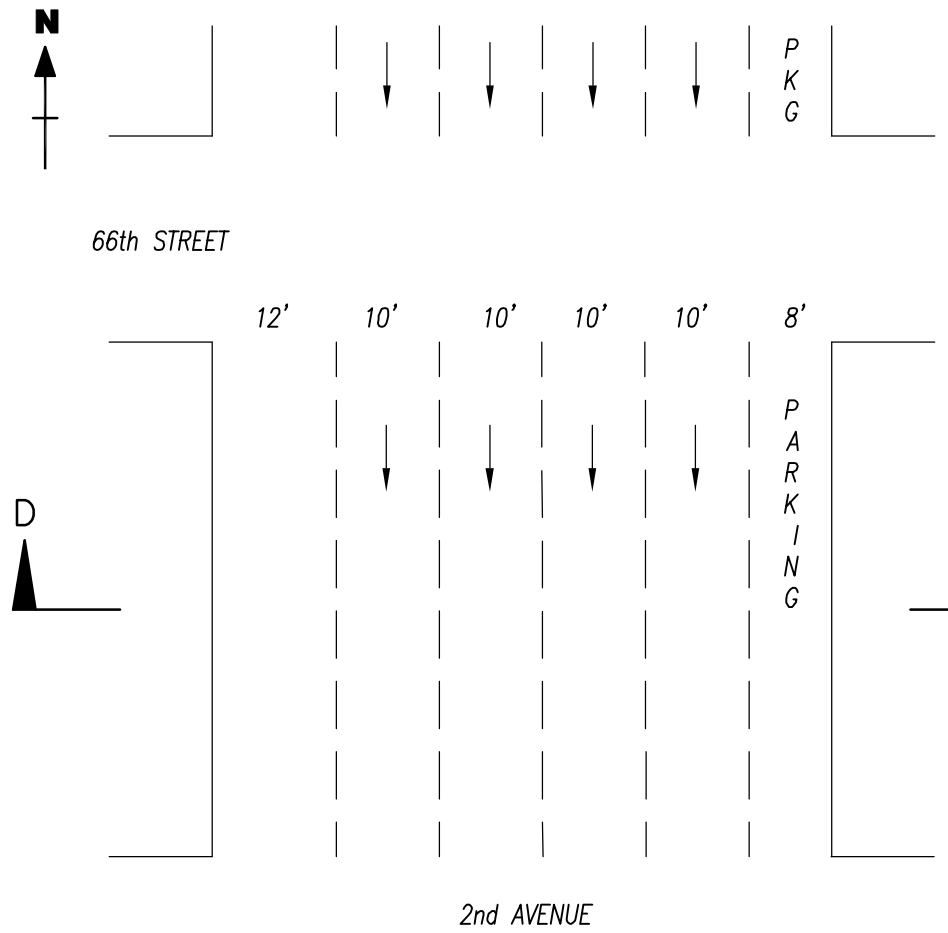
SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

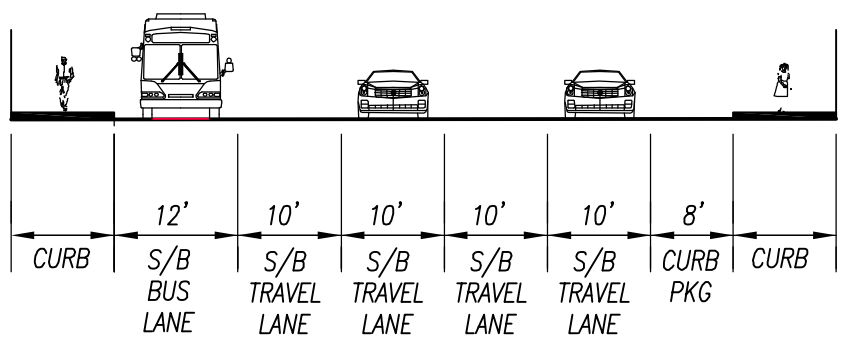
DRAWING TITLE:
1st/2nd AVENUE CORRIDOR SECTION E–E
1st AVE @ 66th ST.

SCALE: NTS	DATE: 09/09/05
DRAWING No: FIGURE 9	
REVISION: 0	SHEET No:

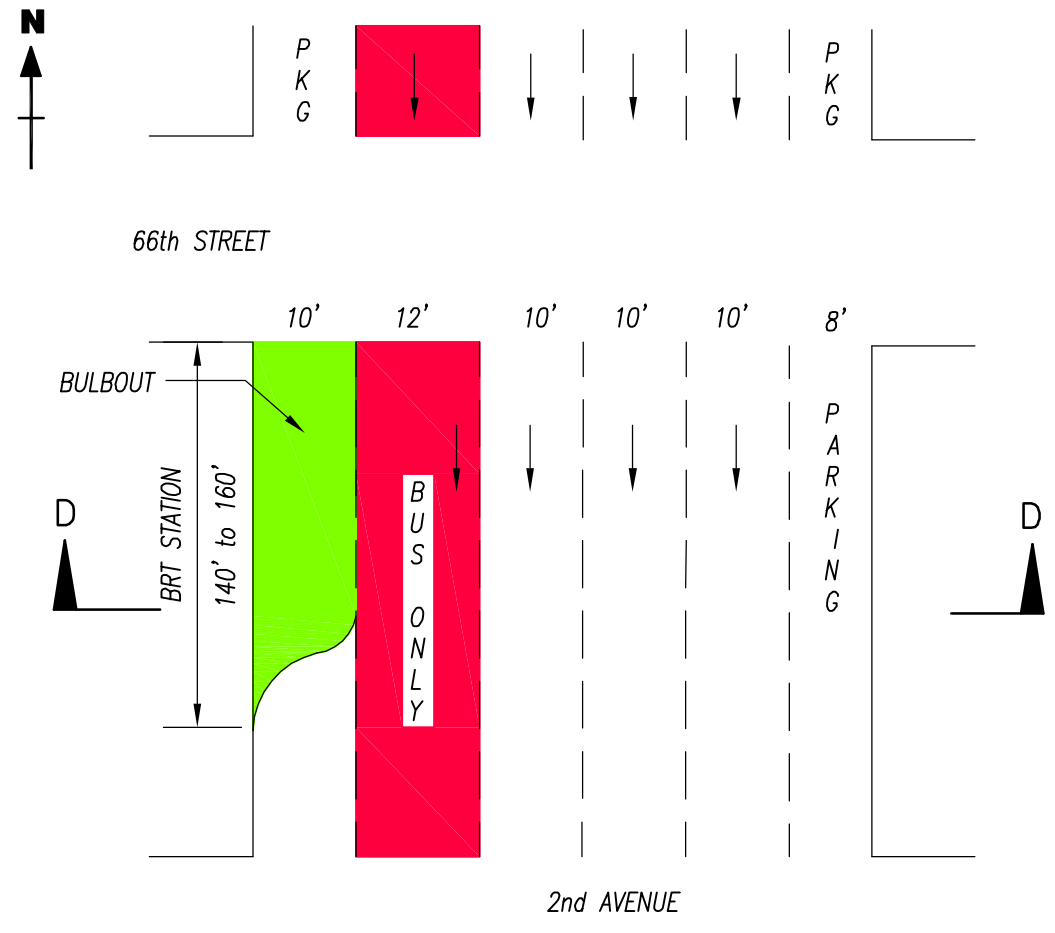
J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-EE_1st&2nd_AVE.dwg, SECTION EE-1st&2nd_AVE, 4/7/2006 12:38:16 PM



