Right of Passage:

Reducing Barriers to the Use of Public Transportation in the MTA Region

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Executive Summary

The Metropolitan Transportation Authority (MTA) attracts a greater percentage of passengers than any other U.S. transit system. However, as virtually any New Yorker will tell you, it can still do better. To this end, the Permanent Citizens Advisory Committee to the MTA (PCAC) examined potential ways to reduce barriers to public transportation usage in the New York region. We looked to provide the MTA with recommendations for attracting even more passengers, without major capital expenditure. Such an approach will help to improve regional mobility and livability, enhance our city's core, and reduce our dependence on the private automobile.

Research and Findings

For purposes of analysis, barriers to public transportation usage were grouped into three broad categories. The first category explored was **Barriers to Commuter Rail Station Access**. Both Metro-North and Long Island Rail Road share a significant barrier in their attempts to increase ridership–limited parking capacity. Parking constraints can prevent potential riders from accessing commuter rail stations that cannot be easily accessed by other means. Since feeder buses, bicycles, and carpooling can only go so far in addressing this problem, we analyzed the potential for an alternative access method, termed "kiss-and-ride," in dealing with parking constraints. Kiss-and-ride involves rail passengers getting dropped off at a station by someone else, thus eliminating the need to park.

The second category we explored was **Barriers to Intermodal Transfers**. Since the free transfer via MetroCard was introduced a few years ago, ridership and intermodal transfers have increased. We sought to determine how well New York City Transit has adjusted to these changes in travel behavior. Specifically, now that there are more people transferring between bus and subway, how well has Transit designed the major transfer points to make them more convenient for riders? Given the increases in bus ridership, how can bus loading and unloading problems be addressed?

The third category and final category we explored was **Barriers to Inter-Agency Transfers**. The New York region's public transportation system suffers from the fact that it crosses three state borders and, thus, is responsible to three separate state jurisdictions. It is further hampered by the fact that the MTA, the major transit service provider, is, itself, divided into three quasi-independent transit operators. Together, the MTA agencies, New Jersey Transit, the Port Authority of New York and New Jersey, and various suburban bus systems provide the most extensive transit network in the country. Unfortunately, the system is not well integrated, at least in terms of design. One of the barriers to integration is physical; there are places where transfers between different transit lines are hindered by the fact that the lines are operated by two different agencies. Another barrier is the lack of an integrated fare system.

We examined these categories in detail with recourse both to agency-provided data and to our own observations gained through field research, as noted below.

Barriers to Commuter Rail Station Access

In order to determine potential improvements at Metro-North and Long Island Rail Road (LIRR) that might result in increased use of kiss-and-ride, we visited several stations on each system. Metro-North stations were chosen by looking at two pairs of nearby stations on each branch, one with a low number of kiss-and-ride passengers, and one with a high number. The stations were compared to see if there are any stations characteristics that may affect the difference in kiss-and-ride percentages. For the LIRR, where kiss-and-ride is not as popular, we chose the most congested parking lots on various branches for site visits.

The site visits revealed that there are several steps the railroads can take to increase the use of kiss-and-ride. Moreover, the analysis shows a significant difference between Metro-North and LIRR commuter rail stations. Metro-North customers are more likely to use kiss-and-ride in part because Metro-North enforces parking regulations that allow kiss-and-ride to remain convenient, while improving their parking facilities as a whole.

Barriers to Intermodal Transfers

We looked at two different barriers to intermodal transfers. First, we visited the most popular bus-to-subway transfer points to examine the ease of customer transfers. We noted, in particular, the presence and utility of wayfinding signage at the most important junctures. Second, we compared schedules of the Staten Island Railway and New York City Transit buses on Staten Island to determine the ease of difficulty of railway-bus transfers. Third, we analyzed strategies for improving bus service and reducing overcrowding.

The analysis of bus-to-subway transfer sites showed that although there is often plentiful signage to buses within subway stations, it can often be insufficient. The signage often just indicated the existence of a bus, rather than helping passengers to find it. Signage from buses to subways is often unnecessary, because subway entrance locations tend to be obvious and easily discernible for arriving bus customers. However, there are several places where it is necessary. We found virtually none of it. We also observed that major transfer points tended to lack bus shelters.

The analysis of schedule coordination showed that Staten Island buses and rail are, for the most part, not coordinated for key transfers. This means that riders often face unnecessarily long waits if they wish to use these two modes in tandem.

Two potential strategies for reducing bus crowding, while at the same time improving service, are the use of exclusive rights-of-way and pre-paid boarding

schemes. Exclusive rights-of-way segregate buses from other traffic, allowing them to achieve higher speeds helping to eliminate unexpected delays that often create crowding conditions. Pre-paid boarding schemes, under which passengers pay for their trip at an enclosed bus station, can reduce unexpected delays caused by long dwell times.

Barriers to Intermodal Transfers

Finally, transfers between different operating agencies within the MTA region were analyzed. The key transfer points outside of the most heavily used facilities such as Grand Central Terminal or Penn Station were visited to determine the ease of customer transfers. The progress of universal fare media, perhaps using SmartCard technology, was also explored.

Transfers between different transit operators tend to be relatively easy and well designed. Very few major problems were observed, except at stations along Fordham Road in The Bronx and at the Flatbush Avenue complex in Brooklyn, where major problems existed.

The fare barriers between agencies have been reduced recently with the introduction of MetroCard. Although SmartCard may offer the potential for further barrier reduction, it appears to us that this technology will be slow to arrive in the region.

Recommendations

Based on our analysis, the PCAC believes that improvements can and should be made by the MTA in the three categories that we explored. Our specific recommendations follow.

Improving Commuter Rail Station Access

In order to improve access to commuter rail stations, that MTA should do the following:

- Implement a marketing campaign to increase kiss-and-ride usage. This will help to reduce parking problems while increasing ridership.
- Provide short-term parking spaces where possible.
- Separate kiss-and-ride passengers from park and ride passengers in their access to stations where possible.
- Provide curbside drop off space and protect it from illegal parking.
- Enforce parking regulations at LIRR stations.
- Improve wayfinding signage for drivers accessing commuter rail stations.

Improving Intermodal Transfers

In order to improve intermodal transfers, the MTA should do the following:

- Install additional shelters at the most widely used transfer points.
- Work to make bus and subway wayfinding signage more useful.
- Work with New York City DOT to provide signage outside of subway stations.
- Improve schedule coordination between Staten Island bus and rail.
- Reduce crowding on NYCT buses by introducing more exclusive rights of way and pre-paid boarding.

Improving Interagency Transfers

In order to improve interagency transfers, the MTA should do the following:

In General:

- Continue to work in concert with other regional transportation agencies to move ahead with the creation and adoption of an integrated fare-collection system based on SmartCard technology.

At the Flatbush Avenue Complex:

- Remove the one poorly-lit and barely visible wayfinding sign pointing to the LIRR that exists on each of the N/R and 2/3 Manhattan-bound platforms and replace it with one that people can actually see.
- Install another message board within the subway station for the convenience of riders wishing to go directly from the subway to the correct LIRR track.
- Remove lingering signage from days gone by in the LIRR station. A sign pointing to Q “diamond” service was seen, despite the fact that such service does not currently exist.

At Fordham Road Stations:

- Improve inadequate wayfinding bus signage. The current signage is just a bus symbol, with no information about specific routes, and no distinction between Bee Line and NYCT buses.
- Improve signage from the Metro-North station to local subways.

- Install wayfinding signage to direct passengers to the Metro-North station from the subway.

Introduction

What exactly is a “barrier” to public transportation? The first thing to pop into most people’s minds might be a turnstile. However, barriers need not be physical structures. Barriers to public transportation can exist in many forms, and they are rarely as obvious or as easy to remove as a turnstile.

For the purposes of this paper, a barrier is anything that discourages people from using public transportation. However, only the barriers that have a realistic chance of being removed are addressed here. For example, the private automobile is probably the greatest barrier to public transportation use of all. This alternative mode of transportation provides superior travel characteristics under most circumstances. The automobile is heavily subsidized, and users are never charged the full cost of their auto trips. To truly reduce barriers to public transit, gas taxes should be raised to charge automobile users for pollution and health care costs, and tolls must become ubiquitous and higher in order to charge users appropriately for the congestion and delays they cause. However, since this paper aims to produce real change, and not just dream about unrealistic utopian scenarios, it must leave some of the greatest barriers to public transit use unscathed.

Three barrier categories are addressed in this paper. The first category is termed **Barriers to Commuter Rail Station Access**. Many transit stations in the New York area are located in areas where there is not sufficient population density to support a transit station with only pedestrian and bus access. Most of these stations are on commuter rail lines, and have parking lots to support significant amounts of access by private automobile. However, space for parking is almost always limited at popular commuter rail stations. Providing more space is difficult and, when it is provided it encourages more people to drive to the station. Increasing access by other modes such as bus or bicycle is usually an uphill battle. Carpooling incentives have never proved to be a particularly successful strategy either. However, one set of strategies that have shown some promise are attempts to increase “kiss-and-ride” passengers. These are passengers dropped off by friends or family members at the train stations, and then picked up when they return. This access method, which is very popular at airports (where the cost of parking is usually high), has a very high capacity since the cars are only at the station for a few seconds. The potential to increase “kiss-and-ride” mode share at commuter rail stations will be assessed.

The second category is termed **Barriers to Intermodal Transfers**. Since the free transfer via MetroCard was introduced a few years ago, ridership and intermodal transfers have increased. This paper will seek to determine how well New York City Transit has adjusted to these changes in travel behavior. Specifically, now that there are more people transferring between bus and subway, how well has Transit designed the major transfer points to make them more convenient for riders? Given the increases in bus ridership, how can bus

loading and unloading problems been addressed? This paper seeks to answer these questions in the hope that we can come up with more ways to reduce barriers to intermodal connections.

The third category is termed **Barriers to Inter-Agency Transfers**. The New York Region's transit system suffers from the fact that it crosses three state borders. It is further hampered by the fact that the MTA, the major transit service provider, is divided into three quasi-independent transit operators. Together, the MTA agencies, New Jersey Transit, the Port Authority, and various suburban bus systems provide the most extensive transit network in the country. Unfortunately, the system is not well integrated, at least in terms of design. One of the barriers to integration is physical; there are places where transfers between different transit lines are hindered by the fact that the lines are operated by two different agencies. Another barrier is the lack of an integrated fare system. This paper examines how these barriers are being addressed.

Barriers to Commuter Rail Station Access

Long Island Rail Road (LIRR) and Metro-North Railroad (Metro-North) suffer from a problem that often affects commuter rail services. Commuter rail tends to be located in less densely settled suburban areas. Although many of these areas originally developed as suburbs centered on their commuter rail station, virtually all of them have experienced extensive development since that time. The more recent development tends to be centered on the automobile, rather than the pedestrian or mass transit. The vast majority of commuter rail users, therefore, own a private car and use it with great frequency. Many of them live in areas in which it is difficult, impossible, or very time-consuming to use any other form of transportation.

This means that a majority of commuter rail users cannot get to their local train stations without driving. Moreover, those who may be able to access the station in another manner are not very likely to do so since they tend to have a car available to them. They are also more likely to use their cars in inclement weather, causing greater congestion and increasing the potential for accidents.

With recent increases in LIRR and Metro-North ridership, the above adds up to severe parking shortages at many of the most popular commuter rail stations. Although parking fees and resident permits may help to limit demand for parking spots, these are not extensive enough to significantly alleviate the parking problem. Moreover, increased parking fees are likely to reduce commuter rail ridership. Therefore, LIRR and Metro-North would, in theory, like to accommodate as many people who want to park at their stations as possible.

