



Express to the 21st Century

The Amalgamated Transit Union's Plan to
Improve Staten Island Express Bus Service

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EXPRESS TO THE 21ST CENTURY

EXECUTIVE SUMMARY

The Amalgamated Transit Union, representing the workers of New York City Transit's Staten Island Express Bus (SIEB) services, have proposed a plan to improve Staten Island Express Bus services. The plan envisions introducing exclusive bus/high occupancy vehicle lanes between Staten Island and Manhattan, switching to larger and faster vehicles, and reducing the fare from \$4.00 per trip to \$2.00. This report concludes that if the entire plan were implemented as proposed, it would net the City of New York benefits worth \$29.49 million per year, or \$348.75 million in total. These benefits take the form of money and travel time saved by commuters, and reduced environmental and safety costs, many of which would be reflected in increased property values. The report also concludes that the Metropolitan Transportation Authority would 'break even,' as the revenues lost due to the fare reduction would be recovered by reductions in operating costs made possible by faster trips into Manhattan, increasing ridership, and other measures. The entire plan would also reduce the level of subsidies per Staten Island Express Bus passenger by 20%.

While we have used figures provided by the Transit Authority to estimate the level of subsidy on SIEB services, we cannot attest to their validity, as the authors received insufficient information from the Transit Authority to corroborate or refute their estimates. The report concludes that whatever the factual basis of the estimated level of subsidy to SIEB service of \$6.50 per trip, the proposed plan would reduce the subsidy per trip by 20%. Furthermore, subsidy per trip is an inappropriate method of comparing the efficiency of SIEB service with other public transport services in New York City. Being a long distance service where the average trip length is several times that of the average MTA trip, subsidies per trip are not surprisingly higher. SIEB services outperform MTA bus-system averages if compared based on the level of cost recovery or on a subsidy per passenger kilometer traveled basis.

We have found a startling disparity in the level of capital subsidy and investment both per rider and per capita when comparing Staten Island's share of the transit authority's budget to corresponding figures for the other four boroughs. For example, each Staten Island resident receives only \$30 in MTA capital expenditures per year, while the rest of the City receives \$190.44 per capita. Staten Island public transit riders receive only \$0.39 per rider in annual capital investment, compared to an annual city-wide average of \$0.87.

The Union's plan also suggests the use of currently employed MTA drivers to provide paratransit services. This could potentially be accomplished with a net savings to the Transit Authority.

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EXPRESS TO THE 21ST CENTURY

THE ATU PLAN TO IMPROVE STATEN ISLAND EXPRESS BUS SERVICE¹

Introduction

The Amalgamated Transit Union (ATU) has developed a broad-based proposal to better serve the mobility needs of Staten Islanders. The plan envisions reducing the current fare on Staten Island Express Bus (SIEB) service from Staten Island to Manhattan from \$4.00 to \$2.00. The fare reduction would be made possible by two main cost-cutting measures: the introduction of express bus lanes on critical congested areas along the route to Manhattan, perhaps including local roads in Staten Island such as Capodanno Boulevard, on the Staten Island Expressway (SIE), on the Verrazano Narrows Bridge, (VNB) and utilizing the bus/taxi/HOV lane under construction on the Gowanus Expressway. Also included are plans to switch to larger and faster buses, and a handful of other cost savings and revenue generating measures.

The current plan would benefit Staten Islanders by reducing their travel costs and travel times, and increasing the value of their property. By significantly increasing bus ridership and more efficiently allocating scarce available road space between Staten Island and Manhattan, it would also reduce the level of traffic congestion, and improve the New York City environment. It would also improve the viability of the Manhattan Central Business District which has been losing jobs to other areas.

Many recent transit developments, such as fare increases and service frequency reductions, have reduced ridership on the MTA system and increased the number of people driving their cars. These changes have had enormous uncounted external costs. Every New Yorker spends more time waiting for buses and subways than they did in the past, and this wasted time has a real value that is reflected in lower real estate values and loss of investments into new jobs in the region. Each additional passenger who switches from the transit system to a private car increases the level of congestion on our already crowded streets, and the level of air pollution in our communities. As New York City is in 'Severe' non-compliance with Clean Air Act regulations on ozone, which are likely to be further tightened in 1997, New York stands to lose hundreds of millions of dollars in Federal Government funds unless we clean up our air. By significantly increasing bus ridership, the proposed ATU plan would move New York back in the right direction.