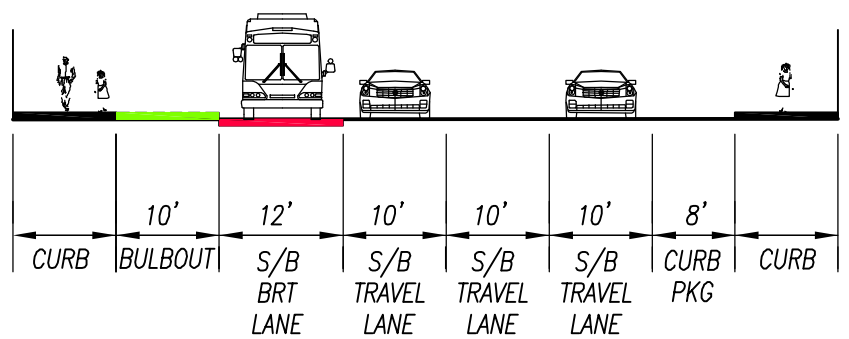
EXISTING LAYOUT



SECTION D



PROPOSED LAYOUT



SECTION D

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

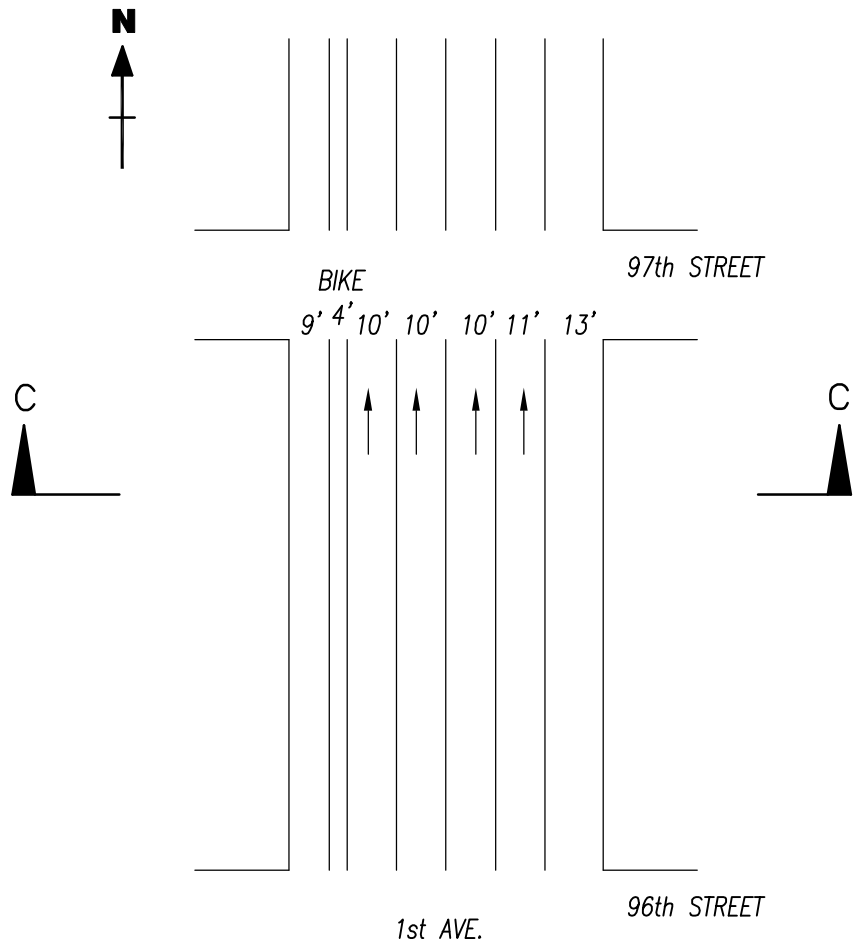
SEAL:

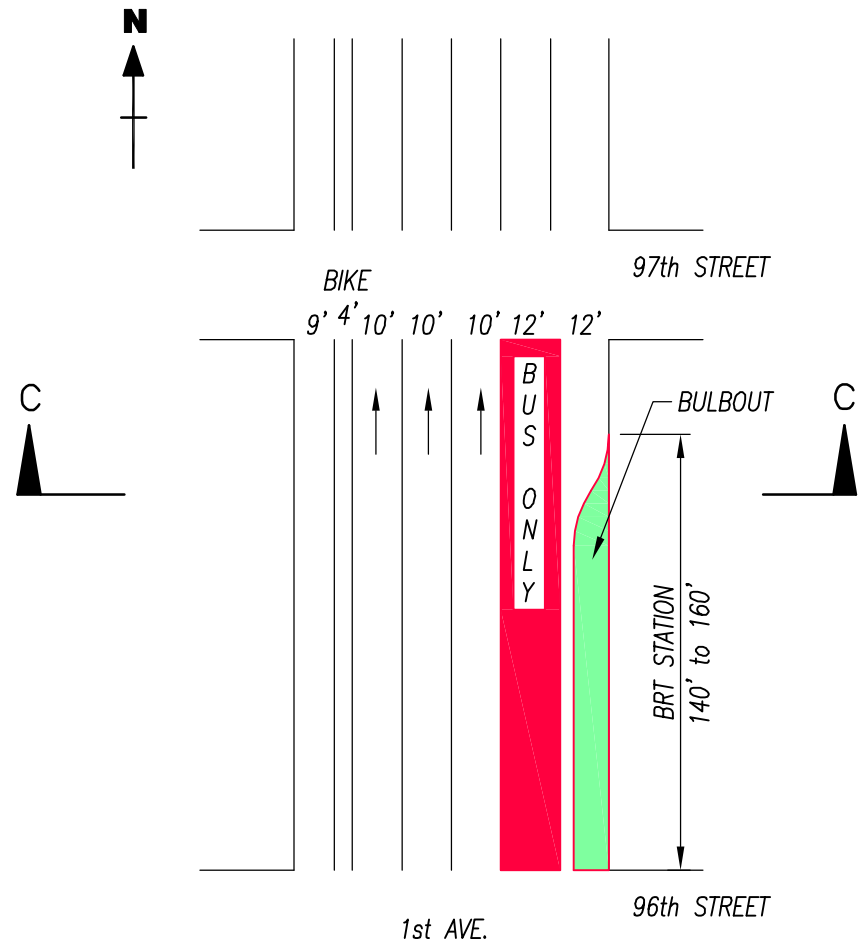
DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

DRAWING TITLE: 1st/2nd AVENUE CORRIDOR SECTION D–D 2nd AVE @ 66th ST.

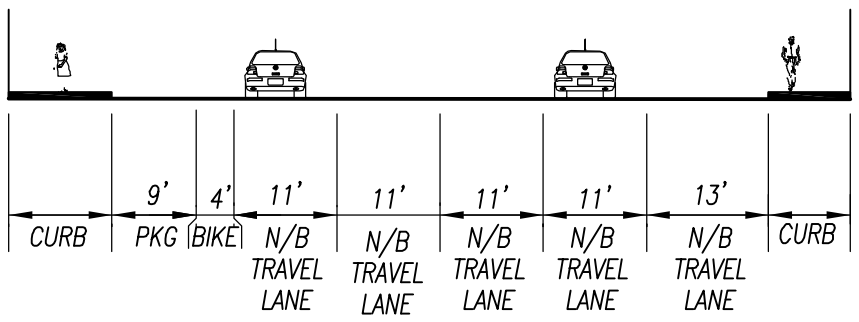
SCALE:	DATE:
NTS	09/09/05
FIGURE 8	
REVISION: 0	SHEET No:

J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-DD_1st&2nd_AVE.dwg, SECTION DD-1st&2nd_AVE, 4/7/2006 2:22:18 PM