However, it is becoming increasingly difficult to satisfy parking demand by constructing new parking spaces. First of all, parking spaces are expensive to build and maintain. Some estimates place the cost of a suburban parking space at $2,000 to $10,000 not including maintenance costs[1]. Since low fees are charged for these spaces in order to encourage use, lot operators (including the railroads) are in effect subsidizing parking for suburbanites. Second, there is limited available space for parking. Since commuter rail stations are often centrally located in a town or village, it is often difficult to find a site for a parking lot at all. Also, residents usually oppose any kind of parking structure, and underground structures are prohibitively expensive.

Therefore, if Metro-North and LIRR want to continue to increase their ridership, they need to figure out how to get more people to their outlying stations without building additional parking spaces. One suggestion for a way to do this is to attempt to increase the use of transit feeder buses. Parking fees at stations could be raised to the point where they discourage automobile access, so that only those who have no other possible access method choose to drive. The

[1] Donald C. Shoup and Don H. Pickrell, “Free Parking as a Transportation Problem,” final report under contract DOT-05-90011 (Washington D.C.: Department of Transportation, 1980).

additional revenue from this increase could be directed towards the subsidy of improved local mass transit, feeder buses, or pedestrian shelters and walkways. Unfortunately, such a strategy would likely risk discouraging ridership since there is very little evidence that suburbanites are willing to use mass transit to access commuter rail stations, no matter how good it is. The commuter railroads are unlikely to ever pursue such a strategy, and it is not considered here[2].

Another possible strategy would be to encourage bicycle access to commuter rail stations. This could be done by installing bike racks or lockers, allocating space for bicycles on-board trains, or even, as some commuter rail operators have done, providing valet bicycle parking. This is an inexpensive and environmentally friendly strategy that could potentially increase ridership. However, the total number of bicycle commuters is likely to remain small no matter how many improvements are made on trains and stations. Although there are some examples in European countries of commuters taking to bicycles en masse, these are usually instances where local governments have encouraged bicycle use by building bicycle lanes on local roads. They are also usually located in relatively flat areas. The New York region is not particularly flat, and lacks bicycle lanes on the vast majority of roads. The potential for reducing barriers to station access via bicycles is very small.

A final strategy, the one pursued in more detail in this paper, offers greater promise. This is the strategy of encouraging "kiss-and-ride" access to commuter rail stations. "Kiss and ride" is merely a cute way of saying drop-off. Instead of parking their car, the commuter is shuttled to the station by a spouse or other family member, or a friend or neighbor. This other person then drives away from the station, keeping the car for their own continued use, until they pick up the rail commuter upon their return. Unlike encouraging the use of mass transit, this strategy is not capital intensive. And unlike encouraging bicycle use, this strategy is likely to work in an auto-centric environment.

Kiss-and-Ride Analysis Methodology

Stations on the LIRR and Metro-North were studied in order to assess what is done well and what is done poorly in terms of encouraging kiss-and-ride. In order to determine appropriate stations to visit, we looked at the current statistics for accessing local commuter rail. We ignored whether the stations examined were owned or operated by the railroad or municipality. It is the railroads' responsibility to improve their parking lots, whether it involves direct action or working with a particular municipality.

[2] However, the PCAC is currently looking at the possibility of improving feeder bus service to MTA commuter rail stations in a separate study.

Metro-North Station Selection

For each branch of Metro-North, two nearby stations were picked for site visits–one with a high percentage of kiss-and-ride, and one with a low percentage. In this manner, we hoped to control for some of the numerous factors that influence kiss-and-ride's popularity. Clearly, most of these factors are beyond the MTA's control. For example, whether a commuter chooses to use kiss-and-ride may depend on whether his or her spouse is available to drive them to the railroad station. However, station design, and often parking lot design are under MTA control. By studying stations near to one another, we hoped to isolate this factor's role in influencing kiss-and-ride. Nonetheless, some of the differences between kiss-and-ride usage at these stations must be attributed to outside factors.

Table 1: Proportion of Metro-North Harlem Line Kiss-and-Ride and Parking Usage

Harlem Line		
Station	**Kiss & Ride**	**Park**
Bedford Hills	48%	52%
Hawthorne	39%	55%
Dover Plains	38%	62%
Valhalla	26%	55%
Patterson	24%	67%
Mt. Vernon West	22%	30%
Crestwood	22%	37%
Scarsdale	20%	31%
Pleasantville	19%	38%
Katonah	19%	63%
Croton Falls	19%	81%
Brewster	19%	77%
Fordham	17%	0%
Woodlawn	17%	23%
White Plains	16%	40%
Pawling	12%	82%
Bronxville	10%	23%
Mt. Kisco	10%	72%
N. White Plains	10%	63%
Tuckahoe	9%	39%
Hartsdale	9%	46%
Chappaqua	9%	84%
Wingdale	9%	91%
Line Average	**15%**	**45%**

Table 2: Proportion of Metro-North Hudson Line Kiss-and-Ride and Parking Usage

Hudson Line		
Station	**Kiss & Ride**	**Park**
Poughkeepsie	23%	63%
Beacon	21%	68%
Croton-Harmon	20%	69%
New Hamburg	19%	80%
Tarrytown	15%	41%
Peekskill	14%	63%
Riverdale	11%	37%
Cold Spring	11%	47%
Phillipse Manor	9%	49%
Greystone	8%	33%
Ossining	8%	79%
Hastings	7%	55%
125th St.	7%	28%
Scarborough	6%	78%
Irvington	5%	68%
Garrison	5%	83%
Spuyten Duyvil	4%	19%
Yonkers	3%	43%
Ardsley	1%	74%
Glenwood	NA	37%
Dobbs Ferry	NA	68%
Ludlow	NA	14%
Cortlandt	NA	94%
Line Average	**11%**	**54%**

Table 3: Proportion of Metro-North New Haven Line Kiss-and-Ride and Parking Usage

New Haven Line		
Station	**Kiss & Ride**	**Park**
Harrison	24%	57%
New Rochelle	21%	37%
Mamaroneck	16%	42%
Pelham	14%	28%
Portchester	13%	52%
Mount Vernon	11%	39%
Larchmont	8%	42%
Rye	6%	60%
Line Average	**13%**	**60%**

To make our selections for stations to visit, we utilized systemwide kiss-and-ride and parking utilization figures secured from Metro-North, as can be seen in Tables 1 through 3. Some stations were excluded from selection, as follows: West of Hudson stations were not included because their relatively low number makes proportional kiss-and-ride comparisons with East of Hudson stations difficult; Connecticut stations were not included because Connecticut is out of the jurisdiction of the PCAC.

Two stations were selected for site visits from each branch. From the Harlem Line, Bedford Hills and Mt. Kisco were chosen, with kiss-and-ride percentages of 48% and 10% respectively. From the Hudson Line, Croton-Harmon (20%) and Cortlandt (0%) were selected. For the New Haven Line, Harrison (24%) and Rye (6%) were the stations chosen.

LIRR Station Selection

For the LIRR, a slightly different strategy was used due to the nature of that system. There were too few pairs of stations on the LIRR with high and low kiss-and-ride numbers to use the same strategy that was employed for Metro-North. LIRR kiss-and-ride numbers, as will be shown, tended to vary much less than those of Metro-North. For LIRR, we decided instead to look at the stations with the most severe parking problems. Of these stations, a few were chosen that reflected a variety in terms of branches and kiss-and-ride percentages.

Again, we secured systemwide kiss-and-ride and parking data from the agency, as can be seen in Tables 4 through 13. The figures are based on survey data provided by the LIRR. As with the Metro-North figures, this means that they are not exact percentages, and are only rough estimates. Several stations were missing from the data received from the railroad due to low survey response rates. Kiss-and-ride percentages were quite similar at the branch/line level for both LIRR and Metro-North. Both railroads have branch percentages that tend to hover around the 10% range. However, Metro-North has many individual stations with high kiss-and-ride percentages, while LIRR does not. For example, three Metro-North stations have kiss-and-ride figures of 30% or greater, and ten

have percentages of 20% or greater. LIRR, on the other hand, has only two stations with more than 30% kiss-and-ride, and only four with 20% or greater. This is a very significant difference when you consider the fact that LIRR has many more stations and branches than Metro-North.

Table 4: Proportion of LIRR Babylon Branch Kiss-and-Ride and Parking Usage

Babylon Branch		
Station	**Kiss & Ride**	**Park**
Babylon	17%	59%
Lindenhurst	15%	64%
Freeport	14%	61%
Baldwin	14%	60%
Massapequa Pk.	13%	50%
Wantagh	13%	61%
Rockville Ctr.	12%	47%
Merrick	10%	66%
Copiague	10%	60%
Bellmore	10%	73%
Amityville	8%	60%
Massapequa	7%	74%
Seaford	4%	76%
Branch Average	**12%**	**62%**

Table 5: Proportion of LIRR Far Rockaway Branch Kiss-and-Ride and Parking Usage

Far Rockaway Branch		
Station	**Kiss & Ride**	**Park**
Valley Stream	20%	50%
Inwood	18%	36%
Laurelton	17%	30%
Gibson	15%	13%
Rosedale	12%	38%
Cedarhurst	12%	34%
Woodmere	10%	40%
Lawrence	9%	39%
Far Rockaway	7%	0%
Hewlett	5%	32%
Locust Manor	4%	13%
Branch Average	**14%**	**40%**

Table 6: Proportion of LIRR Hempstead Branch Kiss-and-Ride and Parking Usage

Hempstead Branch		
Station	**Kiss & Ride**	**Park**
Hollis	39%	22%
Stewart Manor	21%	19%
Nassau Blvd.	15%	29%
Floral Park	13%	29%
Queens Village	12%	32%
Bellerose	11%	13%
Garden City	10%	52%
Hempstead	9%	54%
Country Life Press	4%	42%
Branch Average	**13%**	**34%**

Table 7: Proportion of LIRR Long Beach Branch Kiss-and-Ride and Parking Usage

Long Beach Branch		
Station	**Kiss & Ride**	**Park**
E. Rockaway	17%	28%
Lynbrook	15%	41%
Long Beach	10%	35%
Island Park	10%	57%
Oceanside	9%	65%
Centre Ave.	4%	23%
Branch Average	**11%**	**45%**

Table 8: Proportion of LIRR Montauk Branch Kiss-and-Ride and Parking Usage

Montauk Branch		
Station	**Kiss & Ride**	**Park**
Islip	21%	62%
Patchogue	19%	55%
Sayville	15%	56%
Bay Shore	11%	57%
Branch Average	**16%**	**56%**

Table 9: Proportion of LIRR Oyster Bay Branch Kiss-and-Ride and Parking Usage

Oyster Bay Branch		
Station	**Kiss & Ride**	**Park**
Sea Cliff	12%	50%
Albertson	8%	43%
Glen Head	4%	71%
E. Williston	2%	42%
Roslyn	1%	56%
Branch Average	**5%**	**49%**

Table 10: Proportion of LIRR Port Jefferson Branch Kiss-and-Ride and Parking Usage

Port Jefferson Branch		
Station	**Kiss & Ride**	**Park**
New Hyde Park	16%	41%
Mineola	16%	47%
St. James	15%	60%
Westbury	14%	60%
Kings Park	13%	73%
Syosset	13%	68%
Greenlawn	11%	77%
Hicksville	11%	75%
Port Jefferson	11%	56%
Northport	11%	77%
Carle Place	10%	32%
Huntington	8%	82%
Merillon Ave.	7%	36%
Smithtown	7%	71%
Stony Brook	6%	50%
Cold Sp. Harbor	6%	80%
Branch Average	**11%**	**67%**

Table 11: Proportion of LIRR Port Washington Branch Kiss-and-Ride and Parking Usage

Port Washington Branch		
Station	**Kiss & Ride**	**Park**
Plandome	24%	48%
Manhasset	17%	46%
Great Neck	16%	26%
Pt. Washington	16%	44%
Bayside	15%	23%
Douglaston	10%	37%
Broadway	8%	21%
Little Neck	8%	36%
Murray Hill	5%	18%
Auburndale	4%	23%
Flushing	3%	7%
Branch Average	**13%**	**32%**

The LIRR kiss-and-ride statistics do not show a very significant variation between branches. The highest kiss-and-ride percentage can be found on the Montauk Branch (16%), while the lowest is on the Oyster Bay Branch (5%). However, all of the other branches have figures between 8% and 14%.