Currently, among New York City residents, Staten Islanders have the most expensive transit costs to Manhattan. Many Staten Islanders are living in three fare zones, having to take a local bus or the Staten Island Railroad to the Staten Island Ferry and then switch to subway in Manhattan. Rush hour travel times from some parts of Staten Island are over 2 hours. By contrast, most residents in other boroughs live in a one or two fare zone to the Manhattan CBD. With the recent MTA decision

¹. This report was prepared by Dr. Walter Hook and Deike Peters of the Institute for Transportation Policy under the supervision of Dr. Elliot Sclar of Columbia University, at the request of the Amalgamated Transit Union.

to allow free transfers from bus to subway, reducing all two fare zones down to one fare, residents of all other boroughs will benefit. On Staten Island, however, which has no subway, only a handful of commuters will benefit. Many Staten Islanders from the Mid-Island and the South Shore have no other viable option than taking the SIEB service. While the MTA argues that the express bus service prices were not increased by 20% in 1995, unlike the subway and local bus passengers, express bus service serves de-facto three fare zones. Unlike other multiple-fare zone customers, however, which will receive a 50% reduction in their fare, SIEB customers will receive minimal reductions unless the ATU plan is implemented.²

The fare reduction plan, including the buslanes, would add \$1000 in cash and \$2187 in saved travel time a year to each of the 8000 daily express bus passengers' annual income, saving borough residents \$24.80 million a year. On top of this, the plan would result in \$1.01 million in annual environmental and safety benefits, which would be reflected in better quality of life, lower health care costs, and higher property values. The entire plan would yield an annual net benefit of \$29.326 million a year to New Yorkers, which has an estimated net-present value of \$345 million. Furthermore, the plan would be revenue-neutral for the MTA, with all loss of revenue from the fare reduction made up for by the proposed cost saving and revenue-generating measures. The plan would also greatly improve the operating efficiency Staten Island Express Bus (SIEB) services, reducing the per passenger subsidies by 20%. Thus, the improvements would more than compensate for the revenue lost from the fare reduction. (See Table I)

Background on Staten Island Travel Patterns and Prospects for Regional Economic Growth

The recently released Transit Needs Assessment Study for Staten Island (21) commissioned by the New York City Transit Authority summarizes travel trends in Staten Island. Unlike the rest of New York City, where employment fell by 6.3% between 1970 and 1995, and population grew at only 3.9% in the same period, jobs located in Staten Island increased at the rapid rate of 115% from 1970 to 1995, and population increased by 28.6% (21) According to projections, population on Staten Island is expected to grow another 24% by 2010, and employment to increase at a similar rate. The NYCTA also projects that this increase in population will translate into a 24% increase in travel by all modes. (21)

Most Staten Islanders are traveling to work to other points in Staten Island (43%), with Manhattan (31.4%), Brooklyn (14.6%) and New Jersey (6.2%) the next most important destinations. Trips to Brooklyn increased by 50% from 1980 to 1990, and trips to Manhattan increased by 5% in real terms from 1980 to 1990. Trips within Staten Island grew by 25% in the same period. Thus, a further growth in trips from Staten Island to Brooklyn and Manhattan of at least 24% can be expected by the year 2010. (21)

². Staten Islanders will only benefit from the planned offer of 11 trips for 10 fares which the MTA plans to introduce system-wide in 1998.

There are currently only four routes into Manhattan from Staten Island: the Staten Island Ferry (SIF), the VNB through Brooklyn to Lower Manhattan, and the Goethals Bridge up the New Jersey Turnpike and through the Lincoln Tunnel to Mid-Town, and the Bayonne Bridge up the New Jersey Turnpike and through the Holland Tunnel to Lower Manhattan. An increasing number of private and now public express buses are being routed over the Goethals route, which because of the new high occupancy vehicle (HOV) lanes on the New Jersey Turnpike and the exclusive bus lane through the Lincoln Tunnel, is saving passengers 20 to 40 minutes per trip.(13) Some 28% of the trips to Manhattan and 87% of the trips to Brooklyn are by private car, and the share of riders making the trip by private car is increasing every year. The Staten Island Ferry, which is used by pedestrians and people connecting to and from public transit, has been consistently losing ridership, from 74,000 weekday riders in 1989 to around 60,000 riders this year, a decline of 19% in just six short years.(21) The continuous decline in traffic is largely the result of the slow travel speeds on the ferry and the need to connect to other modes of travel on either end, creating a costly three-fare zone commute for some travelers.

The only other viable option for public transit commuters wishing to make the trip from Staten Island to Manhattan is SIEB service. Ridership on express bus services has also declined, by about 25% since 1985,(21) as passengers switch to private automobiles, worsening congestion.