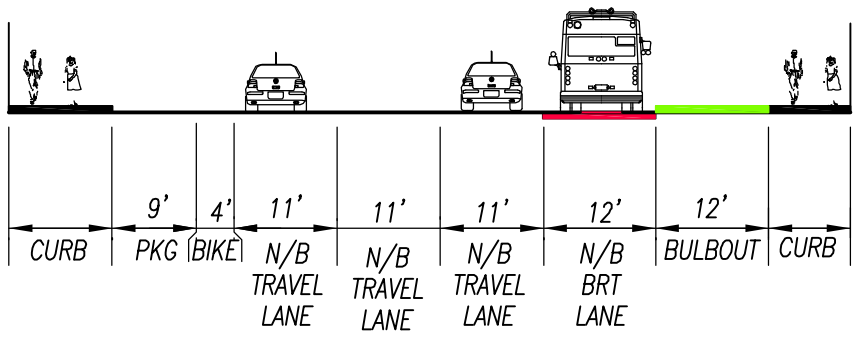


EXISTING LAYOUT



SECTION C

PROPOSED LAYOUT



SECTION C

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

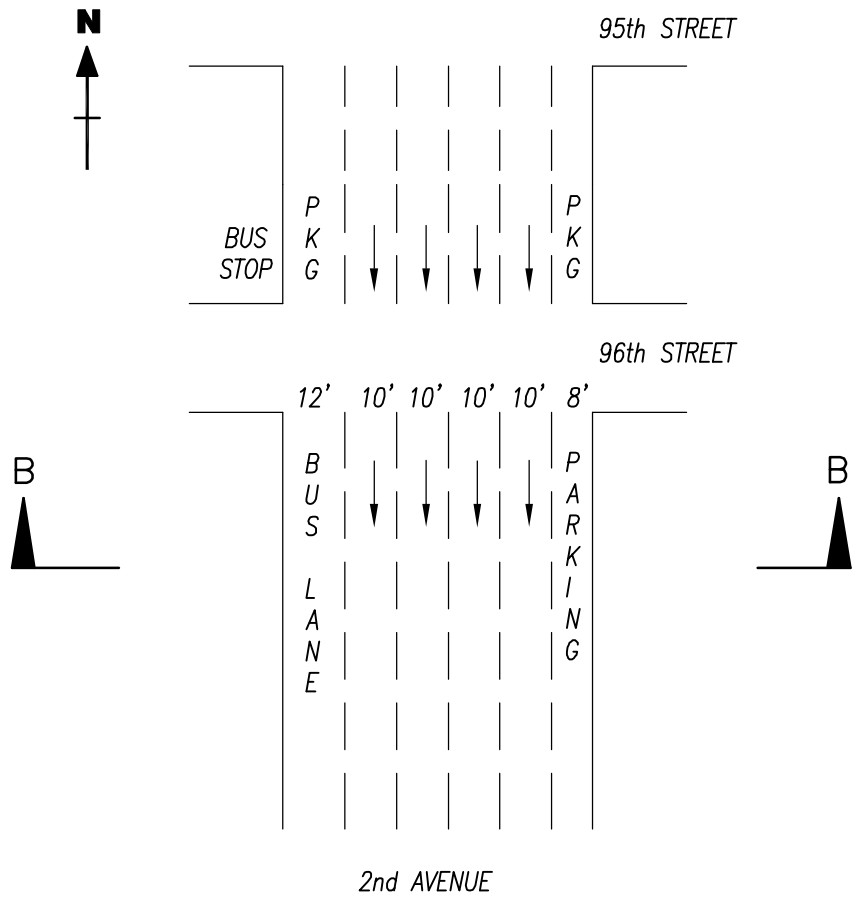
SEAL:

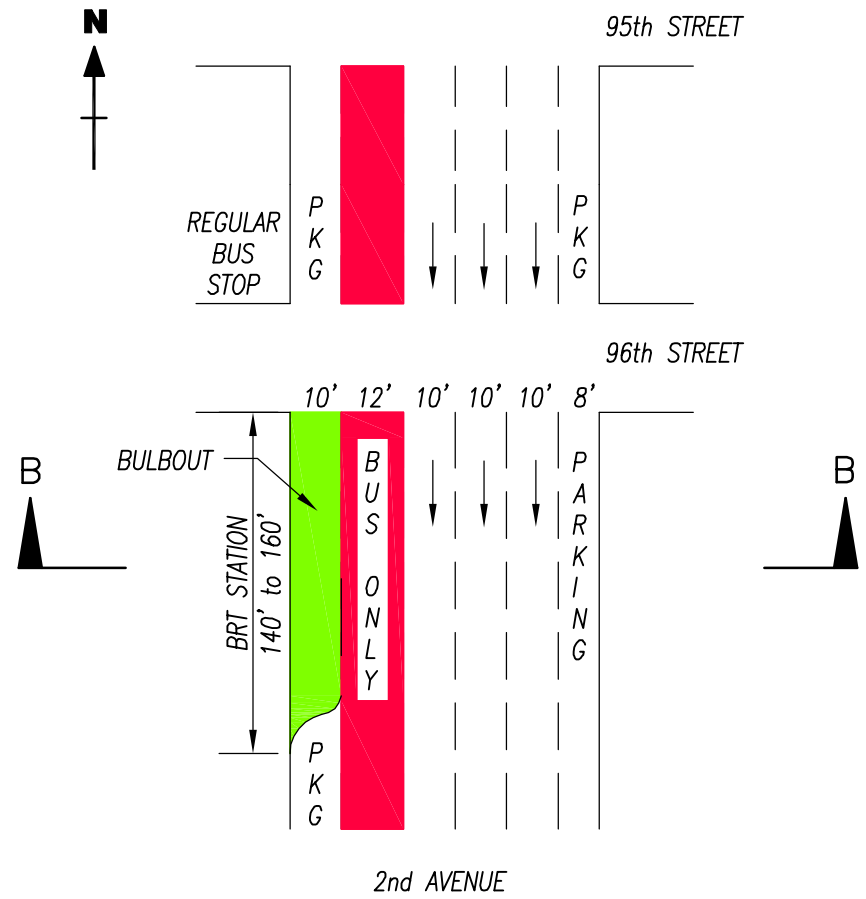
DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

DRAWING TITLE: 1st/2nd AVENUE CORRIDOR SECTION C–C 1st AVE @ 97th ST.

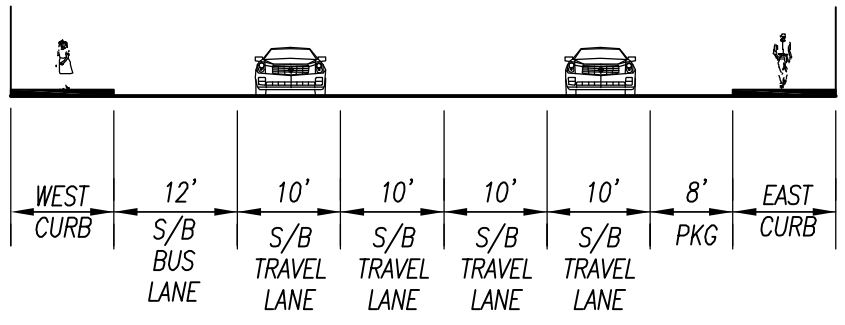
SCALE: NTS	DATE: 09/09/05
FIGURE 7	
REVISION: 0	SHEET No:

J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-CC_1st&2nd_AVE.dwg, SECTION AA-1st&2nd_AVE, 4/7/2006 2:13:07 PM