Due to the fact that there are very few stations with high kiss-and-ride figures, we decided not use the same methodology as used for Metro-North to examine LIRR stations. We also took into consideration the fact that the LIRR is structurally a more complicated system, and thus faces some very different kinds of parking problems. In particular, many parking problems are due to scheduling differences or differences in power sources between adjacent branches. Riders may drive to a station that is further away in order to get to a more frequent

schedule, or electric service, causing parking problems to be concentrated along certain lines.

Table 12: Proportion of LIRR Ronkonkoma Branch Kiss-and-Ride and Parking Usage

Ronkonkoma Branch		
Station	**Kiss & Ride**	**Park**
Central Islip	17%	70%
Brentwood	16%	46%
Wyandanch	13%	70%
Bethpage	13%	66%
Farmingdale	10%	57%
Ronkonkoma	9%	80%
Deer Park	7%	86%
Branch Average	**11%**	**73%**

Table 13: Proportion of LIRR West Hempstead Branch Kiss-and-Ride and Parking Usage

West Hempstead Branch		
Station	**Kiss & Ride**	**Park**
Malverne	11%	30%
W. Hempstead	7%	59%
St. Albans	7%	8%
Hempstead Gdns	6%	18%
Westwood	6%	14%
Lakeview	4%	42%
Branch Average	**8%**	**32%**

Therefore, it makes more sense to choose LIRR stations to survey based on severity of parking problems. Thus, we chose as our base of analysis those stations with 500 or more parking spaces which are at or above 95 percent parking utilization. Data for these station are listed in Table 14. Notably, the worst six stations are on either the Ronkonkoma or Port Jefferson Branches. The worst four stations on the list were the clearest choices for site visits. Deer Park and Central Islip not only have the worst parking problems, but they are both on the Ronkonkoma line and have very different kiss-and-ride percentages. Therefore, they provide a good source of comparison. Cold Spring Harbor was chosen since it has the greatest parking problem of any station on the Port Jefferson Branch. Ronkonkoma was chosen because it not only has one of the most severe parking problems, but serves more parking customers than any other station.

Other stations were chosen to create balance. Huntington was selected because it has such an extensive parking facility, and because it is on the Port Jefferson Branch and right next to Cold Spring Harbor, making it good for comparison. The Seaford station was also selected because it has the second lowest kiss-and-ride percentage of any station. It also allows us to look at the Babylon Branch, which is quite heavily used. Port Washington was selected because it has a high kiss-and-ride percentage, and provides a case study for the Port Washington Branch. Finally, in order to bring in one station from the Long Beach Branch, Oceanside was also selected.

Table 14: LIRR Stations at or above 95 Percent Parking Utilization for Stations with 500 or More Spaces, with Kiss-and-Ride Usage[3]

Station	Parking Capacity	Average Number of Parked Vehicles	Proportion of Capacity Utilized	Proportion of Kiss-and-Ride Usage
Deer Park	1065	1521	***143%***	7%
Central Islip	922	1236	***134%***	17%
Cold Spring Harbor	969	1159	***120%***	6%
Ronkonkoma	5000	5810	***116%***	9%
Wyandanch	959	1033	***108%***	13%
Syosset	1221	1310	***107%***	13%
Merrick	1568	1633	***104%***	10%
Hicksville	3392	3522	***104%***	11%
Bellmore	1573	1615	***103%***	10%
Wantagh	1508	1547	***103%***	13%
Huntington	3460	3547	***103%***	8%
Seaford	1148	1163	***101%***	4%
Massapequa	1937	1951	***101%***	7%
Oceanside	565	566	100%	9%
Bethpage	958	959	100%	13%
Flushing	572	572	100%	3%
Farmingdale	504	503	100%	10%
Port Washington	795	790	99%	16%
Island Park	502	494	98%	10%
Westbury	577	563	98%	14%
Rockville Ctr	1419	1382	97%	12%
Mineola	564	548	97%	16%
Massapequa Park	723	698	97%	13%
Baldwin	1266	1222	97%	14%
Copiague	673	647	96%	10%

No stations were selected from the Far Rockaway, West Hempstead, Montauk, Oyster Bay, or Hempstead Branches. This was done in part due to limits in scope; however, no stations from any of these branches appear on the list of stations with severe parking problems (with the exception of Mineola which will soon have a new parking garage).

Metro-North Site Visit Results[4]

Bedford Hills (48% Kiss-and-Ride) and Mt. Kisco (10% Kiss-and-Ride)

Both of these stations are classic commuter rail stations located in the center of their respective towns. The stations are relatively small, with little parking and many retail stores within easy walking distance of the stations. Neither station is particularly well equipped for kiss-and-ride access, since both have small station areas.

[3] Data from the Draft Environmental Impact Statement for LIRR East Side Access, pp. 9E-9 to 9E-11.

[4] All Metro-North stations were visited on Friday February 16, 2001. Station names are followed by their kiss-and-ride percentages.

However, the difference between the convenience of dropping someone off at either station is apparent. The major feature that makes drop-off attractive at Bedford Hills is a prevalence of one and two hour parking spaces. There are no meters at these spaces, so drivers dropping people off can conveniently park there while they wait for a train, or just park for time enough to say a comfortable good-bye. Enforcement appears to be good, as there were plenty of spaces available at midday (this shows that these spaces were not being used by commuters). There are no such spaces available at Mt. Kisco. There are metered spaces available there, but a meter is not as attractive for kiss-and-ride passengers, who may just want to park for a very short time and don't want to risk a ticket or find change.

Another attractive feature of the Bedford Hills station for kiss-and-ride passengers is that there is a curb area distinct from the parking lot and away from the station that is intended for passenger drop-off. Although there is a small curb area for drop-off at Mt. Kisco, it is directly in front of the train station and intertwined with the parking lot. This probably creates some congestion during peak times that makes drop-off uncomfortable. Moreover, there is a restaurant/café (The Flying Pig) located in the station at Mt. Kisco. When the station was visited at midday, there were trucks making deliveries at the station and taking up significant curb space that would otherwise be available for kiss-and-ride passengers. It is unknown whether or not this is a problem during peak travel times.

Croton-Harmon (20%) and Cortlandt (0%)

Both of these stations are relatively modern, expansive stations with enormous parking lots. Unlike the stations examined on the Harlem Line, these stations are located further from population centers, and have virtually no pedestrian access. They are both far superior in their kiss-and-ride facilities when compared to the stations visited on the Harlem Line, yet both have comparably low kiss-and-ride percentages.

Nonetheless, when compared to one another, these stations show significant differences in the way that kiss-and-ride is accommodated. This is due to the fact that the Croton-Harmon station has the most extensive and most impressive kiss-and-ride facility of any Metro-North station that was visited. The drop-off area curb for Croton-Harmon extends the full length of the station, an entire train length. Passengers can be dropped off anywhere along the curb, but some parts of the curb are reserved for fifteen minute parking spots. There is also designated space along the curb for taxis.

By contrast, the Cortlandt station has a small drop-off loop that offers a fraction of the space offered at Croton-Harmon. Moreover, that small space is labeled as both a "15 minute drop off" area and as a taxi stand. Drivers wishing to access the drop off point must travel on the same route as drivers going to the parking

lot, which probably creates conflict during peak hours. On the plus side, the Cortlandt station has extensive signage for “station drop off” from the moment one enters the station access road.

Overall, both of these stations are very well equipped for kiss-and-ride usage. However, it is clear that a person with the choice of dropping people off at one station or the other would likely choose Croton-Harmon. This is probably enhanced due to the fact that Croton-Harmon is one stop closer to Manhattan and has more scheduled train service.

Harrison (24%) and Rye (6%)

These two stations on the New Haven Line are unlike both of the other sets of stations in their station layout. Like the Harlem Line stations, they are located near the center of the towns they serve. However, unlike those stations, they have extensive parking facilities. Although their parking lots are not as enormous as those on the Hudson Line stations, they are considerably larger than those on the Harlem Line stations.

In the case of these two stations, it was again clear why one station has a greater percentage of dropped off passengers. The Harrison station has a unique feature that encourages drop off. Along a road leading to the Harrison station, there is a drop off point for passengers that is ultra-convenient, and completely separate from the station parking lot. It contains a few spaces for two-hour parking, along with a substantial amount of curb space. There is an old but working station house located right at the drop-off point. Passengers can buy their tickets, and then proceed down a covered walkway that leads directly to the station platforms. There is no need for drivers to deal with what is a crowded parking lot, and there is no need for passengers to weather the elements when they are dropped off.

The Rye station looks much like the Harrison station minus the convenient drop-off area. Passengers can only be dropped off within parking lots on either side of the station. Although there is some meager curb space on the New York bound side of the station, it is also a bus stop, which clearly conflicts with passenger cars (see Figure 1, below). There are parking spaces available near the most convenient drop off point, but these are reserved for taxis and the handicapped. While visiting this station in the afternoon, one car did pull up and drop off a passenger – using the handicapped spot (it did not have a handicapped license plate or visibly handicapped driver). Although there is metered parking at the station, it is not proximate or convenient to the ideal drop off area.

Figure 1: Curbside space at Rye Metro-North station. The curbside space is also used as a local bus stop, which may cause conflicts between buses and cars and discourage the use of kiss-and-ride.

LIRR Site Visit Results[5]

An important aspect of all LIRR stations that was witnessed during the site visits was that the stations are usually unmarked. Drivers along roads leading to the stations are unlikely to be able to find the station without a map or directions. This was not generally true for Metro-North stations, as local roads near to the station were often marked with signs pointing drivers towards the station. Most pertinent for this analysis is the fact that the few LIRR signs that were seen along local roads simply indicated "LIRR Commuter Parking" as if no one would be looking for the station if they were not intending to park.

Central Islip (17%Kiss-and-Ride) and Deer Park (7% Kiss-and-Ride)

These are the only two stations visited that provide a good case for comparison of high and low kiss-and-ride percentages. They are also the two most congested parking lots for LIRR commuters. The two stations are similar in the way that both have significant numbers of illegally parked cars. This is not surprising given the fact that both stations have significant over-utilization. However, there are some important differences between the two stations that may account for their differences in kiss-and-ride percentages.

[5] The Port Washington station was visited on Monday March 5, 2001. All other LIRR stations were visited on Thursday March 8, 2001.

The main difference witnessed on the day visited was that curb space for kiss-and-ride was available at Central Islip, but not at Deer Park. If not for illegal parkers, Deer Park would have a whole train's length worth of curbside space. The curbside at this station is marked with only one sign that indicates that the parking there is limited to 15 minutes. Nonetheless, there was no available curbside space when the station was visited at mid-afternoon. Although it is possible that some of this space is available in the early morning, before people resort to illegal parking, it is most likely very difficult to get to. There is two-way traffic on the narrow road along the station platform, with parallel parking on both sides.

The curbside at Central Islip was slightly better. Although illegal parkers took up the majority of the curbside space, the part of the curb right in front of the station and waiting room juts out into the parking lot and makes it very conspicuous for potential illegal parkers. No cars were parked at this location, allowing for relatively easy kiss-and-ride access. However, there was some confusion entering the station, since a short-term parking sign directs riders to the part of the curbside that is taken by illegal parkers. Moreover, the roadway leading to the curbside is obstructed by illegally parked cars jutting out into it.