Staten Island express bus service and automobile trips both rely on the SIE, the VNB, and the Gowanus Expressway to reach Manhattan and Brooklyn. As ridership on the Ferry has declined, traffic on the SIE, VNB, and Gowanus has grown, contributing to the traffic between New Jersey, Long Island, and Lower Manhattan which is also growing. Traffic on the VNB was increasing consistently at about 1.5% a year throughout the 1980s, growing by 34% from 1980 to 1990.(9) While traffic slowed in the early 1990s due to the downturn in the economy, it has risen again. According to the MTA, traffic on the VNB has 'stabilized' at 'about 30 million vehicles per year,' or around 176,000 vehicles per day. This 'stabilization' of ridership is primarily the result of congestion along the route, particularly at the VNB toll plaza, along the SIE and now along the Gowanus where construction of the first link of the HOV lane is likely to snarl traffic for the next 13 months or more. With 175,000 vehicles traveling this corridor a day, it is approaching its maximum carrying capacity (volume/flow ratio) at peak hours, given the current free vehicle access to all lanes. Once on the VNB, traffic is still slightly below capacity, as the bridge has 6 lanes, while the surrounding highways have only 3 lanes. According to the MTA,

"With projections of population growth and increased development over the next two decades, these conditions can be expected to become far more severe if no improvements are built. Volumes on the Staten Island Expressway (SIE) between the Verrazano-Narrows Bridge (VNB) and Manor Road may rival the highest volumes per lane on freeways anywhere." (20, p. ES-3)

Table I
COSTS AND BENEFITS
OF PROPOSED ATU EXPRESS BUS IMPROVEMENT PROGRAM

	ANNUAL BENEFIT (COST) millions	NET PRESENT VALUE BENEFIT (COST) millions	ANNUAL MTA FINANCIAL BENEFITS (COSTS) millions
I. EXCLUSIVE BUS LANES			
a. Congestion Reduction/ Construction Saved	n.a.	n.a.	n.a.
b. Costs of Construction	n.a.	n.a.	n.a.
c. Travel Time Saved	\$17.5	\$205.82	0
d. Revenue from Ridership Increase	\$0.875	\$10.29	\$0.88
e. Increased Cost of Servicing New Riders	(\$2.77)	(\$24.89)	(\$2.77)
f. Reduced MTA Operating Costs	\$8.75	\$102.25	\$8.75
Sub Total	\$24.80	\$293.47	\$6.86
II. REDUCTION OF FARE FROM \$4.00 TO \$2.00			
a. Money Saved by SIEB Riders	\$8.00	\$94.09	
b. Money Lost by MTA	(\$7.67)	(\$90.14)	(\$7.66)
c. Cost of Accommodating New Riders	(\$1.02)	(\$11.95)	(\$1.02)
Sub Total	(\$0.68)	(\$8.00)	(\$8.68)
III. INTRODUCTION OF BIGGER & FASTER BUSES			
a. Reduction in Operating Costs	\$1.63		\$1.63
b. Increased Customer Revenues	\$0.42		\$0.42
c. Saved Travel Time	\$2.63		
d. Capital Cost of Bus Purchase	(\$0.32)		(\$0.32)
e. Advertising Revenues	n.a.	n.a.	\$0.09
Sub Total	\$4.36	\$51.28	\$1.82
IV. ENVIRONMENTAL AND SAFETY BENEFITS			
a. Environmental & Noise Benefits	\$0.28	\$3.42	0
b. Safety Benefits	\$0.73	\$8.58	0
Sub Total	\$1.01	\$12.00	0
TOTAL PROPOSAL IMPACTS	\$29.49	\$348.75	0

There are several ways to accommodate the projected growth of traffic in the region. The first is to expand usage of the Staten Island Ferry. While this may be viable for some residents, it will do nothing for Staten Islanders whose residences are not proximate to ferry services. The second, which is also being contemplated, is to create additional high speed ferry services. While these have proven to be viable with government subsidies for related facilities, they tend to serve a small, elite portion of the commuting public with little impact on the general traffic pattern. The third is to speed up the toll collection process on the VNB. The recent introduction of EZ passes may help to mitigate this bottleneck as the EZ passes gains greater market acceptance. This will help the VNB bottleneck, but do nothing for serious congestion along the SIE and the Gowanus. The fourth is to expand the physical capacity of the SIE, the VNB toll plaza, and the Gowanus. While building additional lanes down the SIE in the median strip for HOV/exclusive bus lanes is being considered, it is likely to be a decade or more away, extremely costly, and face legal environmental challenges. The fifth, and best possibility, is to increase the capacity of the SIE and reduce congestion at the toll plaza of the VNB by introducing an exclusive 'contra-flow' buslane or combined bus/HOV lane on existing out-bound lanes in the morning and in-bound lanes in the afternoon. Surprisingly, the MTA's report (21) virtually ignores this possibility.

Current travel trends, if unchecked, promise to severely compromise the accessibility of Manhattan, Brooklyn, and the rest of Long Island. Lack of access to New York City has been undermining job growth in the region, which has fallen by 6.3% since 1970, while the outer rim of the Tri-State Metro Area, predominantly in New Jersey and Connecticut, saw employment increase by 73.5% in the same period.(7) The ATU proposal has the possibility of greatly enhancing regional mobility, while greatly increasing the economic viability of New York City and New York State.