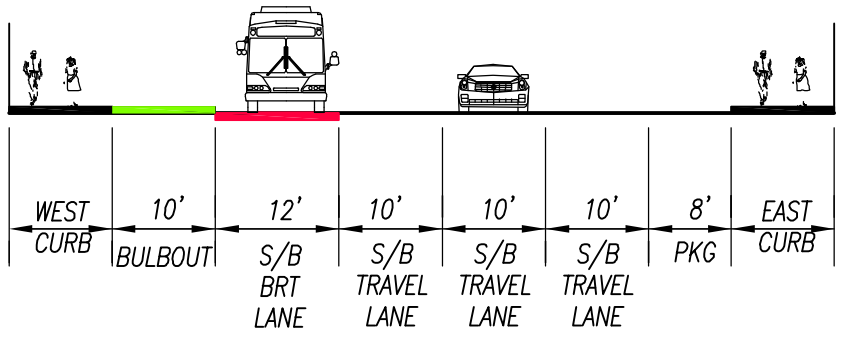


EXISTING LAYOUT



SECTION B

PROPOSED LAYOUT



SECTION B

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

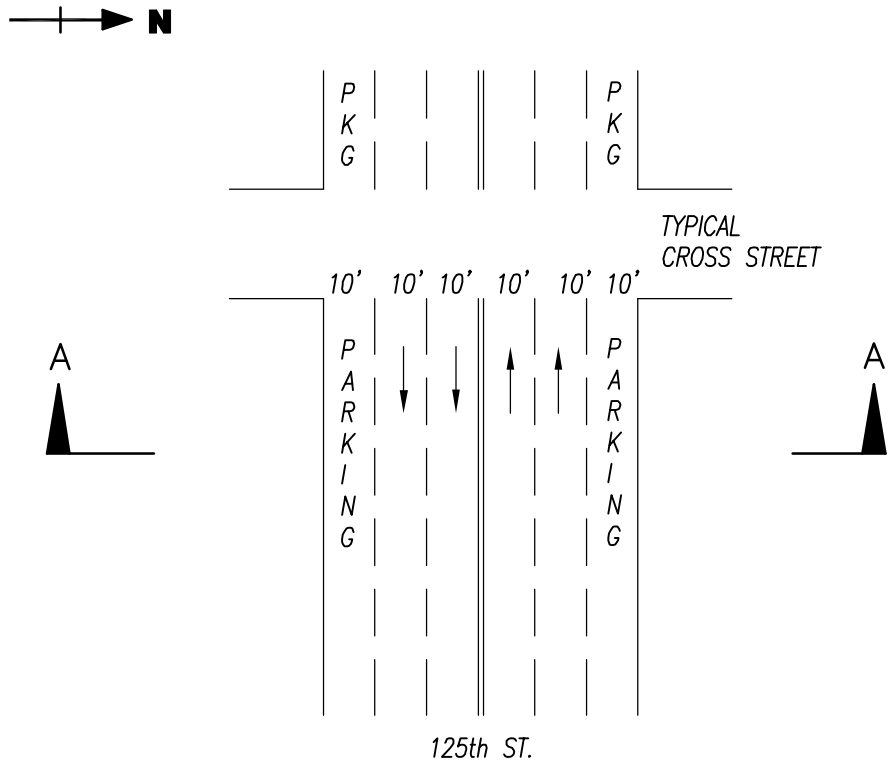
DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

DRAWING TITLE: 1st/2nd AVENUE CORRIDOR SECTION B–B 2nd AVE. @ 96th ST.

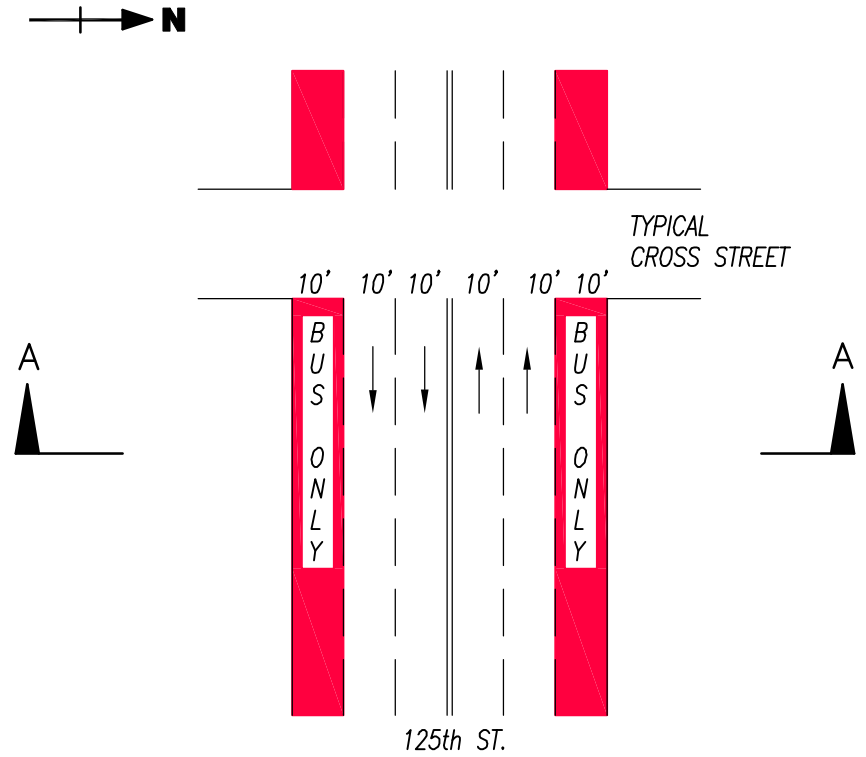
SCALE:	DATE:
NTS	09/09/05

FIGURE 6

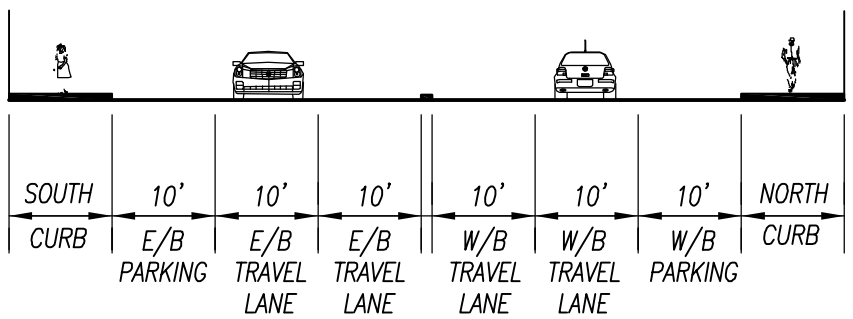
REVISION:	SHEET No:
0	



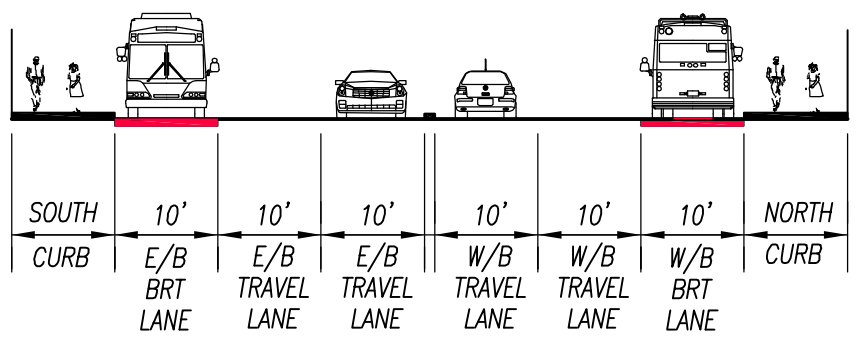
EXISTING LAYOUT



PROPOSED LAYOUT



SECTION A



SECTION A

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: J. JENKINS	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