Figure 2: This sign at the Central Islip station on the LIRR is an example of a way to separate kiss-and-ride traffic from park and ride traffic. Unfortunately, due to illegal parking, if one follows the arrow for short-term parking it leads to occupied curbside space.

Nonetheless, as can be seen in Figure 2, above, Central Islip clearly benefits from open curb space due to the design of the roadway, and the fact that short and long-term parkers are separated upon entrance to the station.

Ronkonkoma (9%)

This is the most heavily used parking lot in the entire LIRR system. The station is virtually unapproachable by foot due to its location in an embankment just south of the Long Island Expressway. There are several approaches to the station by car.

It is easy to see why the Ronkonkoma station has low kiss-and-ride numbers. This was the only station, out of all the stations visited on both LIRR and Metro-North, where there was no place to park a vehicle out of the way of traffic on the day visited. At other stations, if there was not a legal parking space, there was at least some curbside space that could be taken temporarily while the station was examined. At Ronkonkoma, any space of pavement, either legal or illegal, on which a vehicle could be placed without blocking a roadway, was occupied. This limited examination of the station to what could be seen from inside a car.

It also meant that there was no possible space for kiss-and-ride passengers to stop for more than a moment. All curbside space was taken despite numerous "no stopping anytime" and tow away icon signage. The cars clearly had not been towed away by noontime when the station was visited. Navigation of the station by car was severely hindered by the numerous illegally parked vehicles that protruded into the roadways.

Huntington (8%) and Cold Spring Harbor (6%)

Although these stations both have low kiss-and-ride percentages, they are grouped together in this report because they are right next to one another on the Port Jefferson Branch.

Figure 3: Despite a parking shortage, this space at Huntington is reserved for LIRR employees only. Although next to the station house and platform entrance, it was one of several such spaces that were empty on the day of our visit.

There is plenty of room for improvement at both of these stations, although Huntington is somewhat better. Huntington benefits from easy curbside access. A one-way entrance to the closest station lot leads directly to an open curbside space for easy drop off. Moreover, there is a small traffic island a car's width from the curb that helps create two distinct lanes for drop off. However, there are no short-term or metered parking spaces, and all of the best spots in the Huntington lot were devoted to LIRR personnel (22 spots), and taxis (5 spots). Although there may be a need for exclusive spaces for these uses, one might question why the spaces closest to the station are the ones provided for railroad personnel even if kiss-and-ride is ignored. When kiss-and-ride is considered, it makes little sense not to provide any short-term parking spaces near to the station at the expense of parking for employees (see Figure 3, above).

Cold Spring Harbor has significant problems that discourage kiss-and-ride. Cars were parked illegally everywhere, making navigation through the station roadways treacherous. The lack of directional signs aggravates this problem, as it appears that all roadways are two-way despite the fact that many of them are quite narrow. There are no signs indicating where to drop off passengers, and it is not easy to find the drop off point due because the station is quite hilly. There are no temporary spaces at the station, and the closest spaces are reserved for LIRR personnel.

Oceanside (9%)

This station was very different from the others visited. It is a relatively pedestrian friendly station with smaller parking lots, and cars were parked in an orderly fashion.

There are two lots for the station, a northern and a southern lot. The southern lot is not intended for passenger drop off. All potential curbside space is taken by legal parking spaces (see Figure 4, below). The northern lot has curbside space, right next to a station house, that is intended for kiss-and-ride. However, cars were parked illegally in this space, despite "no parking anytime" signs. The smaller northern lot has separate entrances and exits, but there is no indication to arriving motorists that this is the appropriate lot for kiss-and-ride. There is no way to drive between the lots.

Figure 4: Curbside space at Oceanside station on the LIRR. Note that despite signage indicating that this space not for parking but for "pick-up and discharge only," cars are parked there for the day.

Port Washington (16%)

This is one of the few stations on the LIRR with a relatively high kiss-and-ride percentage. The station is located in a denser environment than any other visited, and was reminiscent of some of the Metro-North stations (Rye, for example).

Parking enforcement was significantly better at this station than at any other visited. Curbside space for passenger drop off is extensive and directly outside the station house. One-way traffic from the nearest station entrance probably eases traffic flow and makes drop off easier.

However, there is room for improvement. There are two entrances and two exits for the station, and all traffic within the parking lot is one-way. One entrance and exit are clearly preferable for kiss-and-ride passengers, but they conflict with park and ride passengers trying to use the same entrance. There are no short-term parking spots, and, as usual, the best parking spots are reserved for LIRR employees and police.

Seaford (3%)

This station was visited because it has the lowest kiss-and-ride percentage of any LIRR station with major parking problems. When the station was visited it was easy to see why this is the case.

Figure 5: The Seaford station on the LIRR. Notice that there is no conceivable place for drop off at this station. These cars parked along the curb are parked legally. There is very little curbside space on the opposite side, and it is marked with “no stopping anytime” signs.

There is literally nowhere to drop off a passenger at this station without blocking a major access artery. The lots for the station are located on either side of an access road just off of route 27. The LIRR is on an elevated structure above the lots. As Figure 5, above, shows, there is no curbside space within the lots, and no conceivable places for passenger drop off. The only possible place for drop off is underneath the elevated structure, on the access road between the two lots. Unfortunately, legally parked cars on the west side of the street take this curbside space. On the east side, curb space is much more limited due to the nature of the parking lot entrances. There is some room for potential drop off, but the “no stopping anytime” signs on that side probably discourage such drop off.

Commuter Rail Station Access Conclusions and Recommendations

This investigation helped to demonstrate two important characteristics of commuter rail station access in the New York area. First, it showed that station and parking lot design can have an effect on the number of passengers who access these stations by kiss-and-ride. The Metro-North analysis showed that stations with higher kiss-and-ride access percentages show tangible and significant differences that may explain these percentages. Although we cannot be sure about the direction of causality, we can at least be confident that there are certain steps that can be taken at stations in order to encourage kiss-and-ride.

Figure 6: An example of the illegal parking rampant at congested LIRR stations. This one is from Huntington.

Figure 7: Another example of people ignoring LIRR parking signs and regulations, this time at Cold Spring Harbor. There are many large cars parked in the section for small cars only. The closest cars are not even in legal spaces.

Second, the analysis showed a significant difference between Metro-North and LIRR. Although the sample of stations visited was not a random or representative one for either railroad, it seems apparent that Metro-North stations are much better suited to encouraging kiss-and-ride. This is due, in part, to the fact that the stations visited on the LIRR all had severe parking problems, and

some aspects of severe parking problems such as illegally parked vehicles, help to discourage kiss-and-ride (see Figures 6 and 7, above, and Figure 8, below). However, enforcement of parking regulations appeared to be significantly superior at Metro-North stations. This probably helps to alleviate parking problems.

Figure 8: This area at Deer Park is not really part of the parking lot. The reason that only SUVs are parked in this area is that it would be very difficult for a regular car to jump the icy, snowy curb to get to where these cars are illegally parked.

Besides these two main points, several simple recommendations flow from the above analysis. The following are applicable to both railroads (except where noted):

> **Implement a marketing campaign to increase kiss-and-ride usage should be implemented to help reduce parking problems while increasing ridership**. The analysis above showed that station characteristics can have an effect on kiss-and-ride percentages. Therefore, marketing is likely to be able to have an effect as well. Besides simply increasing awareness, one possible strategy for encouraging kiss-and-ride system-wide is to provide randomly selected prizes for kiss-and-ride customers. The prizes, such as a free monthly ticket, could be given away at random to passengers leaving their cars at curbside locations.

Provide short-term parking spaces where possible. Providing 15-minute or even one-hour spaces appears to encourage kiss-and-ride, and can be an effective use of space with proper marketing. The railroads should undertake analyses to determine whether they would increase parking lot capacity by converting some prime parking spaces to short-term spaces. Many of the best LIRR parking spaces are reserved for LIRR personnel. Converting these particular parking spaces for kiss-and-ride passengers could help to alleviate parking problems without infuriating customers. Spaces for LIRR personnel could be provided elsewhere.

Separate kiss-and-ride passengers from park and ride passengers. This is probably the most effective way to encourage kiss-and-ride, as evidenced most clearly by the Harrison station on Metro-North. Although it may not always be possible, or inexpensive, each railroad should investigate the places where they might be able to make this happen.

Provide and protect curbside drop off space. Stations with plentiful and available curbside near to station houses are more likely to encourage kiss-and-ride. In some cases, such as Seaford, simply changing the parking regulations could increase curbside space. In other cases, such as Cortlandt, curbside space could be increased with a few physical alterations.

Enforce parking regulations at LIRR stations. The condition of congested LIRR parking lots at midday is atrocious. Even without regard to kiss-and-ride, the LIRR must figure out how to enforce these regulations in order to improve safety and convenience for commuters. Although this might mean reducing the number of people who could actually park and ride, the current system of having regulations that are not enforced is unreasonable and unsustainable.

Improve signage for passengers accessing stations. Metro-North stations were slightly better than LIRR stations in this regard. However, both railroads need to work with local municipalities to improve wayfinding signage to their stations. In particular, the LIRR should create signage that helps remind passengers that parking is not the only option for commuters.

Barriers to Intermodal Transfers

Although many people had advocated a free transfer from bus-to-subway for years, few could have predicted the overwhelming impact that occurred from its implementation. When MetroCard Gold was introduced on July 4, 1997, a significant barrier to public transportation use in the city was brought down. Ridership on New York City Transit subways and buses has increased at an unprecedented rate since that time. Riders now enjoy a nearly seamless transition in terms of fare collection between different modes of transportation under the purview of MTA New York City Transit.

However, fare collection is not the only barrier to seamless transfers between subways and buses. There are physical barriers that often make such transfers difficult and/or cumbersome. Now that financial barriers preventing people from transferring from subway to bus have been eliminated, it makes sense to focus on these remaining physical impediments. The first part of this section looks at some of the physical barriers that exist and what can be done to eliminate them.

Another important barrier to making intermodal connections is scheduling. Many NYCT services are scheduled frequently enough to reduce the need for schedule coordination. However, service in some places, and virtually all late-night service, is much less frequent. For example, bus and train service on Staten Island is infrequent throughout the day. Schedule coordination during early morning hours, when there is greater competition from automobiles due to less traffic congestion, and when darkness and a dearth of people can make passengers uncomfortable waiting for a transit vehicle, is crucial. Schedule coordination between infrequent NYCT services is analyzed in the second part of this section.

Although it is wonderful that ridership has been boosted so dramatically by MetroCard and a healthy economy, this has nonetheless created or exacerbated crowding on subways and major bus routes. This crowding creates a new barrier to public transportation. The crowds discourage riders who might otherwise take transit, and crowding can act as a physical barrier when it literally prevents a rider from boarding a transit vehicle.

Furthermore, crowding slows travel times for transit vehicles due to increased dwell times. This can discourage transit use as well. However, on this point, it is crucial to note that buses are more severely impacted than subways. Subway crowding is certainly problematic, but since subways operate on their own rights-of-way and are not subject to traffic congestion, they will provide a superior alternative to virtually any other mode of transportation even if boarding times are very slow. Buses, on the other hand, are plagued by traffic and street conditions that slow travel times dramatically. Slow boarding times in addition to this can be a serious barrier to increased ridership. Therefore, the last part of this section focuses on how to speed boarding of buses, not subways.

Physical Barriers

The physical barriers that exist for bus and subway transfers were analyzed by performing field research at the subway stations with the most passengers transferring on a daily basis, and at subway stations along bus routes with the most passengers transferring from subways.