Benefits and Costs of the Planned Exclusive Bus Lanes³

----Benefits

The ATU plan envisions creating a 'contra-flow' exclusive bus lane/HOV lane on an existing out-bound lane during in-bound rush hour and on an in-bound lane during outbound rush-hour on the VNB, SIE, and utilizing the bus/HOV lane on the Gowanus. This would greatly expand the capacity of the system, improve travel speeds, and greatly reduce the operating costs of bus services. This approach would be far less expensive, would have much greater environmental benefits, and thus face far fewer political and financial obstacles, than constructing additional lane capacity. It would also face

³. A more accurate estimate of the impacts of the exclusive bus network on express bus travel speeds and hence costs would require access to NYMTC's TRANSCAD system and network data files, which the authors did not have at the time of issue of this draft report. Impacts of the plan on mode shift requires an even more sophisticated level of analysis. Greig Harvey of Deakin, Harvey Skabardonis, Cambridge Systematics, and COMSIS are working on developing a more sophisticated nested logit behavioral model based on micro-simulation of household travel behavior, but their application to New York City is still under development. As such, the authors have used sketch planning techniques to develop 'back of the envelope' estimates. It is hoped that by presenting some preliminary estimates, sufficient interest in the plan will convince the MTA to further analyze its impacts using the more sophisticated modeling at their disposal.

less political resistance than converting an existing in-bound lane to an exclusive bus/HOV lane during morning rush hour.

The problem is congestion along the SIE, the Gowanus, and at the VNB toll plaza, and not on the bridge itself. In 1996, roughly 16,000 vehicles were taking the SIE, VNB, and Gowanus Expressways per hour between 8 - 10 am every day, (20), of which roughly 9,000 was on the in-bound side.⁴ While there are six lanes over the VNB, or 1,500 vehicles per hour per lane, which is well below the 2000 vehicles per hour maximum capacity to maintain free flow travel speeds. Along the three-lane SIE and Gowanus, there are nearly 3000 vehicles per lane per hour, (23) well over total capacity of 2300 vehicles per hour, let alone the free-flow capacity of 2000. The American Automobile Association has given this stretch of road the dubious distinction of being one of the ten most congested expressways in the country. (20)

Each lane on the route from SI to Manhattan, if operated as an exclusive bus lane, could increase its carrying capacity from a U.S. standard 2,300 passengers per hour to 22,500 passengers per hour. The single exclusive buslane/HOV mixed lane on the Gowanus is moving 12,000 people per lane, increasing the capacity of that lane by five times. The introduction of a single contra-flow express bus/HOV lane will increase the road's capacity by 2.75 times. Existing roadway capacity would therefore be more than sufficient to handle current traffic at free-flow speeds and increase the roadway capacity sufficiently to more than handle projected regional growth, with minimal cost outlays. (23) The economic benefit resulting from this increase in capacity would be the value of infrastructure that does not have to be built to accommodate projected growth in traffic.

If the exclusive bus lane system were implemented, travel speeds would be reduced from the current average Staten Island Express Bus peak-hour travel time of 90 minutes, to their free flow travel time averaging closer to 60 minutes each way, saving roughly 33% of the travel time⁵.

This dramatic decrease in travel time would have three positive effects. First, it would reduce what is known as the 'generalized cost' of making the trip from Staten Island to Manhattan for the current 8000 daily riders. Many recent studies indicate that people's willingness to pay to save travel time is roughly equivalent to their average hourly wage rate. Current average hourly wage rates in

⁴. Estimated based on percentages from 1990 MTA data. (9)

⁵. Estimate of 30 minutes in time savings is based on the following. Recent data from the Gowanus Expressway HOV/bus lane shows travel time savings of 15 minutes per trip. (20) Another 15 minutes of additional savings resulting from HOV/bus lanes on the SIE and VNB is a reasonable assumption. This corresponds with estimates from the scheduling department of ATU. Rush hour travel times on the longest route was 2 hours and 6 minutes, compared to 1 hour and 28 minutes during non-peak, for a travel speed increase of 43%. Averages were considered to be around 30 minutes on a 90 minute average trip, for a 33% increase in travel speed. The MTA's Faster than Walking study found congestion responsible for some 23.9% of time delays on surface bus service. While follow up studies underway at the University Transportation Research Center indicate that a lot of the rush-hour travel time increases are the result of delays from loading and unloading and fare collection more than congestion on the road network per se, this is much less true for express bus service, where longer distances over crowded highways and relatively infrequent stops will tend to increase the importance of traffic delays and decrease the importance of loading and unloading and fare collection delays to a minimum.