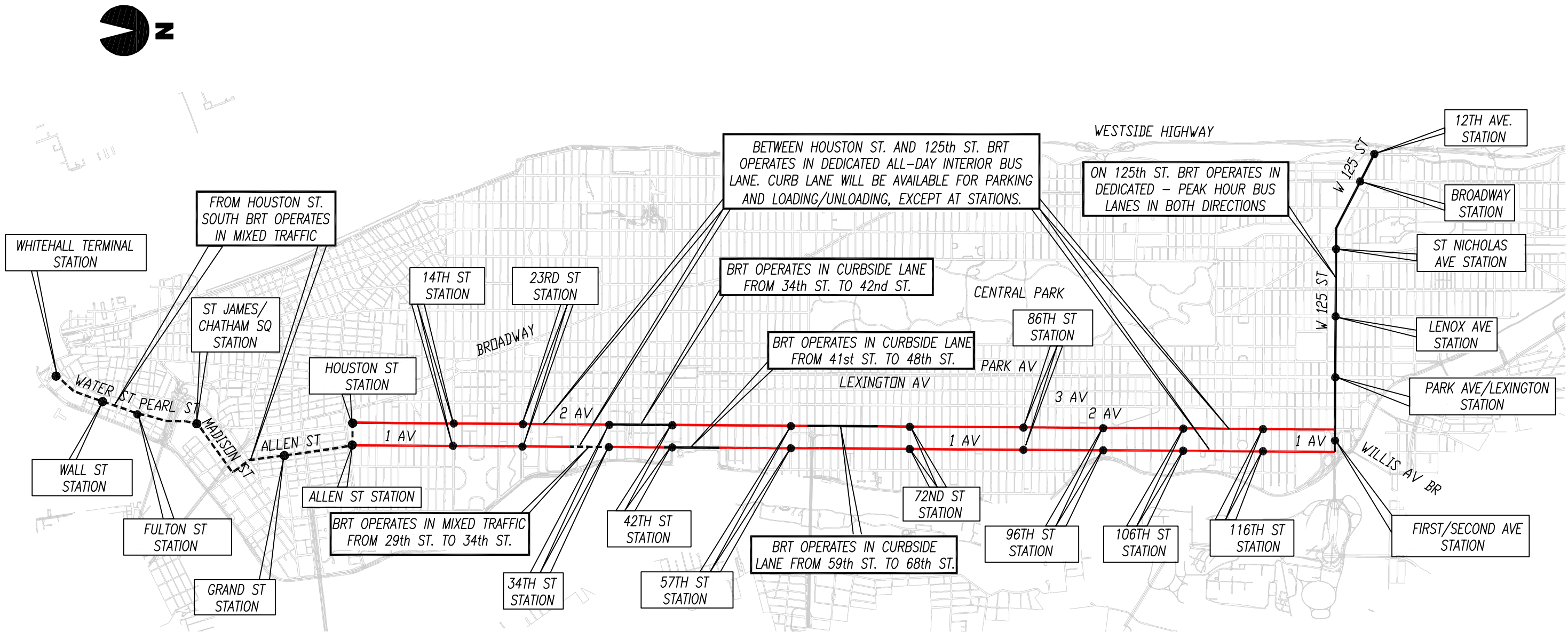
CONTRACT CM–1286

NEW YORK CITY BUS RAPID TRANSIT STUDY

DRAWING TITLE: 1st/2nd AVE CORRIDOR SECTION A–A 125th ST. @ AC POWELL BLVD.

SCALE:	DATE:
NTS	09/09/05
FIGURE 5	
REVISION: 0	SHEET No:

J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-AA_1st&2nd_AVE.dwg, SECTION AA-1st&2nd_AVE, 6/2/2006 2:35:32 PM



NYCBRT study

REV	DESCRIPTION	DATE	APPRVD
△			
△			
△			
△			

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: J. JENKINS	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

CONTRACT CM-1286

NEW YORK CITY BUS RAPID TRANSIT STUDY

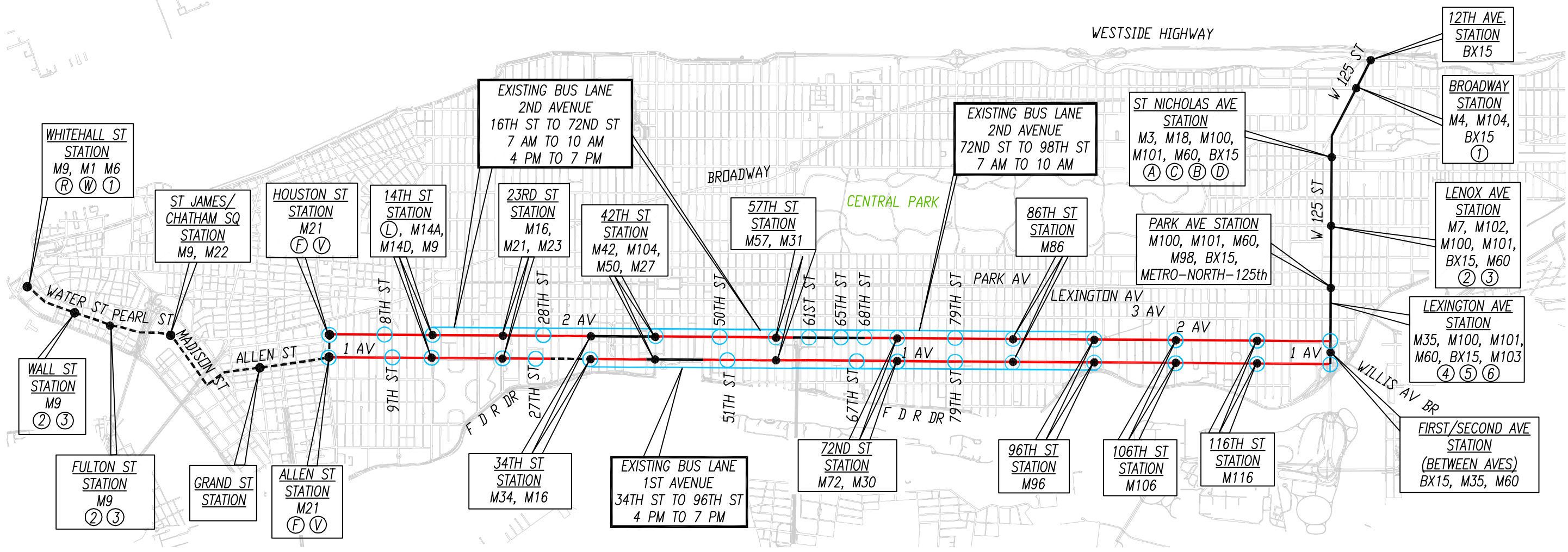
DRAWING TITLE:

1ST & 2ND AVENUE CORRIDOR TRAFFIC PLAN

SCALE:	DATE:
NTS	09/09/05

FIGURE 4

REVISION:	SHEET No:
0	



LEGEND:

- PROPOSED MIXED TRAFFIC OPERATIONS
- PROPOSED INTERIOR BUS LANE
- PROPOSED CURBSIDE BUS LANE
- PROPOSED BRT STATION
- EXISTING LIMITED STOPS (L/S)
- EXISTING BUS LANE

NOTE: CURRENT M15 LIMITED MAKES ALL STOPS SOUTH OF HOUSTON ST.

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

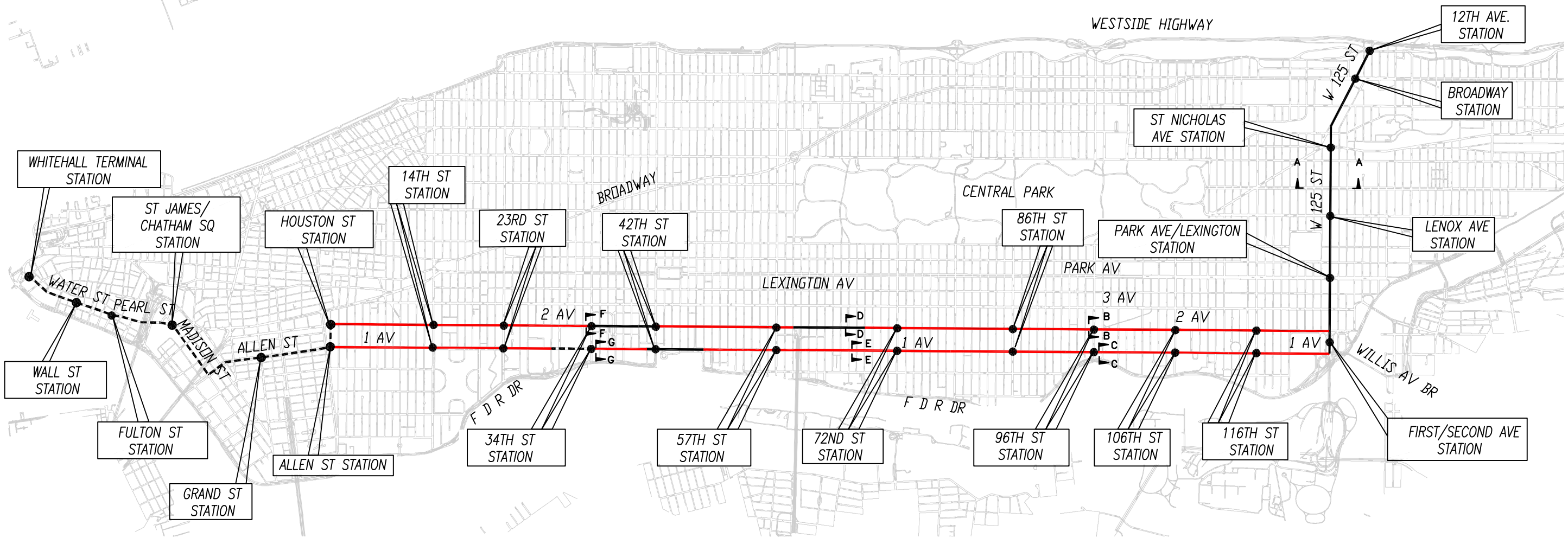
IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM-1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