Physical Barriers Analysis Methodology

Good New York City Transit data on transfers from subway to bus and vice-versa is limited due to the nature of MetroCard. First, a transfer is only recorded when a rider boards a bus or enters a subway station after disembarking from the opposite mode. Therefore, data is available only in one direction, and it cannot be known where on a bus route a transferring rider boarded. This is not a particularly limiting factor. Secondly, weekly and monthly pass holders are excluded from transfer counts. Fortunately, data from May 1998, before the unlimited ride passes were introduced, is available. Since this data is not the most recent, it is supplemented by data from September 2000. Since one set of data is the most recent, and another is more accurate, together they can help paint an appropriate picture.

The top 50 Subway stations in terms of percentage of passengers transferring from a bus were examined. The top 10 stations in terms of total transferring passengers were calculated using this list. Both sets of data produced an identical list of stations, although the actual numbers were different and the stations were not in the same order. The results from both data sets are shown in Tables 15 and 16, below.

Table 15: Subway Stations with Greatest Average Numbers of Customers Transferring from a Bus, in May 1998

Subway Station (Line)	Transfers from Bus
Main St.–Flushing (7)	19,738
Jamaica Center (E, J, Z)	14,832
179 St.–Jamaica (F)	10,134
Union Turnpike (E, F)	9,326
3 Ave.–149th St. (2, 5)	5,856
74 St./Roosevelt Ave. (7, E, F, G, R)	5,800
Flatbush Ave. (2,5)	4,822
71 Ave.–Forest Hills (E, F, G, R)	4,738
Utica Ave.–Crown Heights (3, 4)	4,635
South Ferry (1, 9)	4,345

Table 16: Subway Stations with Greatest Average Numbers of Customers Transferring from a Bus, in September 2000

Subway Station (Line)	Transfers from Bus
Main St.–Flushing (7)	15,163
Jamaica Center (E, J, Z)	10,457
179 St.–Jamaica (F)	8,180
Union Turnpike (E, F)	7,359
74 St./Roosevelt Ave. (7, E, F, G, R)	4,391
71 Ave.–Forest Hills (E, F, G, R)	3,943
South Ferry (1, 9)	3,564
Flatbush Ave. (2, 5)	3,455
3 Ave.–149th St. (2, 5)	3,405
Utica Ave.–Crown Heights (3, 4)	3,177

A similar analysis was performed for bus routes. The two lists generated by the 1998 and 2000 data were not identical in this case, but they were quite similar. Table 17 shows the 1998 data, and Table 18 shows the 2000 data.

Table 17: Bus Routes with Average Greatest Numbers of Customers Transferring from the Subway, in May 1998

Bus Route	Transfers from Subway
M86	6,489
M14	5,778
Q46	5,396
M23	4,260
BX55	3,794
Q27	3,006
Q5	2,905
B17	2,817
M66	2,644
Q17	2,611

Table 18: Bus Routes with Average Greatest Numbers of Customers Transferring from the Subway, in September 2000 (Excluding MetroCard Passes)

Bus Route	Transfers from Subway
M86	9,434
Q46	8,982
M23	6,034
B17	4,608
Q17	4,580
Q27	4,474
B36	4,352
M96	4,266
M66	4,060
Q5	4,058

Based on this data, a list of subway stations to be examined through field research was generated (see Table 19). All of the top subway stations listed in Tables 16 and 17 were included. However, it would be beyond the scope of this paper to examine every single subway stop served by the top bus routes from those tables. Therefore, only routes that do not serve the subway stations already listed are considered for inclusion. Most of these routes are crosstown buses in Manhattan, which account for a high number of bus-to-subway transfers, but since they touch so many subway stations, do not create a singular high transfer point. All routes outside Manhattan were included. Two Manhattan routes, the M96 and M14, were selected for station evaluation. All subway stations along these routes are included.

Physical Barriers Site Visit Results

Table 19, below, shows the results of our site visits[6]. The buses listed are all the buses that stop near the subway station visited. Buses in bold are those from the list of top bus routes for transfer passengers (Tables 3.3 and 3.4). The "shelters" column lists the number of shelters for bus passengers at each location. The "signs to buses" column refers to how many wayfinding signs, either in the subway station, on the platforms, or anywhere within the vicinity of the station, were observed that directed passengers from the subway to the buses. The actual bus stop sign (where the bus stops), however, is not included in this figure. The "signs to subway" column refers to the number of wayfinding signs directing passengers from the buses to the subways. However, in many cases such signage was not necessary, due to the fact that the subway station is clearly marked by signage that can easily be seen from the relevant bus stop.

[6] Coney Island, West 8th St., Sheepshead Bay, Flatbush Ave., Utica Ave., South Ferry, and 14th St. Union Square were all visited on December 15, 2000. Main St. Flushing, 179th St., Jamaica Center, Union Turnpike, 71st. Ave., 74th St., 3rd Ave., 96th St./Broadway, and 96th St./Central Park West, were all visited on January 12, 2001. 96th St./Lexington, 14th St./8th Ave., and 14th St/.6th Ave. were all visited on January 19, 2001.

Table 19: Results of Site Visits to Subway–Bus Transfer Points

Subway Station (Line)	Bus Routes	Bus Shelters	Wayfinding Signs to Buses	Wayfinding Signs to Subway
14th St. (L, N, R, 4, 5, 6)	M1, M2, M3, M7, M9, **M14**[7]	0	0	0
14th St. (F, L)	**M14**, M5, M6, M7	0	0	not necessary[8]
14th St. (A,C,E,L)	**M14**, M20	2	0	not necessary
179 St.- Jamaica (F)	Q1, Q2, Q3, **Q17**, Q31, Q36, Q43, Q75, Q76, Q77, Q110, N1, N2, N3, N6, N22, N22a, N24, N26	0	4	not necessary
3 Ave.- 149th St. (2, 5)	Bx2, Bx4, Bx15, Bx19, Bx21, Bx41, **BX55**	3	2	not necessary
71 Ave.- Forest Hills (E, F, G, R)	Q23, Q65A	2	0	not necessary
74 St./Roosevelt Ave. (7, E, F, G, R)	Q19B, Q32, Q33, Q45, Q47, Q53	3	15	not necessary
96th St. (1, 2, 3, 9)	**M96**, M104	1	0	not necessary
96th St. (B, C)	**M96**, M104	1	0	not necessary
96th St. (6)	**M96**, M98, M101, M102, M103	0	0	not necessary
Coney Island/Stillwell Ave. (B, D, F, N)	**B36**, B64, B74	1	2	not necessary
Flatbush Ave. (2, 5)	B6, B11, B41, B44, Q35	1	2	0
Jamaica Center (E, J, Z)	Q4, Q5, Q6, Q8, Q9, Q24, Q25, Q30, Q31, Q41, Q42, Q44, Q54, Q56, Q65, Q83, Q84, Q85, Q110, Q111, Q112, Q113, N4	11	2	0
Main St.- Flushing (7)	Q12, Q13, Q14, Q15, Q16, Q17, Q20a/b, Q25, Q26, **Q27**, Q28, Q34, Q44, Q48, Q58, Q65, Q66, QBx1, N20, N21	0	6	0
Sheepshead Bay (D, Q)	B4, **B36**, B49	0	6	not necessary
South Ferry (1, 9 and N, R)	M1, M6, M15	2	2	not necessary
Union Turnpike (E, F)	Q10, Q37, **Q46**, Q74	2	11	not necessary
Utica Ave.- Crown Heights (3, 4)	B14, **B17**, B46	1	2	not necessary
West 8th St. (D, F)	**B36**	1	0	not necessary

[7] Bold indicates a bus route included in Tables 17 and 18, which show bus routes with the greatest average numbers of customers transferring from the subway in 1998 and 2000.
[8] "Not necessary" indicates that the location of the subway station entrance is blatantly obvious to an arriving customer on a bus.

Shelters:

As Table 19 shows, bus shelters appear to be lacking at key transfer points where many people are likely to be waiting. Main St. Flushing, 179th St., and Sheepshead Bay, which are all very popular transfer points, have no shelters for bus passengers. Overall, 32% of the stations surveyed have no bus shelters, and 63% have one or zero. If this were a random survey of stations, these figures would be discouraging. However, since this is a survey of the most popular stations for bus-to-subway transfers, these figures are unacceptable.

In some places, shelters are well designed and setup to complement the subway station and provide a clear waiting area for passengers. For example, Jamaica Center and 74th St./Roosevelt Ave. both have waiting areas for buses that are convenient to the subway. However, even at these stations, the convenience of these waiting areas is marred by poor signage (see below).

Wayfinding Signage to Buses:

Table 19 also shows that wayfinding signage to buses is lacking at some key transfer points. Forty-two percent of stations surveyed do not have any signage pointing to buses at all. Admittedly, many of these stations (six of them) are in parts of Manhattan where signage may not be as critical due to a rigid grid system of streets and fewer buses. However, even at these stations, signage can be an issue. For example at the 96th St. station on the B and C, the nearest stop for the westbound M96 is on Central Park West, not on 96th St. A passenger exiting the station and unfamiliar with the route of the M96 could easily have trouble finding the stop (see Figure 9, below).

Figure 9: Sign at the 96th St. station on the B and C line in Manhattan. Note that buses are not mentioned at all, despite the fact that the M96 and M10 stop just outside the station. Moreover, the M96 does not stop in an obvious place at this intersection. This lack of wayfinding signage to buses is typical for Manhattan stations.

Wayfinding signage was the most noticeable problem in subway-to-bus transfers. Although there is often plentiful signage regarding buses at subway stations with high numbers of bus transfers, the signage is not particularly useful. There are

often signs on station platforms, and within the pre-pay station area. However, these signs often fail to adequately help passengers reach the bus of their choice.

First of all, signs sometimes fail to point passengers towards the best exit for their particular bus. For example, at Jamaica Center, a sign listing multiple buses directs passengers to the north side of Archer Avenue, but all buses stop on the south side of Archer Avenue, where a shelter and many bus bays are present. Another example is 74th St./ Roosevelt Avenue, where a convenient passageway leading directly to a bus depot is marred by confusing signage (and on the day it was visited, dripping water and impassable puddles). Yet another example is the Union Turnpike station, where there would be an easy transfer to the Q46 if only signage directed passengers towards it. Instead, the signs are too vague and leave passengers guessing about which exit is best for them. A similar problem was witnessed at Flatbush Avenue, where multiple exits exist but signs to buses do not specify which exit to take for which bus. In fact, at this station, opposite exits point to the same buses. The same problem was also seen at West 8th St., where multiple exits lack appropriate signage.

One station had very good signage in this respect. At 149th St./3rd Avenue, a sign directs passengers to exactly the proper exit for their particular bus. Unfortunately, this appears to be the exception and not the rule.

Second, the signs are typically plentiful within the stations, but virtually non-existent outside the stations. In part, this is due to a lack of a place for Transit to place signs, since they do not control the areas outside the station. However, it is also due to poor bus signage at bus stops. Many bus signs are unclear, missing, or difficult to understand. Moreover, Transit could help to fix the problem by posting some simple directions on the signs within the station that tell people how to get to certain buses from the proper exits. These kinds of problems were particularly acute at stations with multiple bus routes, such as Main St./Flushing. Signs in this station for multiple bus routes lead directly to (maybe) one or two of those buses. The same problem was seen at 179th St./Jamaica.

A final discouraging note about signage is that although some stations had plentiful signs for buses, these signs were often duplicative and failed to really help passengers, while other necessary signage was lacking. For example, at Union Turnpike, there were eleven signs for buses, all within the subway station. However, ten of these signs referred only to the Q10 bus, which is a Green Line bus going to Kennedy Airport. Only one sign referred to the Q46, one of the most heavily used lines in the city for bus-to-subway transfers. Another good example is 74th St./Roosevelt Ave., where there are at least fifteen signs for buses, but none of them directs you to the proper place to wait for the Q32 or Q53.