Staten Island is \$8.75 an hour (\$17,507) (7). The benefit to Staten Islanders from this reduction in travel time would be \$8.75 a day times 250 work days a year, or \$2,187.50 per person. This would result in a benefit of \$17.5 million dollars to Staten Island, which would be shared between commuters and owners of real estate who would benefit by increased real estate values.

Secondly, it would increase the ridership of express bus service. We know that ridership is a function of the generalized cost of making a trip, and the 'generalized cost' is primarily determined by out of pocket expenses and travel time. The total generalized cost of making the trip by SIEB to Manhattan is 3 hours (at \$8.75/hour, or \$26.25) plus out of pocket expenses of \$8.00 a day, for a total of \$34.25 a day. The reduction in the travel time by one hour a day would thus reduce the generalized cost of the trip by 26%. We know the recent increase in MTA fares by \$0.25/trip or \$0.50/day per commuter, increased the average cost of a trip by the average New York City Transit commuter by about 6%, and decreased ridership by 2.1%.⁶ Thus, the impact in ridership of a 26% reduction in the generalized cost of the trip would be a roughly 9.1% increase, or an increase from 8000 daily passengers to 8728 daily passengers, or an additional 364,000 total trips a year. This would bring an additional annual revenue of \$728,000 a year at the new rate, worth a net present value of some \$8.56 million.

Finally, the decrease in travel time would greatly reduce the operating costs of providing the bus services. According to an MTA study Faster than Walking? (3), there is roughly a one to one correlation between bus operating costs and travel time, as the major operating expenses are driver's salaries, fuel, and bus maintenance, all of which vary with travel time and distance. The MTA estimates that a 1% increase in travel time leads to a 1% increase in variable operating costs. As the exclusive bus lanes could reduce travel times by at least 33%, the plan would also reduce operating costs by 33%. As currently, the variable operating costs of SIEB service is \$26.4 million, a 33% reduction in this cost would yield a stream of values worth \$8.75 million a year into perpetuity. Actually, as congestion increases, the value of this benefit will substantially increase, but for our purposes we will assume a fixed flow of benefits into perpetuity. The present value of this stream of benefits at current interest rates of 8.5% is \$72.25 million. This will reduce the per passenger and per mile operating cost of express bus service. There will also be environmental and other externality benefits, but they will be quantified separately in aggregate form.

----Costs

While the cost of building the proposed contra-flow HOV/bus lane would not be insignificant, it would be more than outweighed by the benefits resulting from the increased road capacity.

⁶. Average travel time per trip in New York City is 22 minutes, or 44 minutes a day. At the average Staten Island wage rate of \$8.75 an hour, this is worth \$6.40. Plus, the average New York City Transit commuter spends \$2.50 a day in cash. The average generalized cost of commuting in New York is \$8.90 per day. The increase of the MTA fare from \$1.25 to \$1.50 per trip, or from \$2.50 to \$3.00 per day in cash payments increased the total generalized cost of the trip by New Yorkers by 6%.(8)

Of more immediate concern to SIEB service, the increase in ridership resulting from the faster service would require an expansion of the existing vehicle fleet and the number of drivers in order to handle this increase. This increase in ridership would require an additional 15 big new buses a year to accommodate, based on MTA estimates (12). Given current interest rates of 8.5%, and a total cost of \$6 million (\$400,000 each), this would require \$817,000 in annual payments for the entire fleet to pay off in the 12 year life of the bus, plus \$1.360 million a year additional to operate the vehicles (at \$90,609 per vehicle)(12), for a total of \$2.177 million a year increase in costs, or a net present value of \$24.89 million.

This \$2.177 million in annual increased costs is more than outweighed by the \$26.2 million saved annually due to reductions in operating costs and increases in travel speeds, plus the additional \$728,000 in passenger revenue. The total quantified net benefit of implementing exclusive bus lanes is thus roughly \$24.80 million per year, with a net present value of \$261.74 million in benefits. The financial impact on the MTA would be the \$8.75 million in annual savings plus an estimated \$880,000 in additional revenue from new passengers, less the \$2.77 million cost of providing additional service, for a net financial improvement of \$6.86 million a year.

Benefits of the Reduction of the Staten Island Express Bus Fare from \$4.00 to \$2.00

----Benefits

The benefits of reducing the fare from its current \$4.00 to \$2.00 would be several. First, it would put \$2.00 per trip, or \$4.00 per day back into the pockets of each of the current 8000 daily Staten Island Express Bus commuters. That's \$8 million dollars a year saved by Staten Islanders which could be spent in the New York Metropolitan Region.

Second, it would increase the ridership of Staten Island Express Bus service. The reduction in the fare from \$4.00 to \$2.00 each way will reduce the generalized cost of making the trip from \$34.25 a day to \$30.25, for a 12% reduction in the generalized cost of making the trip. We know from the discussion above that a 6% increase in the generalized cost of public transit service led to a 2.1% reduction in travel. Therefore, we can estimate that a 12% reduction in the generalized cost of travel will lead to a 4.2% increase in the level of ridership.