DRAWING TITLE: 1ST & 2ND AVENUE CORRIDOR TRANSIT PLAN

SCALE:	DATE: 09/09/05
DRAWING No: FIGURE 3	
REVISION: 0	SHEET No:



LEGEND:

- PROPOSED MIXED TRAFFIC OPERATIONS
- PROPOSED INTERIOR BUS LANE
- PROPOSED CURBSIDE BUS LANE
- PROPOSED BRT STATION

NOTE:

FOR SECTION A–A, SEE FIGURE 5
FOR SECTION B–B, SEE FIGURE 6
FOR SECTION C–C, SEE FIGURE 7
FOR SECTION D–D, SEE FIGURE 8
FOR SECTION E–E, SEE FIGURE 9
FOR SECTION F–F, SEE FIGURE 10
FOR SECTION G–G, SEE FIGURE 11

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: J. JENKINS	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

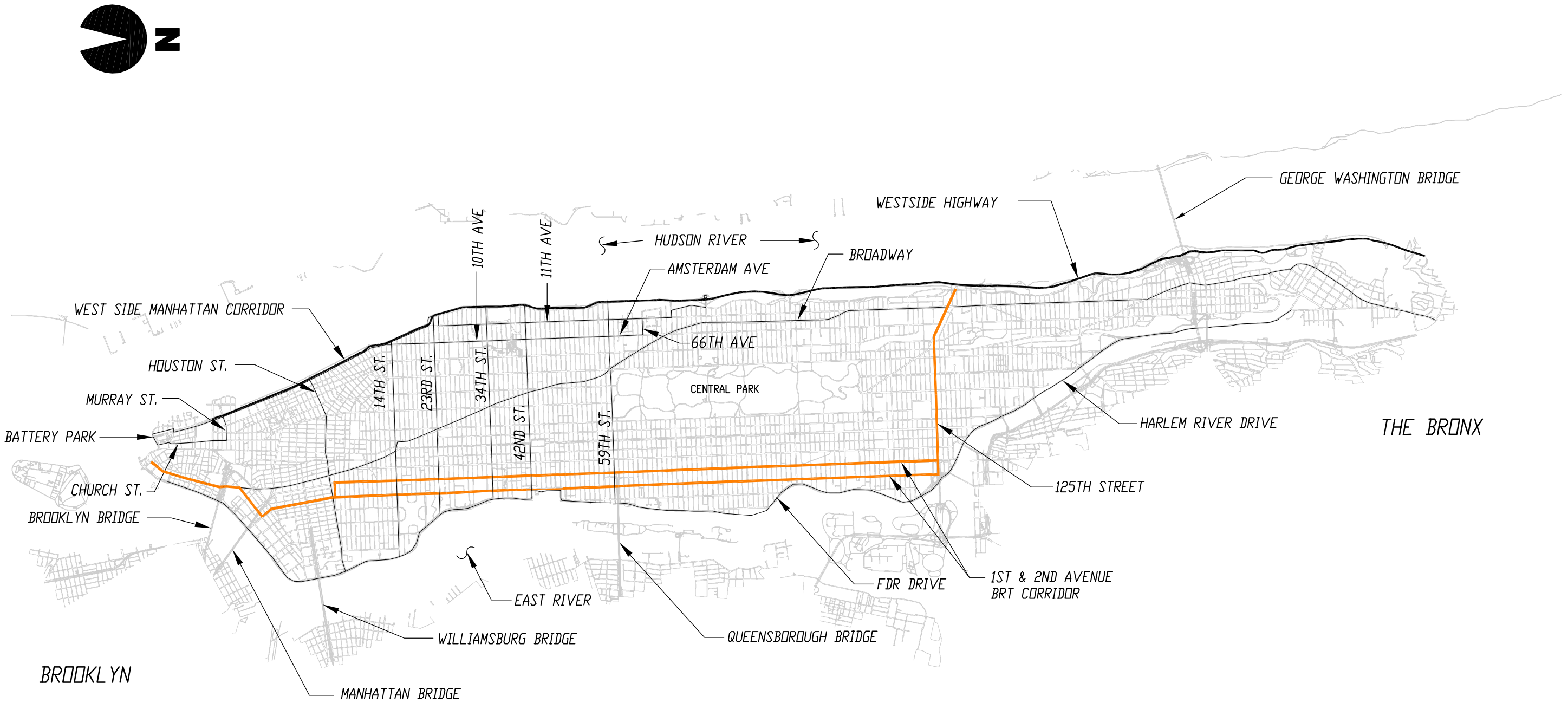
CONTRACT CM–1286

NEW YORK CITY BUS RAPID TRANSIT STUDY

DRAWING TITLE:

1ST & 2ND AVENUE CORRIDOR KEY PLAN

SCALE:	DATE: 09/09/05
FIGURE 2	
REVISION: 0	SHEET No:



NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: I. MCNAMARA	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

CONTRACT CM-1286

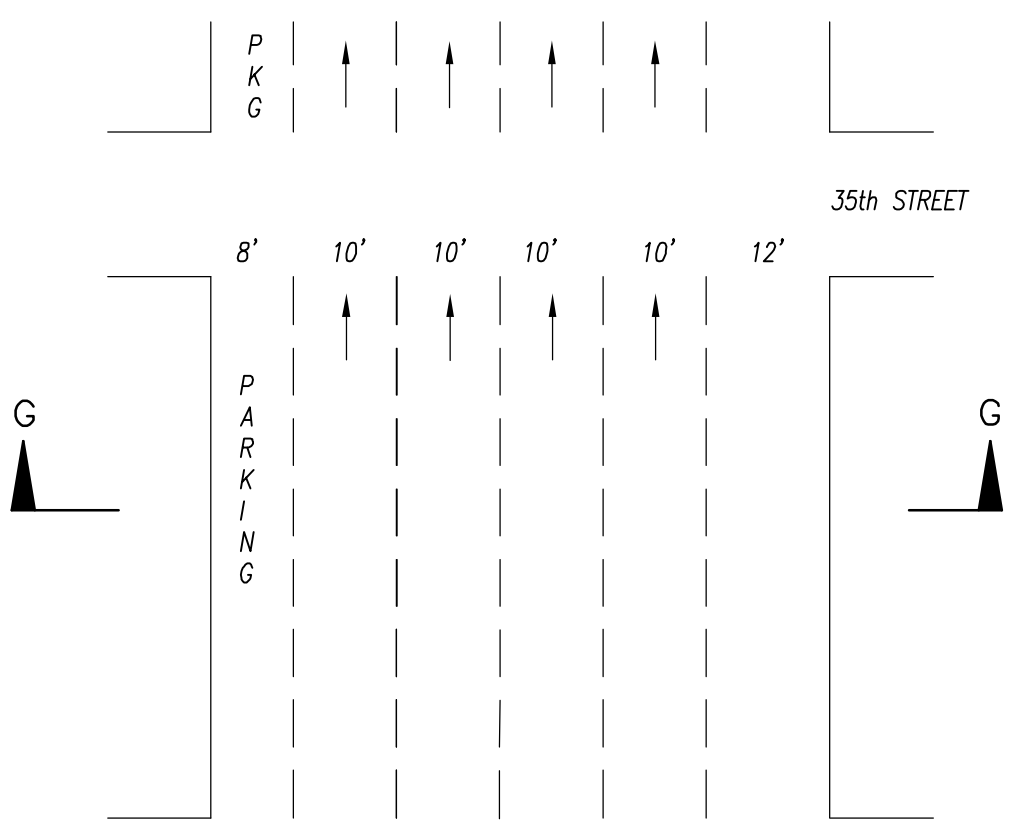
NEW YORK CITY BUS RAPID TRANSIT STUDY

DRAWING TITLE:

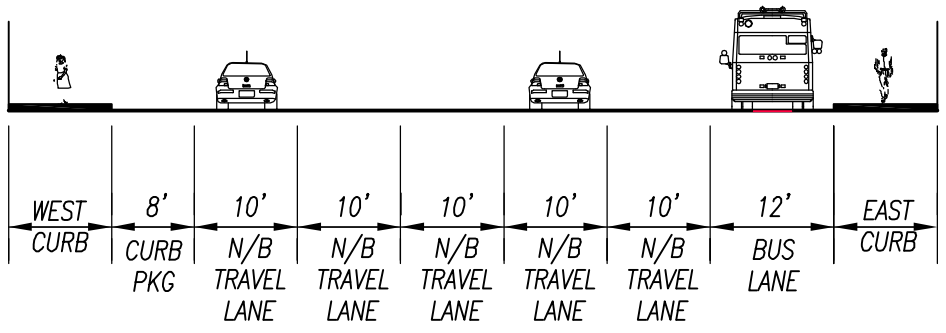
MANHATTAN BOROUGH PLAN 1ST & 2ND AVENUE CORRIDOR

SCALE:	DATE: 09/09/05
DRAWING No: FIGURE 1	
REVISION: 0	SHEET No: 1

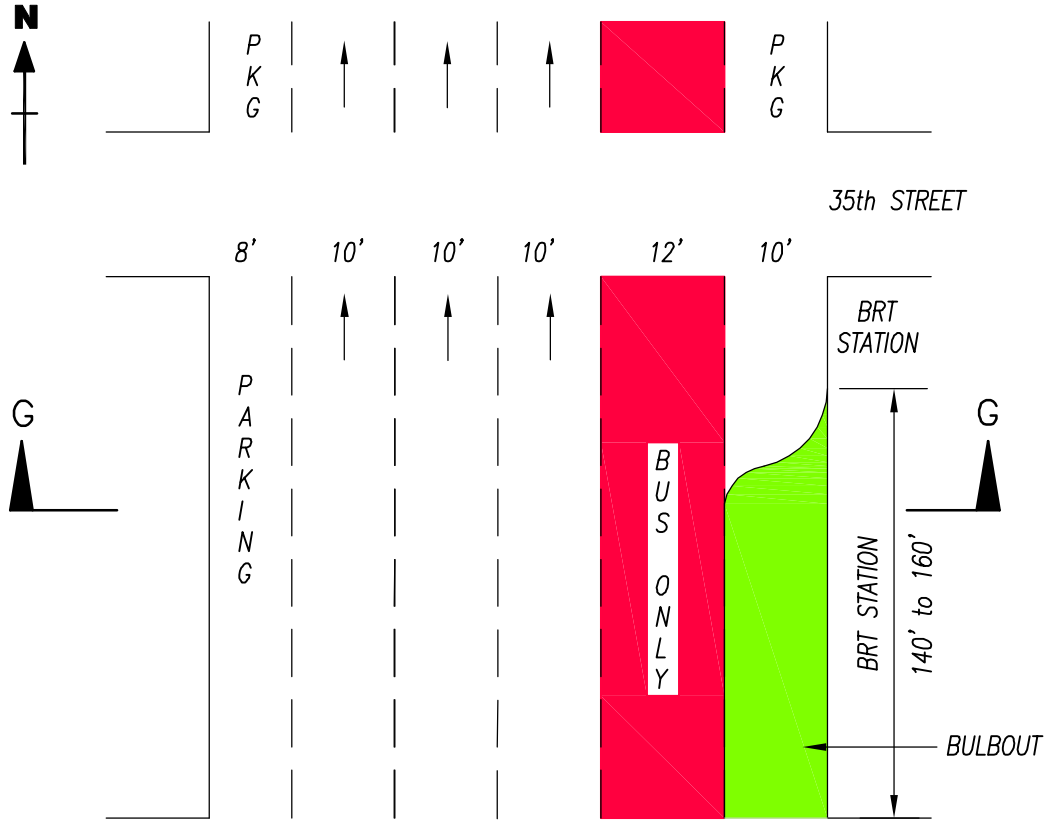
J:\PROJECTS\BRT\DRAWINGS\BOROUGH\New-manhattan_key plan.dwg, Manhattan_keyplan, 4/6/2006 11:16:43 AM



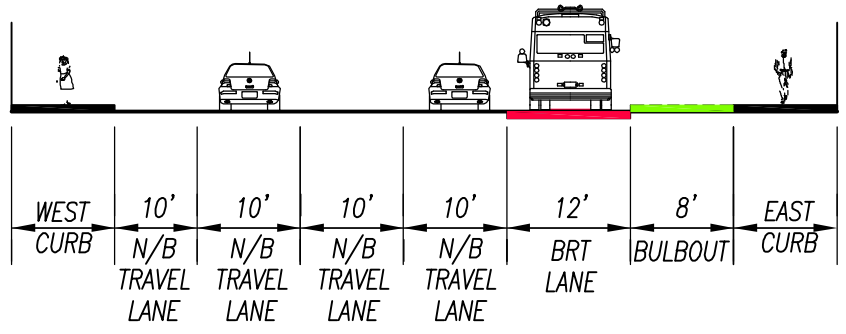
EXISTING LAYOUT



SECTION G



PROPOSED LAYOUT



SECTION G

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	
DESIGNED BY: J. JENKINS	SIGNATURE:	
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