Wayfinding Signage to Subways:

As Table 3.5 demonstrates, no signage directing passengers from buses to subways was observed anywhere. In most cases (79%) such signage is unnecessary since subway stations are in such close proximity and are clearly marked. However, there are other stations where a lack of this kind of signage is a real drawback. For example, at Union Square in Manhattan there are several nearby buses that stop in different places. Some of these stops are far enough away that passengers exiting the buses who do not know how to get to the subway station might have trouble. The lack of signage at Main St. Flushing is also problematic, since many nearby buses stop on streets that are not within the sightline of the subway station.

Scheduling of Transfers

There are two areas within the NYCT system where rail service is infrequent enough to justify schedule coordination between bus and rail. The first area is Staten Island, where the Staten Island Railway (SIR) runs at service frequencies of 30 minutes during much of the day. The second area is in the far reaches of Queens, where the A train runs on twenty minute headways on each of its branches throughout much of the day. However, this area is not considered in this paper, since the buses with the most important connections to those stations (the Q10 and Q37) are Green Line Buses that are not under the control of New York City Transit. Schedules for buses connecting to SIR services are analyzed to see how long passengers transferring from one mode to the other will have to wait. Only buses that run more or less perpendicular to the rail service are analyzed, since these buses are more likely to carry connecting passengers.

Scheduling of Transfers Analysis Methdology

In order to determine schedule coordination for both peak and off-peak early-morning service, weekday schedules between the hours of 4:00 am and 10:00 am are examined. Schedule coordination is only examined in one direction – towards Manhattan – for simplification, and since this is the direction in which most people want to travel during the early morning and the morning peak.

For each rail station, all train arrival times between 4:00 a.m. and 10:00 a.m. are listed. The arrival time of the bus that arrives before the train (since we are only looking at bus to train transfers) within the least amount of time is listed next to that train time. Only vehicles arriving within twenty minutes of one another are considered. The bus arrival in the most likely direction for transferring to subway is considered. If one bus arrival is within twenty minutes of two train arrivals, it is assumed that anyone who wanted to transfer to the train took the first train to arrive. The second train arrival is therefore listed without a companion bus in such a case.

It should be noted that this analysis is merely intended to be an approximate evaluation of schedule coordination. It is intended to provide a general picture of how well buses and trains are coordinated. In the reality that is New York City, a

bus scheduled to arrive at the exact same time as a train would not be perfect schedule coordination, since traffic is likely to delay the bus at least occasionally and cause passengers to miss their train. However, for simplification, it is assumed in this analysis that when NYCT schedules a train to meet a bus exactly, or within one or two minutes, it is because they are confident that the bus will arrive early or on time.

Results for Staten Island

The following Staten Island Railway (SIR) stations were analyzed: Grasmere, Grant City, New Dorp, and Eltingville. These stations were chosen because they are the most logical places for travelers to make connections from Staten Island buses. All of them, with the exception of Grant City, are highlighted on the MTA map for their bus transfers. Therefore, infrequent travelers are also likely to be drawn to these stations to make their transfers. Grant City was also included as an example of a station not specifically designated on the MTA map as a bus transfer point.

Table 20: Coordination of Peak-Direction Staten Island Railway and S53 Bus Arrivals at Grasmere Station, Weekdays between 4:00 a.m. and 10:00 a.m.

Time of Train Arrival	Time of Connecting Bus Arrival[9]	Waiting Time in Minutes
4:39	4:31	8
5:39	5:36	3
6:00	6:00	0
6:20	6:16	4
6:40	6:32	8
6:57	6:57	0
7:03	No bus	NA
7:15	7:13	2
7:23	7:21	2
7:37	7:29	8
7:54	7:49	5
8:12	8:09	3
8:14	No bus	NA
8:29	8:25	4
8:39	8:35	4
9:09	9:05	4
9:39	9:35	4
Average Wait Time:		**3.9**

As Table 20, above, shows, there does not seem to be a consistent, conscious effort on the part of Transit to coordinate schedules between bus and train at Grasmere, since wait times for trains are quite variable. However, the average

[9] Only buses scheduled to arrive within 20 minutes of a train arrival are included.

wait time of approximately four minutes shows that despite the lack of ideal coordination between buses and trains, service is frequent enough to provide reasonable connections for those who need them.

Table 21: Coordination of Peak-Direction Staten Island Railway and S51 Bus Arrivals at Grant City Station, Weekdays between 4:00 a.m. and 10:00 a.m.

Time of Train Arrival	Time of Connecting Bus Arrival[10]	Waiting Time in Minutes
4:31	No bus	NA
5:31	No bus	NA
5:52	No bus	NA
6:12	5:58	14
6:32	No bus	NA
6:49	6:35	14
6:55	6:35	20
7:07	7:00	7
7:15	No bus	NA
7:29	7:16	13
7:37	7:36	1
7:46	No bus	NA
8:04	7:51	13
8:21	8:21	0
8:31	No bus	NA
9:01	8:51	10
9:31	9:21	10
Average Wait Time:		**10.2**

Grant City shows very poor coordination between the S51 bus and the SIR. Seven trains (41%) are not met by any bus. As shown in Table 21, above, virtually anyone wishing to make this trip in the morning would face transfer waiting times greater than ten minutes. The S51 bus turns around near the Grant City station, so schedule coordination should not be that difficult. Moreover, other local buses do not duplicate the bus service, so residents living nearby have few public transportation options.

The New Dorp station, as shown in Table 22, below, also has poor coordination between buses and trains. Almost half of the trains arriving in New Dorp, eight out of eighteen (44%) are not even met by the S57 bus, which serves residents of the Oakwood and New Dorp sections of Staten Island. This is mostly due to the bus' extremely low frequency. However, schedule coordination is even more critical for low frequency buses, and it is quite clear that the S57 is not scheduled for feeding the SIR, despite the fact that it originates and terminates at the New Dorp SIR station. The S76 is also poorly coordinated, but its more frequent

[10] Ibid.

schedule makes it more convenient. Three (17%) of the trains arriving at this station during these hours do not meet an S76 bus within twenty minutes.

Table 22: Coordination of Peak-Direction Staten Island Railway and Bus Arrivals at New Dorp Station, Weekdays between 4:00 a.m. and 10:00 a.m.

	S57 Bus		S76 Bus	
Time of Train Arrival	**Time of Connecting Bus Arrival[11]**	**Waiting Time in Minutes**	**Time of Connecting Bus Arrival[12]**	**Waiting Time in Minutes**
4:29	No bus	NA	No bus	NA
5:29	516	13	No bus	NA
5:50	546	4	5:48	2
6:10	No bus	NA	6:08	2
6:30	616	14	6:28	2
6:47	No bus	NA	6:38	9
6:53	648	5	6:50	3
7:05	No bus	NA	7:00	5
7:13	No bus	NA	7:10	3
7:27	726	1	7:20	7
7:35	No bus	NA	7:30	5
7:44	741	3	7:40	4
8:02	756	6	8:00	2
8:19	811	8	8:15	4
8:29	826	3	No bus	NA
8:59	841	18	8:45	14
9:29	No bus	NA	9:14	15
9:59	No bus	NA	9:54	5
Average Wait Time:		**7.5**		**5.5**

Eltingville is a major transit hub for the southern part of Staten Island, with two local buses and four express buses stopping at the SIR station. Tables 23 and 24 show schedule coordination data separately for local and express routes. Interestingly, it appears that express bus services are better coordinated than local buses. Passengers traveling on the SIR can make relatively convenient transfers to express buses, the X4 especially. However, overall these transfers appear uncoordinated. Many trains are not met by a bus within twenty minutes. Admittedly, express buses are intended for the peak hour and thus cannot meet early morning trains. However, for the S59 and S79, buses do not meet 33% and 11% of trains within twenty minutes, respectively.

[11] Ibid.
[12] Ibid.

Table 23: Coordination of Peak-Direction Staten Island Railway and Local Bus Arrivals at Eltingville Station, Weekdays between 4:00 a.m. and 10:00 a.m.

	S59 Bus		S79 Bus	
Time of Train Arrival	**Time of Connecting Bus Arrival[13]**	**Waiting Time in Minutes**	**Time of Connecting Bus Arrival[14]**	**Waiting Time in Minutes**
4:21	No bus	NA	No bus	NA
5:21	No bus	NA	5:20	1
5:42	No bus	NA	5:42	0
6:02	559	3	5:53	9
6:22	620	2	6:20	2
6:39	No bus	NA	6:31	8
6:45	640	5	6:41	4
6:59	650	9	6:51	8
7:05	700	5	7:01	4
7:19	No bus	NA	7:11	8
7:28	722	6	7:21	7
7:46	744	2	7:45	1
8:02	759	3	7:59	3
8:11	No bus	NA	No bus	NA
8:21	815	6	8:14	7
8:51	835	16	8:44	7
9:21	915	6	9:14	7
9:51	935	16	9:44	7
Average Wait Time:		**6.6**		**5.2**

[13] Ibid.
[14] Ibid.

Table 24: Coordination of Peak-Direction Staten Island Railway and Express Bus Arrivals at Eltingville Station, Weekdays between 4:00 a.m. and 10:00 a.m.

	X1 Bus		X4 Bus		X5 Bus		X6 Bus	
Time of Train Arrival	**Time of Connecting Bus Arrival[15]**	**Waiting Time in Minutes**	**Time of Connecting Bus Arrival[16]**	**Waiting Time in Minutes**	**Time of Connecting Bus Arrival[17]**	**Waiting Time in Minutes**	**Time of Connecting Bus Arrival[18]**	**Waiting Time in Minutes**
4:21	4:25	4	No bus	NA	No bus	NA	No bus	n/a
5:21	5:25	4	No bus	NA	5:24	3	5:30	9
5:42	5:45	3	No bus	NA	5:50	8	5:45	3
6:02	6:06	4	6:05	3	6:09	7	6:15	13
6:22	6:24	2	6:24	2	6:23	1	6:30	8
6:39	No bus	NA	6:40	1	6:42	3	6:40	1
6:45	6:46	1	6:45	0	6:48	3	6:48	3
6:59	7:02	3	7:00	1	7:00	1	7:04	5
7:05	7:10	5	7:07	2	7:07	2	7:10	5
7:19	7:22	3	7:25	6	7:20	1	7:22	3
7:28	7:28	0	7:35	7	7:35	7	7:28	0
7:46	7:48	2	7:50	4	7:50	4	No bus	n/a
8:02	8:04	2	8:05	3	8:05	3	No bus	n/a
8:11	8:12	1	No bus	NA	No bus	NA	No bus	n/a
8:21	8:28	7	No bus	NA	8:35	14	No bus	n/a
8:51	9:00	9	No bus	NA	No bus	NA	No bus	n/a
9:21	9:32	11	No bus	NA	No bus	NA	No bus	n/a
9:51	9:56	5	No bus	NA	No bus	NA	No bus	n/a
Average Wait Time:		**3.9**		**2.9**		**4.4**		**5.0**

Crowding

The free intermodal transfer, a New York City renaissance, and a booming economy has brought severe crowding to NYCT buses and subways. Along with crowding comes increased dwell times, and delayed transit vehicles. In these good times, it is vital for Transit to convince new riders to stay, and to avoid losing old riders, despite the seeming lack of a place to put them all. Procurement of new vehicles, rehabilitation of subway stations, addition of new staff, system expansion, and the provision of new service are long-term, cost-intensive ways to alleviate crowding that Transit must undertake. However, in the meantime, it would be helpful for Transit to pursue other anti-crowding strategies.

Unfortunately, it is virtually impossible to alleviate crowding on-board subways without increases in service. Campaigns to encourage better boarding procedures, and efforts to encourage off-peak usage (without fare differentials) are not likely to have a significant impact.

[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Ibid.

However, buses are a very different story. Buses experience crowding in part because they experience so many possible elements that can cause delay. Unlike subways, they usually do not have their own rights-of-way and boarding a vehicle must include time for paying a fare. Strategies for addressing each of these problems are discussed below.

Exclusive Rights-of-Way

This is probably the greatest cause of bus delay and subsequent crowding. Besides regular traffic jams, NYCT buses must deal with cars illegally parked at bus stops. Regular traffic jams are very difficult to avoid without the use of exclusive bus lanes. Transit should pursue the right to exclusive lanes for buses wherever possible. However, given the difficulties involved in obtaining such lanes, this strategy has only limited viability.

On the other hand, cars illegally parked or stopped at bus stops, or other obstructions are a problem that can be dealt with. First, the MTA must work with police to ensure that offenders are punished. It is not appropriate for the MTA to absolve themselves of responsibility simply because it is out of their realm of direct control. Since traffic enforcement issues directly affect the MTA and its ridership, it is essential for the MTA to open a dialogue to New York City DOT and the New York City Police Department so that these groups continue to work together towards what should be mutually compatible goals. Second, the MTA needs to make customers and others aware of the delays that are caused by illegally parked or stopped vehicles. Many of their customers are often the same people who are blocking bus stops. Moreover, if customers were aware of how much their waiting time and comfort are compromised by illegally parked vehicles, there might be more of an outcry from customers waiting at bus stops. This type of “civilian enforcement” could prove to be quite effective. Ads on MTA buses heralding the amount of delay that results from this problem are worth trying.

Pre-Paid Boarding

The boarding process for buses is painstakingly slow because customers must pay as they board. The bus must wait to leave until everyone is on-board. This can take particularly long at very popular bus stops, such as those on certain crosstown routes in Manhattan.

Fortunately, the technology has arrived that will allow us to successfully deal with this problem. Due to the existence of High Entrance/Exit Turnstiles (HEETs), it is now possible to create bus stops with enclosed waiting areas that are only accessible to fare-paying customers. Customers would slide their MetroCard through the HEET, and wait in an enclosed area. When the bus arrives, they would board the bus through an exit that is exit-only directly into the bus without stopping to pay a fare. This would be similar to a system that has proved quite

effective in Curitiba, Brazil, where an entire Transit network has been developed based on this concept.

In New York City, it would probably make sense to apply this technology selectively. First, due to the relatively small but not insignificant capital costs involved, pre-pay bus stops should only be installed where there is very high demand. Second, since New Yorkers are accustomed to being able to use change when boarding buses, it would be helpful to install MVM machines in stores nearby these bus stops. This way, the HEETs would not have to accept coins. Instructions at the bus stop could direct passengers to the MVM if necessary. Finally, since these bus stops take up a lot of sidewalk space, their appropriateness could be limited.

In the meantime, before a pre-pay boarding system can be installed, the MTA should look into the possibility of rear-door boarding for buses. With the advent of MetroCard, it may be possible to install a rear-door boarding system that avoids fare evasion problems while speeding the boarding process.

Intermodal Transfers Conclusions and Recommendations

There is plenty of room for improvement where intermodal transfers are concerned. This analysis was only concerned with two specific areas; major intermodal transfer points, and intermodal transfer points on Staten Island. Wayfinding signage between buses and subways at the most popular transfer points between buses and subways is generally inadequate. The timing of transfers between buses and trains on Staten Island is either poor or nonexistent. These two obvious barriers to public transportation can and should be removed without high cost.

The following are our specific recommendations:

Install additional shelters at the most widely used transfer points. It was discouraging to find that 63% of the most highly used bus-to-subway transfer points in the city have one or zero bus shelters (32% have zero). Shelters are important everywhere, but especially where there are large numbers of people making transfers.

Work to make bus and subway wayfinding signage more useful. Our survey of wayfinding signage showed that in the most relevant cases, wayfinding signage does not indicate the best exit from a subway station for a particular bus. Moreover, such signage was often found to be duplicative. NYCT should re-examine its system of wayfinding signage for buses thoroughly so that a system that can provide more help to riders can be installed.

Work with New York City DOT to provide signage outside of subway stations. There were few, if any signs outside subway stations that helped to direct passengers making bus-to-subway transfers. Although in

many cases such signs are not necessary, in many other cases it can be extremely difficult to find a subway station from a bus stop, even if the subway is very close by. NYCT assistance in finding their buses and subways should not stop on the street.

Improve schedule coordination between Staten Island bus and rail. Our analysis showed that, by and large, schedules for the Staten Island Railway and local Staten Island buses are not well coordinated. Passengers trying to transfer between these modes often face unnecessarily long wait times. Now that NYCT operates the Staten Island Railway, this problem should be eliminated to help encourage more transit in New York City's least transit-dependent borough.

Reduce crowding on NYCT buses by introducing more exclusive rights of way and pre-paid boarding. The recent boom in bus patronage can be handled if these methods are explored and implemented. Exclusive rights of way are hard to acquire, but are still much cheaper than building new rail links. The introduction of HEETs (High Entrance Exit Turnstiles) means that pre-paid boarding can become a reality without a major capital investment.

Barriers to Inter-Agency Transfers

This section looks at two of the problems imposed upon the New York Region by the fact that there are three states and multiple agencies combining to produce one transit network for the area. The first of these problems, physical barriers, is similar to those examined in the previous two sections. There are certain places in the region where people make key transfers between transit systems run by different agencies. These places are examined to determine how well that physical transfer is designed, and what might be improved, much the same way as barriers between bus and subway for NYCT were examined in the previous section. The second problem is one that New York City Transit partly alleviated by introducing MetroCard – fare barriers. Different fare collection systems for each transit agency in the region cause problems for riders. The current state of this issue is discussed.

Physical Barriers

The major transfer points between the various transit agencies in the region are easily identified. These points include transfers between agencies within the MTA. They are listed in Table 25, below.

Physical Barriers Analysis Methodology

Since visiting and analyzing all of these transfer points would be beyond the scope of this paper, the list was narrowed to a more manageable size. This was done by eliminating the most long-standing and obvious transfer points, where there is likely to be less room for improvement.

Table 25: Major Inter-Agency Transfer Points

Transfer Point	Location	Agencies with Available Service
Flatbush Ave.	Brooklyn	NYCT, LIRR
Penn Station	Manhattan	LIRR, NJT, NYCT
Grand Central Terminal	Manhattan	Metro-North, NYCT
Herald Square	Manhattan	NYCT, Port Authority
World Trade Center	Manhattan	NYCT, Port Authority
South Ferry	Manhattan	NYCT, NYC DOT
Port Authority Bus Terminal	Manhattan	NYCT, Port Authority
125th St.	Manhattan	NYCT, Metro-North
181st St./GWB Bus Terminal	Manhattan	NYCT, Port Authority
Hoboken Terminal	New Jersey	Metro-North, Port Authority
Woodside	Queens	NYCT, LIRR
Jamaica Station	Queens	NYCT, LIRR, LI Bus
St. George Terminal	Staten Island	NYCT, NYC DOT, SIR
Fordham Road	The Bronx	NYCT, Metro-North, BEELINE

For example, Penn Station and Grand Central Terminal, the two biggest transfer points in the region, are so vast that it would be difficult for a limited investigation

of this sort to uncover much of anything. Other transfer points, such as the World Trade Center, South Ferry, the Port Authority Bus Terminal, and Hoboken Terminal, were also determined to be too extensive for an investigation of this sort. The transfer points that remain are more manageable in size, and are likely to have opportunities for simple improvements that could help reduce barriers to their use.

Physical Barriers Site Visit Results

Each of the remaining sites was visited, with an eye towards making the relevant transfers. Table 26, below, shows the results of the site visits[19]. Note that all of the sites visited had NYCT services of some kind. The "Wayfinding Signs to Non-NYCT Agency Service..." column shows the number of signs within NYCT stations that point to the other agency at that transfer point. The "Wayfinding Signs to NYCT Service..." column shows the number of signs within the area of the relevant agency's station that direct people to NYCT buses, subways, or Staten Island Railway (SIR). At one station, Fordham, there are two agencies (Bee Line buses and Metro-North) in addition to NYCT. However, all of the signs recorded above pointed to the buses, not the railroad.

Table 26: Results of Site Visits to Inter-Agency Transfer Points Where NYC Transit Service Is Available

Transfer Point	Agencies with Available Service	Wayfinding Signs to Non-NYCT Agency Service Located in NYCT Area	Wayfinding Signs to NYCT Service Located in Non-NYCT Agency Area
Jamaica Station	LIRR	4	32
St. George Terminal	NYC DOT	6	15
Flatbush Ave.	LIRR	25	12
125th St.	Metro-North	8	10
Woodside	LIRR	18	9
Herald Square	Port Authority	52	9
181St./175th St.	Port Authority	11	5
Fordham Road	Bee Line/Metro-North	2	3

As Table 26 shows, signage between agencies is generally quite plentiful. Overall, it appears that travelers looking to transfer between agencies will not face tremendous barriers in terms of finding their way. Only Fordham and Jamaica (for signs to the LIRR) had a small number of signs, and at Jamaica the signs were hardly needed due to the ease of finding the LIRR station from the subway. Moreover, this station is being completely rebuilt by the LIRR in conjunction with the Port Authority's Air Train project.

[19] 181st St/175th St. and 125th St. were visited on February 5, 2001. Woodside, Jamaica, St. George, Herald Square, and Fordham were visited on February 9, 2001. Flatbush was visited on February 12, 2001.

Figure 10: Sign at Fordham Metro-North station. The C train has not run into The Bronx since early in 1998.

Figure11: If you follow the sign above, this is the first station entrance you will come to. Unfortunately, it is often closed.

Most of the stations visited allowed easy, protected transfers, plentiful and accurate signage, and little confusion. However, two of the stations visited, Flatbush and Fordham, were deficient in a few areas. Although Flatbush is under renovation, and some of its problems may soon disappear, this renovation is a long way from completion and riders should be aided before then. Problems encountered at each station are listed below.

Flatbush Avenue Complex:

- The N/R and 2/3 Manhattan-bound platforms each contain one poorly lit, barely visible sign pointing to the LIRR.

- LIRR riders are pointed to two different sets of access points from the subway. They can head up to a main entrance to the LIRR through the 2/3 Manhattan-bound platform, or they can go to specific LIRR tracks via various exits. The exits directly to specific tracks would be very useful, except for two reasons. First, they are very poorly marked, with only small lettering on the walls and no signage for tracks 3-6. There is also no message board telling riders which train departs from which track except at the main entrance.

- There is still lingering signage from days gone by in the LIRR station. A sign pointing to Q "diamond" service was seen, despite the fact that such service does not currently exist.

Fordham Road Stations:

- Wayfinding bus signage is inadequate. The signage is just a bus symbol, with no information about specific routes, and no distinction between Bee Line and NYCT buses.

- Signage from the Metro-North station to local subways was also inadequate. Although the station is a few blocks from the subway, this is still an important connection. One sign directs passengers to C trains, despite the fact that these trains no longer run to The Bronx (see Figure 10, above). Another problem is that passengers exiting the station from the New York bound platform encounter no signage directing them to the 2/3 subway station. Fortunately, passengers exiting from the northbound platform are directed to both the IRT and IND trains. However, although passengers are directed six blocks in the appropriate direction to IND trains, if they follow these directions they find themselves at a station entrance that is only open during the morning rush and certain weekend hours (see Figure 11, above). Other station entrances are not visible or obvious from this point. This station entrance would be an ideal candidate for a High Entrance Exit Turnstile (HEET).

- There is no signage whatsoever directing passengers to the Metro-North station. Although this is not much of a problem for bus riders across the street from the station, it is a problem for B/D riders trying to get to Metro-North.

Fare Barriers[20]

The current maze of agencies, authorities, and states that own and operate the regional transportation system in New York present a significant barrier to increased transit use in the form of differentiated fare collection procedures. First, there is the problem that each system, such as LIRR, PATH, NYCT, or New Jersey Transit (NJT), has a different fare structure. For example, LIRR and NJT charge different fares based on hour of travel and distance, whereas NYCT and PATH charge one fare regardless of time or distance. Furthermore, even systems with a similar fare structure, such as NYCT and PATH, charge different fare levels. This causes confusion and psychological disconnect for regional transit riders.

[20] Much of the information from this section was garnered from an interview with Christopher Boylan, MTA Deputy Executive Director. Corporate Affairs and Communications. The interview was conducted on Friday February 16, 2001.

A second problem is that many systems have different fare collection methods. For example, NYCT uses MetroCards and tokens, while the LIRR uses cash and tickets[21]. This is an added annoyance for riders, already paying extra to ride two systems, who sometimes have to carry two forms of fare media.

The problem of differing fare structures is unlikely to be solved in the near future. In a perfect world, we would have one system of fare determination based on distance and time of day, for the entire region. Given the political realities of the region, however, this is not even worth discussing.

The second problem is one that can realistically be addressed. It is a valid recommendation to suggest that regional fare-media integration is a good, or even necessary idea whose time has come. Since MetroCard dominates as the premiere, and most successful form of fare collection in the region, it is reasonable that this is the fare media that should be used on as many other forms of transit as possible. Moreover, given that the PATH fares have been raised to $1.50 (the same as NYCT), this is an opportune time to pursue fare media integration between NYCT and PATH.

The MTA has already made considerable progress in extending MetroCard to other modes besides the subway. In January of 1997, the MTA introduced a joint commuter rail ticket, which is a MetroCard with a commuter rail ticket printed on the back. Although this does not provide full integration of fare media, i.e., swiping MetroCard to board and exit commuter rail stations, it comes very close. However, the ticket is limited in its usefulness as it is only available for LIRR monthly ticket customers. In January of 1998, MetroCard became available on Long Island Bus. This was not a simple task given the fact that funding for that agency comes from Nassau County, and not the MTA. The MTA has also been successful in installing MetroCard on private buses.

However, the main problem has been integration with other transit operators. The MTA wants the Port Authority and New Jersey Transit to install MetroCard in their facilities as soon as possible. Both agencies appeared to be ready to go ahead with MetroCard a few years ago, but changes in leadership at those agencies negated the progress that had been made. Now it appears that those organizations would prefer to wait for new SmartCard technology, rather than "waste" money on MetroCard. MTA even offered the Port Authority MetroCard turnstiles for all thirteen of their PATH stations, but the agency declined.

Although the Port Authority and New Jersey Transit have chosen to "wait" for SmartCard, they have been waiting for a few years at this point and now show signs of actually adopting the technology. The MTA's policy concerning SmartCard is that although they are monitoring the technology, they do not plan to move ahead with its implementation at this time. The MTA feels that it is not

[21] This problem has been somewhat alleviated by the introduction of the monthly joint ticket, which is discussed later in this section.

clear that SmartCard would offer significant advantages over MetroCard that justify the investment at this time. Moreover, the MTA feels that SmartCard technology has not been adequately tested on transit systems of similar size and complexity.

The immediate, concrete benefits of SmartCard over MetroCard do not appear to be as great as the benefits of MetroCard over tokens. SmartCard may offer the ability to pay for transit fares without opening one's wallet, but this is a minor benefit that is hardly worth the significant cost associated with the technology. However, SmartCard may offer two benefits that would prove very valuable to the MTA. First, it appears that the introduction of SmartCard would help to encourage fare media integration between the MTA and the other regional transit agencies. Second, SmartCard technology is likely to be used by banks, retail stores, and many other places. This means that the convenience of paying for mass transit will increase dramatically if this happens.

These benefits are apparent but not convincing for the MTA. The first benefit would be achieved without SmartCard, the MTA says, if the other agencies would just adopt MetroCard. Although they acknowledge the second benefit, the MTA is not willing to take the risk on this new technology before the other possible SmartCard users. They would prefer to wait until, for example, Citibank adopts SmartCard, before they press ahead with it. This would ensure that the technology was mature, and that this second benefit would become a reality.

Inter-Agency Transfers Conclusions

Although only minor problems were encountered at most transfer points, the MTA can greatly improve the customer experience along Fordham Road and at Flatbush Avenue, as well as redouble efforts to hasten the arrival of SmartCard technology In order to improve interagency transfers. The MTA should do the following:

In General:

Continue to work in concert with other regional transportation agencies to move ahead with the creation and adoption of an integrated fare-collection system based on SmartCard technology.

At the Flatbush Avenue Complex:

Remove the one poorly-lit and barely visible wayfinding sign pointing to the LIRR that exists on each of the N/R and 2/3 Manhattan-bound platforms and **replace** it with one that people can actually see.

Install another message board within the subway station for the convenience of riders wishing to go directly from the subway to the correct LIRR track.

Remove lingering signage from days gone by in the LIRR station. A sign pointing to Q "diamond" service was seen, despite the fact that such service does not currently exist.

At Fordham Road Stations:

Improve inadequate wayfinding signage to buses. The current signage is just a bus symbol, with no information about specific routes, and no distinction between Bee Line and NYCT buses.

Improve wayfinding signage from the Metro-North station to local subways.

Install wayfinding signage to direct passengers to the Metro-North station from the subway.

Conclusions and Recommendations

The MTA region has a complex system of public transportation. It relies on private transportation, varying modes, and several public agencies to make it work. Despite these difficulties, it stands proud as the most extensive and most used system in the United States.

This should not deter us from striving for improvement. This paper has looked at some of the barriers in the MTA region that hold back the transit system, and the region, from being even better. It has proposed many cost-effective strategies for eliminating these barriers, in the hopes that they will be implemented by the MTA and other agencies.

Like most research, what is presented here is not exhaustive. Further probing into ways to reduce barriers to public transit should continue. However, further investigation should not be permitted to delay the implementation of some of the key recommendations in this report. This will allow the New York region to continue to lead the way towards a sustainable and thoroughly user-friendly transportation system.The bad news is that there are substantial barriers to public transportation in the MTA region. This research looked into four distinct areas for possible barriers, and found barriers in all four. There are barriers that affect commuter rail, subways, and buses alike, along with the transfers between these modes. These barriers help to prevent ridership increases, and cause difficulties for current riders.

However, the good news is that most of these barriers can be mitigated or eliminated without major capital expenditure. Pursuing strategies to encourage people to drop off, rather than park, at commuter rail stations, can alleviate barriers to commuter rail station access. Posting more effective signage and improving schedule coordination where possible can reduce barriers to intermodal transfers. Barriers to interagency transfers can also be diminished by better signage, as well as by improved fare integration.

Summary Conclusions

Barriers to Commuter Rail Station Access

An analysis of commuter rail stations looked at a potential strategy for relieving serious parking problems, known as kiss-and-ride. It showed that station and parking lot design have an effect on the number of passengers who access commuter rail stations by kiss-and-ride. An analysis of Metro-North stations showed that stations with higher kiss-and-ride access percentages show tangible and significant differences that may explain these percentages.

The analysis also showed that it is somewhat easier, and more popular, to use kiss-and-ride to access Metro-North stations than LIRR stations. This is primarily due to the fact that LIRR stations with severe parking problems have rampant

illegal parking and a total lack of parking regulation adherence and enforcement. This takes away precious curbside space and makes it dangerous and cumbersome to navigate through parking lots.

Barriers to Intermodal Connections

In this section we analyzed how well New York City Transit (NYCT) has designed their intermodal transfers. First we looked at the major transfer points between bus and subway. This analysis showed that many of these transfer points need improvements. There were not enough shelters at the surveyed bus stops given their popularity. Moreover, wayfinding signage for transferring passengers was found to be inadequate. In most subway stations, signage fails to indicate the best exit from that station for a particular bus. There is little or no signage outside subway stations to help passengers find bus or subway stops.

Second, we looked at schedule coordination between bus and rail on Staten Island, one of the only portions of rail within the NYCT system that runs on headways of greater than 20 minutes. Our analysis found that there is not enough coordination between NYCT Staten Island buses and the Staten Island Railway. Passengers often face unnecessarily long wait times as a result.

Finally, we looked at a few specific strategies for reducing overcrowding on buses. Providing exclusive rights of way and pre-paid boarding would help to relieve overcrowding, provide better service, and reduce barriers to public transportation. These strategies may be more feasible and cost-effective than long-term capital expenditures.

Barriers to Interagency Transfers

This section looked at interagency transfer problems in the MTA region by examining both the physical and technological barriers to such transfers. Major transfer points in the MTA region were visited to examine wayfinding signage and ease of transfer. MTA personnel were consulted about their attempts to reduce fare barriers.

In general, we found that physical transfers between agencies to be well designed. Moreover, the fare barriers between agencies have been reduced recently with the introduction of MetroCard. SmartCard technology offers the potential for further barrier reduction, however, it appears that the technology will be slow to arrive in the region.

We found notable room for improvement to the customer's transfer experience at two main interagency transfer points: the Flatbush Avenue LIRR/NYC Transit complex in Brooklyn, and the Fordham Road Metro-North and NYC Transit stations in the Bronx.

Recommendations

Based on our analysis, the PCAC believes that improvements can and should be made by the MTA in the three categories that we explored, as noted below.

Recommendations to Improve Commuter Rail Station Access

In order to improve access to commuter rail stations, that MTA should do the following:

- Implement a marketing campaign aimed at increasing kiss-and-ride usage to help both to reduce parking problems and to increase ridership.
- Provide short-term parking spaces where possible.
- Separate kiss-and-ride passengers from park and ride passengers in their access to stations where possible.
- Provide curbside drop off space and protect it from illegal parking.
- Enforce parking regulations at LIRR stations.
- Improve wayfinding signage for drivers accessing commuter rail stations.

Recommendations to Improve Intermodal Transfers

In order to improve intermodal transfers, the MTA should do the following:

- Install additional shelters at the most widely used transfer points.
- Work to make bus and subway wayfinding signage more useful.
- Work with New York City DOT to provide signage outside of subway stations.
- Improve schedule coordination between Staten Island bus and rail.
- Reduce crowding on NYCT buses by introducing more exclusive rights of way and pre-paid boarding.

Recommendations to Improve Interagency Transfers

In order to improve interagency transfers, the MTA should do the following:

In General:

- Continue to work in concert with other regional transportation agencies to move ahead with the creation and adoption of an integrated fare-collection system based on SmartCard technology.

At the Flatbush Avenue Complex:

- Replace the lone poorly lit and barely visible wayfinding sign to the LIRR that currently exists on each of the N/R and 2/3 Manhattan-bound platforms with signage that is more legible and installed in better-visbile locations.

- Install another message board within the subway station for the convenience of riders wishing to go directly from the subway to the correct LIRR track.

- Remove lingering signage from days gone by in the LIRR station. A sign pointing to Q “diamond” service was seen, despite the fact that such service does not currently exist.

At Fordham Road Stations:

- Improve inadequate wayfinding bus signage. The current signage is just a bus symbol, with no information about specific routes, and no distinction between Bee Line and NYCT buses.

- Improve signage from the Metro-North station to local subways.

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