There are considerable externality costs which would be saved by the implementation of the plan, such as the reduction of traffic congestion on the main highways into Manhattan, and the reduction of air emissions and safety externalities resulting from a reduction of trips made by private car. These externality benefits are discussed on pp. 9-10.

----Costs

The impact of the plan on revenues of the MTA would be a loss of revenue of \$7.664 million. This loss of revenue is less than the total \$8 million gained by Staten Islanders from lower fares by \$336,000 because lower fares would attract an additional 336 daily passengers, or some 168,000 new trips a year.

At the same time, accommodating these new trips would require adding 7 more buses a year. At a total cost of \$2.8 million, amortized over 12 years, the additional buses would cost \$381,228 a year, plus \$634,263 to operate them, totaling \$1.016 million a year. Thus, if externalities are excluded, costs would outweigh benefits by \$680,000 a year, or a net present value of \$8 million. The externality benefits of the plan would more than compensate for this modest difference.

From a financial perspective, the MTA stands to lose \$7.664 million a year in revenue as a result of the fare reduction, plus will incur new costs of \$1.016 million a year to provide increased service, for an additional \$8.680 million in expenditures a year. Nonetheless, this represents only 5% of the projected \$161 million annual (14) loss from the planned MTA change from two fare to one fare zones, which will primarily benefit the other boroughs.

Benefits and Costs of the Introduction of Bigger and Faster Buses

----Benefits

MTA has done a cost benefit analysis of the impact of using bigger buses on SIEB routes.(12) The MTA currently favors a scenario where 103 operating vehicles would replace 121 operating vehicles, reducing the entire fleet from 142 to 120, which would allow for a modest increase in capacity to accommodate a projected 7% increase in annual demand. This scenario yields the following benefits.

First, by reducing the number of vehicles required to service the existing level of demand, 18 fewer buses would need to be in operation, reducing annual operating costs by \$1.63 million. Secondly, the increase in capacity, faster buses, and greater quality of service would generate a 7% increase of riders along some routes, yielding an estimated increase in revenues of \$420,760 at the new \$2.00 fare. Finally, the faster buses would increase travel speeds by perhaps 5%, saving SIEB riders roughly 1,200 hours a day, or 300,000 hours a year. This benefit in travel time saved is worth roughly \$2.625 million annually. Total benefits of the switch to large buses would therefore be \$4.6758 million annually. (12)

Finally, the introduction of the new buses would allow the use of television monitors. Programming could have both entertainment and informational value, while also including advertisements. While the aggregate social costs and benefits of such a plan are difficult to quantify, an

estimated \$90,000 a year in additional advertising revenues above the costs of installing the system is a reasonable estimate.

-----Costs

As the operating costs of the two types of buses are roughly equivalent, the primary cost of the switch-over to larger buses involves the increased capital expenditure. According to the MTA, the incremental capital cost of buying the additional buses, at \$400,000 each, after selling the old buses which are reasonably new for \$265,000 each, and considering that the buses retain \$40,000 of their value after 12 years of use, the MTA projects a total 12 year value of \$6.280 million for the retrofit of the fleet. This would require payments of only \$321,240 a year to make the shift. (12)

If the plan were implemented without the addition of exclusive bus lanes and the reduced fare, there would be a projected 2 minute increase in waiting time per trip due to cutback in the level of service, or a 4 minute per passenger increase in waiting time. This represents an estimated 133,333 hours of extra waiting a year, or about \$1.166 million in wasted time. If the plan were implemented with the addition of exclusive bus lanes and reduced fares, however, there would be no need to decrease service frequency, and it could in fact be increased in some areas.

The total benefits thus exceed the total costs by \$4.36 million a year. The financial impacts of the plan would be to increase the MTAs annual revenues by \$1.73 million. If the impacts of the three plans are combined, the plan shows a net benefit of \$28.47 million a year, which has a net present value of \$335 million.

Other Possible Cost Savings on SIEB

There are other possible sources of cost savings that could help to finance the loss of revenues resulting from the reduction in the SIEB fare. One possibility worth exploring would be to have SIEB drivers, many of whom are idled in Manhattan between rush hours, provide paratransit services in Manhattan during these times. In order to comply with the Americans With Disabilities Act (ADA), New York spends \$3,408,864 a year on paratransit services for the disabled just for services in Manhattan. This service is 100% subsidized. (13)

Unlike SIEB service, which has a high level of ridership during the rush hours, and low levels of ridership during the rest of the day, these services tend to be in greatest demand during the day, as many people able to avoid the rush hours choose to do so. While insufficient data was available to determine the level of cost savings the MTA could realize by using SIEB drivers to operate Manhattan paratransit services during the day, it is likely that complying with ADA in this way would be much cheaper than the current \$3.4 million a year subsidy.

Environmental and Safety Benefits of the Full Plan

Increasing traffic congestion on the Staten Island Expressway creates an environmental problem which has important economic and financial consequences. New York City is already in Severe Non-Attainment of the Clean Air Act Amendment (CAAA) of 1990's ozone limits. The growth in traffic in the Staten Island corridors is projected to increase by 24% between now and 2010. Auto ownership has grown by 96% in the last 25 years on Staten Island, while the population has only grown by 28.6%. Traffic on the VNB grows at an average of 1.6% a year, and congestion on the Staten Island Expressway is almost the worst in the country. (21) These factors will make it very difficult to meet EPA guidelines.

In order for New York City to be eligible for federal transportation funds, our transportation plans have to be shown to be in 'conformity' with EPA ozone and volatile organic compound (VOC) standards. Next year EPA is expected to greatly tighten their air standards, making it even more difficult for New York City to conform to national clean air standards. Under the current rules, New York City will be required to demonstrate how it plans to reduce ozone-precursor emissions (NO₂ and Hydrocarbons) by 15% from 1990 baselines and 3% thereafter. Auto exhaust are a primary source of both VOC and ozone-precursor emissions. Our state implementation plans (SIP) and transportation improvement programs (TIPs) must be found in conformity with these air quality targets or else our eligibility for federal transportation funds will be jeopardized. New York's inability to demonstrate conformity of their current SIP and TIP already threatens the region with potential loss of federal revenues and lawsuits.

The ATU plan will have positive, demonstrable environmental benefits which are both benefits in their own right, and will also facilitate the ability of the New York Metro Region to comply with CAAA and ensure continued federal support.

The ATU plan, by inducing an estimated 1 million new passenger trips of an average of 19 miles per trip to be made by taking express bus service rather than driving their cars, would reduce the total automobile vehicle miles traveled by an estimated 19 million vehicle miles traveled per year. According to OECD and U.S. averages (1, 5, 16) the average car with a catalytic converter generates 0.002kg of NO₂ per vehicle mile traveled and 0.0000833kg of HC per vehicle mile traveled, the two principal components of ground level ozone. Thus, the plan would reduce NO₂ emissions by 38,000 kilograms and HC by 1,583 kilograms the first year, and every year thereafter, helping the region to comply with CAAA.

The pollution also creates external costs which are paid in the form of lower real estate values and higher public health costs. People with houses near highways find their property values reduced because of poor air quality and noise. Ground level ozone is a major contributor to upper respiratory illnesses such as asthma, bronchitis, and pneumonia, and a contributor to heart disease. While the impacts of these externalities are quite place specific and estimates vary widely, using reasonable OECD averages, (1, 5, 16) which will if anything tend to underestimate external costs due to the high

population density in the New York Metro area, the average estimated environmental benefit resulting from the shift of a passenger from auto travel to bus travel is \$0.016 per passenger mile traveled. This would result in a \$280,000 savings per year into perpetuity in environmental costs, which has a present value of \$3.42 million.

Even more important in terms of value is the safety improvements resulting from the shift from private automobile to bus due to the enormous costs each year related to the 50,000 national highway deaths and millions of costly accidents. The Federal Highway Administration indicates a mean estimated benefit per passenger mile traveled of roughly \$0.04 in reduced accident costs. (4) The plan would result in a \$730,000 annual savings into perpetuity, with a present value of \$8.58 million. All together, the externality and safety benefits of the full plan have an annual value of \$1.01 million and a net present value worth roughly \$12 million.

The Impact on the MTA's Budget and the Level of Subsidies

The MTA claims that the plan is just too expensive to implement. It claims that at the current level of subsidy, at \$6.50 per ride, (13) is higher than the level of subsidy per passenger for most other transit services in the region. As a result, they argue, the MTA cannot afford to further subsidize Staten Island Express Bus Service.

If the entire ATU plan were implemented, however, it would have a neutral effect on the MTA's finances, as cost savings and additional revenues would roughly balance the loss of fare revenues. As the current ridership would rise from 4 million to 5 million as a result of the plan, however, the subsidy per passenger would fall from the current MTA estimated subsidy per passenger of \$6.50 per fare (13) to a \$5.20 subsidy per passenger. (See Table II)

Furthermore, using the level of subsidy on a per passenger basis is not a very good way to estimate the efficiency and level of cost recovery for SIEB service. Because express buses tend to service very long trips at a fixed price, with distances equivalent to what are three fare zones in other parts of the city, while Manhattan subway and bus services tend to service very short trips, it is not fair to compare subsidy levels on a per trip basis. Naturally the level of subsidy is going to be larger for SIEB service, as the average trip made by a SIEB passenger is around 19 miles, compared to the average MTA bus ride of only 2.4 miles, and the average subway ride of 6.6 miles. (8) Naturally, since SIEB is providing a different kind of service which caters to the long distance traveler, a more reasonable estimate of efficiency would be either the percentage of cost recovery for the system, or the level of subsidy per passenger mile traveled.

According to the NYCTA, Staten Island Express Bus services recovered 63.1% of their total costs from passenger fares, outperforming all other express and local bus services in New York City. New York City local bus service recovers only 55% of their total costs, Queens local bus service

Table II

PROJECTED IMPACT OF THE ATU PLAN ON SUBSIDY PER PASSENGER⁷

Current revenues: \$16 million (4 million times \$4.00)
Current Costs: \$42 million (\$24.6 million operating)
Current Subsidy: \$26 million
Current SIEB Ridership: 4 million
Subsidy Per Passenger: \$6.50 (13)

Estimated Impact of ATU Plan on Ridership:

**25% increase in ridership in first year,
7% annual increase thereafter**

- (4%) increase from fare reduction
(168,000 additional trips per year)
- (9%) increase from speed increase due to bus lanes
(364,000 additional trips per year)
- (5%) increase from speed increase due to switching from alternative services.
(195,000 additional trips per year)
- (7%) increase per year natural increase due to population increase in area served by SIEB (9, p.12)
(273,000 additional trips per year)

Total trips accommodated per bus (including spares): 24,000 (12)

New Ridership:

5 million after 1 year
9.64 million by 2010 at 7% annual growth, est. by MTA

Total Subsidy After ATU Plan Implemented: \$26 million

(ie. no change: See Table I)

New Subsidy Level Per Passenger (Year I):

\$5.20

⁷. While we have used figures provided by the Transit Authority to estimate the level of subsidy on Staten Island Express Bus services, we cannot attest to their validity, as the authors received insufficient information from the Transit Authority to corroborate or refute their estimates. The MTA uses an MTA-wide average to calculate overhead costs for SIEB service, which accounts for \$17.4 million out of \$42 million of SIEB costs. SIEB overhead costs may in fact be lower than MTA averages. Furthermore, MTA figures do not appear to include capital costs which are much higher for subway passengers than for bus passengers.

recovers only 35% of total costs, and Brooklyn Express Bus services, the best performing express bus service outside SIEB, recovered only 42% of their costs. (11) This service efficiency is often buried by the MTA by quoting SI-wide figures, which include SI local bus services which at 27% have the lowest cost recovery rates in the region due to low density population.

In terms of operating costs per passenger mile, SIEB passengers travel roughly 76 million miles a year, at an annual cost of \$24.6 million, or roughly \$0.32 per passenger mile. This compares favorably to the MTA's bus system-wide average of \$0.79 per passenger mile, and even better than the subway system average of \$0.38 per passenger mile.(22) These performance measures are even more surprising given the fact that capital-intensive systems like the subway tend to have lower operating costs per mile and higher capital costs than bus systems.

Scarcely considered in the debate about the appropriateness of SIEB fares is the fact that SI receives only between 0.9% - 2% of total MTA capital expenditures, while it has 5% of the total New York City population. Each Staten Islander receives only \$30 in MTA capital expenditures per year, while the rest of the City receives \$190.44 per capita. While MTA spokespersons argue that the level of investment per rider is a more appropriate estimate of the level of the MTA's commitment, and notes that SI commuters rely much more heavily on private automobiles than in other boroughs, nonetheless, SI public transit riders receive only \$0.39 per rider in annual capital investments, compared to a city-wide average of \$0.87.(13)

Conclusion

The ATU plan to improve Staten Island Express Bus service by reducing the fare from \$4.00 to \$2.00, by implementing a system of express bus lanes, and by replacing the current bus fleet with larger and faster buses, is fully justifiable in terms of both cost benefit analysis, equity considerations, and the liveability of the community. The net benefits of the entire plan would yield a net benefit of \$29.49 million in annual benefits to New Yorkers, or \$348.75 million in total benefits. The plan would be neutral from the point of view of the MTA's finances. Furthermore, two of the three components of the plan, the exclusive bus lanes and the switch to bigger buses, are justifiable in cost benefit terms in their own right. The reduction in the fare from \$4.00 to \$2.00 is justifiable given the current disproportionate level of capital spending on boroughs other than Staten Island, the level of congestion and environmental and safety externalities it would mitigate. Furthermore, the change would be consistent with the MTA's reduction of fares in two-fare zones to single-fare, which will not benefit many Staten Islanders who rely on express bus services which accommodates the equivalent level of travel of three fare zones in other parts of the city.

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