CONTRACT CM–1286

NEW YORK CITY BUS RAPID TRANSIT STUDY

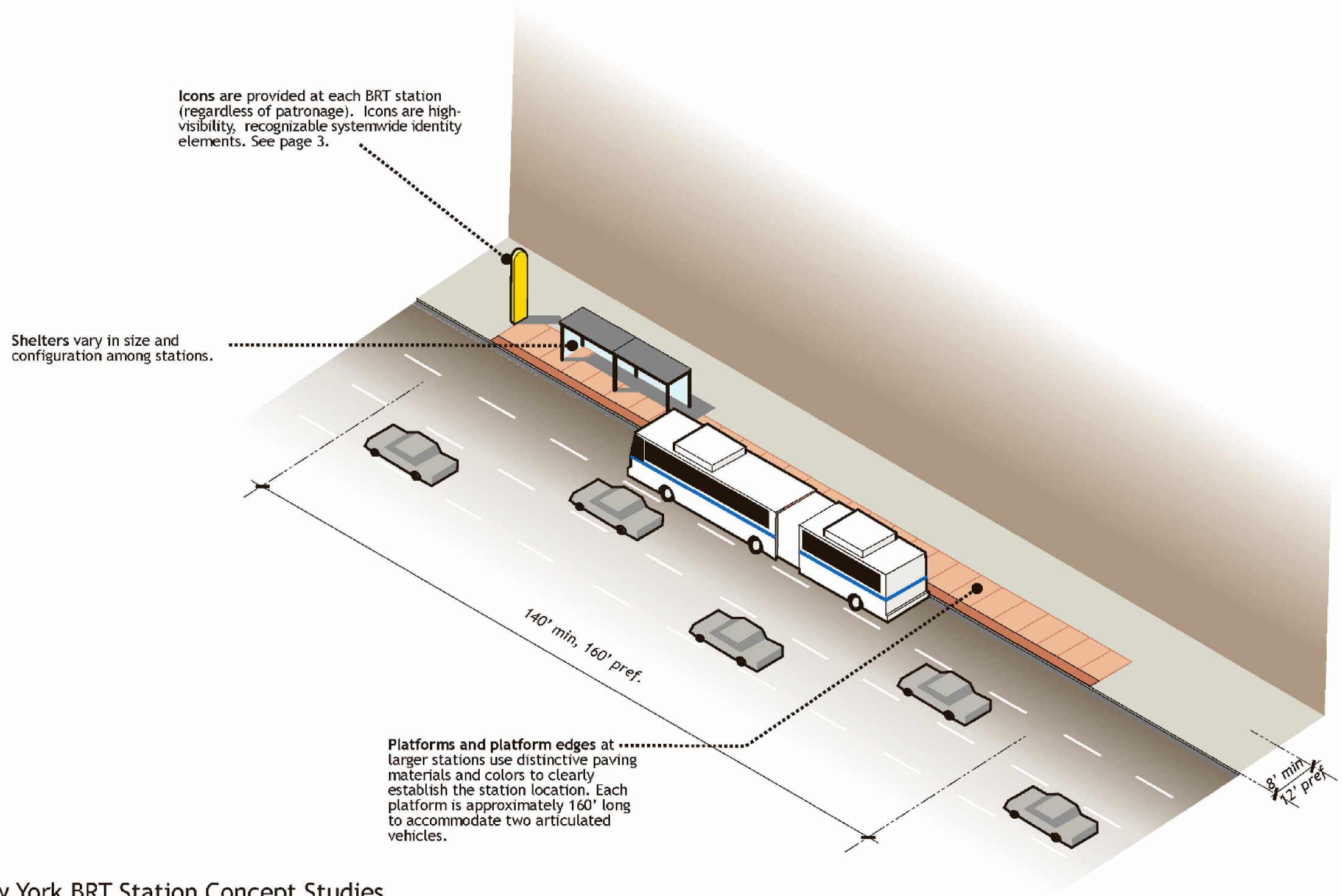
DRAWING TITLE:
1st/2nd AVENUE CORRIDOR SECTION G–G
1st AVE @ 34th ST.

SCALE:	DATE:
NTS	09/09/05

FIGURE 11

REVISION:	SHEET No:
0	

J:\PROJECTS\BRT\DRAWINGS\CORRIDORS\CORRIDOR SECTIONS\SECTION-GG_1st&2nd_AVE.dwg, SECTION GG-1st&2nd_AVE, 4/7/2006 1:07:07 PM



New York BRT Station Concept Studies
Typical Station Features

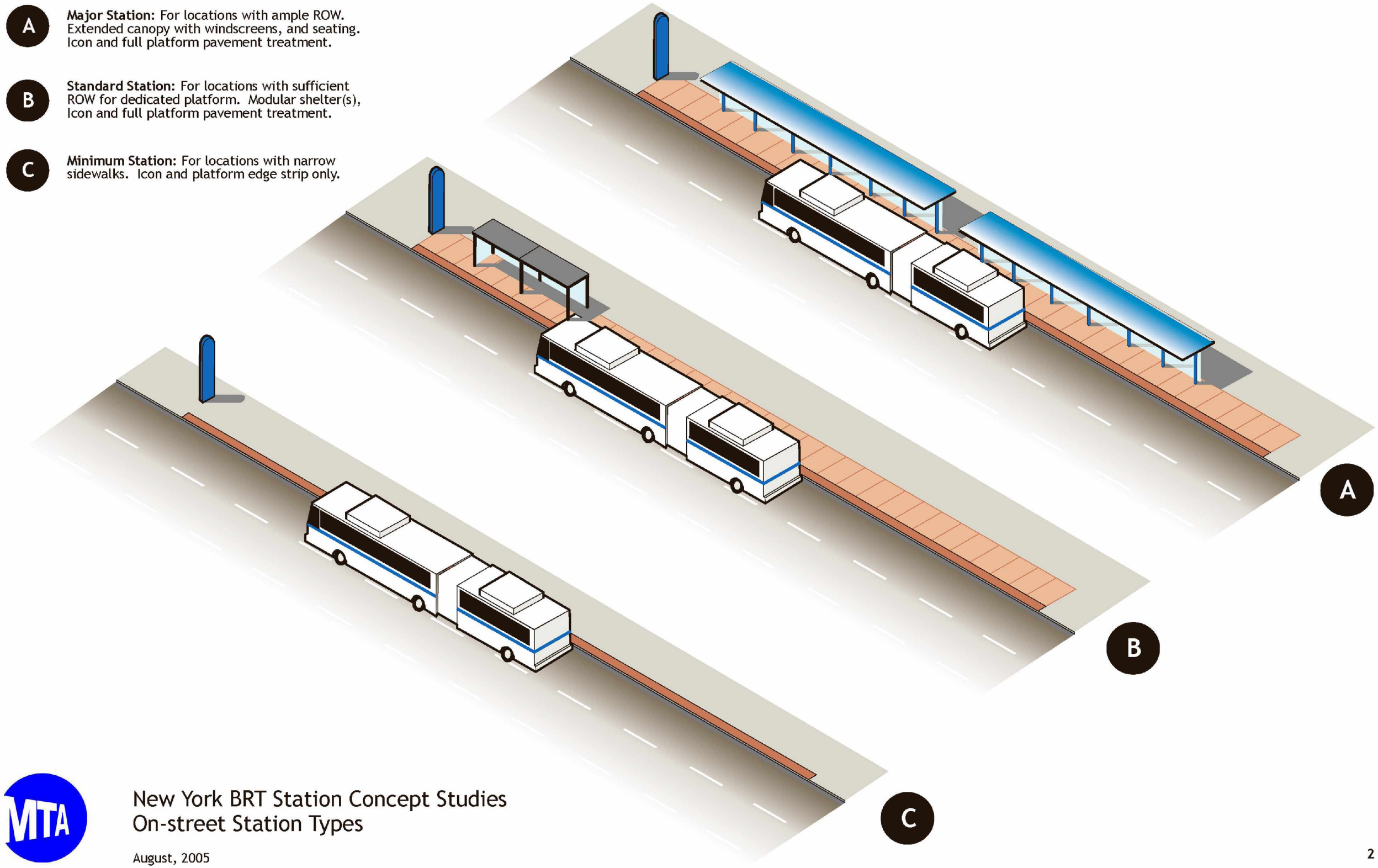
September, 2005

NYCBRT study	REV / DESCRIPTION / DATE / APPRVD	SEAL:	DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286	DRAWING TITLE: STATION CONCEPT STUDIES TYPICAL STATION FEATURES	SCALE: NTS; DATE: 09/09/05
			DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY		DRAWING No: CONCEPT ENGINEERING 01-09-1601
			CHECKED BY: R. POPOLIZIO	SIGNATURE:			REVISION: 0; SHEET No:
			APPROVED BY: S. FIALKOFF	SIGNATURE:			

A **Major Station:** For locations with ample ROW. Extended canopy with windscreens, and seating. Icon and full platform pavement treatment.

B **Standard Station:** For locations with sufficient ROW for dedicated platform. Modular shelter(s), Icon and full platform pavement treatment.

C **Minimum Station:** For locations with narrow sidewalks. Icon and platform edge strip only.



MTA

New York BRT Station Concept Studies
On-street Station Types

August, 2005

NYCBRT study

REV	DESCRIPTION	DATE	APPRVD

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, THE ALTERING ENGINEER SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF ALTERATION.

SEAL:

DRAWN BY: N. DUJOUR	SIGNATURE:	CONTRACT CM–1286
DESIGNED BY: J. JENKINS	SIGNATURE:	NEW YORK CITY BUS RAPID TRANSIT STUDY
CHECKED BY: R. POPOLIZIO	SIGNATURE:	
APPROVED BY: S. FIALKOFF	SIGNATURE:	

DRAWING TITLE: STATION CONCEPT STUDIES ON STREET STATION TYPES

SCALE: NTS	DATE: 09/09/05
DRAWING No: CONCEPT ENGINEERING 01-09-1602	
REVISION: 0	SHEET No: